

Industrial Storm Water Best Management Practice (BMP) Plan Castle Mountain Mine

San Bernardino County, California

September 2022
(Updated November 2022)

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1.0 INDUSTRIAL STORM WATER BEST MANAGEMENT PRACTICE PLAN CERTIFICATION

Site Name: Castle Mountain Mine, San Bernardino County, California

This BMP Plan will be implemented in good faith with the intent of the Industrial General Permit¹. The plan was developed by a Qualified Industrial Storm Water Practitioner (QISP) as certified below.

"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 ensure 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, to the best of my knowledge and belief, the information submitted is 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."

Qualified Industrial Storm Water Practitioner (QISP): Anne Simpson, QISP # 00339, QSD # 517,

CPESC # 3615, CPSWQ #642

Phone:

6/26/2022

Signature

Date

Aren Hall
Environmental Manager
Castle Mountain Venture
Phone:

¹ The Industrial General Permit can be accessed online at:

https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/industrial/2014indgenpermit/order.pdf.

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2.0 INDUSTRIAL STORM WATER BMP PLAN

This BMP Plan has been developed for the Castle Mountain Mine (Site), located in eastern San Bernardino County, California, which is operated by Castle Mountain Venture. The open-pit heap leach gold mine comprises 2,609 acres of public lands (Bureau of Land Management) and 1,301 acres of private lands, totaling 3,910 acres.

Although facility operations have an applicable Standard Industrial Classification Code listed in California's *General Permit for Storm Water Discharges Associated with Industrial Activities (General Permit) Order No. 2014-0057-DWQ (NPDES No. CAS000001)*, the Site does not discharge to Waters of the U.S. and, thus, is not subject to the Industrial General Permit. **The facility has a Regional Water Board-approved Notice of Non-Applicability (NONA), number 7 36NNA000736** (Appendix A). Additionally, a portion of the Site was included in an Approved Jurisdictional Determination, number SPL-2019-00042-blr).

The objectives of this plan are to:

- Identify potential storm water and non-storm water pollutant sources associated with industrial activities;
- Eliminate illicit connections and illegal dumping;
- Establish, construct, implement, and maintain BMPs to reduce or eliminate pollutants in runoff;
- Develop a BMP maintenance schedule; and
- Support an Industrial Storm Water Training Program.

2.1 BMP PLAN AVAILABILITY

This plan will remain on-site at all times during working hours. The plan is intended to be an internal document to guide BMP implementation, as stated above, in good faith with the Industrial General Permit.

2.2 RESPONSIBILITY FOR PLAN IMPLEMENTATION

The primary project contact noted in Section 1.0 will be responsible for performing or delegating:

- Coordination with the appropriate representatives to ensure the project complies with this plan and other approved plans;
- Implementation of all elements of the plan, including prompt and effective erosion, sediment, tracking, and wind erosion control measures and management of non-storm water discharges, construction materials, and liquid, solid, and hazardous wastes;
- Mobilization of crews to conduct BMP repairs and providing storm water pollution prevention training;

- Communication with the proper authorities for non-compliance actions, such as spills, unauthorized discharges, illicit connections, or dumping; corrective actions; and reporting.

2.3 TRAINING PROGRAM

Training will be conducted by qualified Castle Mountain Venture personnel to pertinent staff regarding implementation of this plan, which may be recorded using the *Training Record* provided in Appendix B. Training topics may include, but are not limited to the following:

- Storm water overview
- Applicable regulations
- Best management practices to control industrial storm water pollutants
- Spill prevention, control, and reporting
- Non-compliance reporting and enforcement

2.4 REQUIRED NON-COMPLIANCE REPORTING

Authorized representatives from the U.S. EPA, SWRCB, or Colorado River Regional Water Board (Regional Board) will be permitted entry to the Site for reviewing applicable facility plans, inspecting the site, and/or collecting storm water samples. If a discharge violation occurs, the project contact will immediately notify the appropriate authorities (i.e., Regional Board, etc.). Corrective measures will be implemented immediately following identification of unauthorized activity or written notice of non-compliance from the Regional Board. Unauthorized activity and corrective actions should be documented including the following items:

- The date, time, location, nature of operation, and type of unauthorized activity;
- The cause or nature of the notice or order;
- The control measures deployed before the discharge event or prior to receiving notice or order; and
- The date of deployment and type of control measures deployed after the discharge event or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence.

3.0 SITE DESCRIPTION

Current industrial operations at the Site include:

- Transferring ore along haul roads from existing open pits to the heap leach pad and/or crushing pad in mine trucks;
- Applying lime to the ore while in transfer to the heap leach pad;
- Applying a leaching solution to the ore on the heap leach pad;
- Collecting the gold-impregnated leaching solution and transporting the leaching solution via the solution conveyance channel to the tank pond and other onsite processing facilities for recovery. The solution conveyance is composed of closed pipe situated in a double HDPE-lined earthen channel.
- Processing barren leaching solution for recirculation into the leach pad; and
- Depositing overburden rock in designated overburden piles or used as backfill within the open pits.

3.1 OPERATIONS SCHEDULE

The Site operates 24 hours a day, seven days a week, 365 days a year, placing a maximum of 17,000 tons per day. Based on the remaining capacity of the Heap Leach Pad, approximately 37 million tons of ore, the life expectancy for the Site is 8 years.

3.2 CLIMATE

The climate in the area has an average maximum temperature of 72.3 degrees Fahrenheit and an average minimum temperature of 53.2 degrees Fahrenheit (Western Regional Climate Center [WRCC] 2016). Precipitation can fall throughout the year. The month with the lowest average precipitation is June (0.09 inches) and highest is February (1.64 inches) which is followed closely by August (1.37 inches). The total annual average precipitation is 10.45 inches. Rainfall that occurs within summer months generally consists of spotty, intense showers with up to three inches of rain per hour. Occasional snowfall also occurs.

3.3 STORM WATER CONVEYANCE

The Site is located within the Piute Wash Hydrologic Unit (HUC 10). There are no water bodies in the immediate vicinity of the Site. The Site topography is such that it is highest in elevation in the north portion of the site, with a gradual slope to the southwest. Several ephemeral washes drain the Site, as shown in the (Appendix C), which also show locations in which storm water would leave the Site. The nearest water body is the Colorado River, which is approximately 25 miles east, but it does not appear from topographic and aerial maps that runoff from the Site could flow to the Colorado River; it dissipates into the Lanfair Valley south of the Site before reaching the river. As stated above, the Site does not discharge to Waters of the U.S.

Site storm water conveyance infrastructure includes the event pond and solution conveyance channel that also serves as a stormwater conveyance channel to capture any runoff from the heap leach pad. The heap leach pad is designed as a zero-discharge facility. Storm water collected from the heap leach is temporarily contained within the event pond before it is recirculated back on the heap leach. The event pond is constructed to contain the 100-year, 24-hour storm event, and no storm water runoff is

expected from the heap leach or event pond areas. The storm water conveyance channel west of the leach pad is constructed to divert and convey stormwater runoff from upland area away from the heap leach.

3.4 SOIL DESCRIPTION

The Site is located in a transitional area between the alluvial valley floor and surrounding mountains. The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Web does not yet contain electronic mapping data for the area, but the survey shows that the majority of the area consists of two soil types:

- *Hartpeak-Highland association, which are described as: 15 to 50 percent slopes – aridisols that are shallow gravelly loams with high to very high runoff rates, are well-drained, and categorized in Hydrologic Groups C and D; and*
- *Minehart, which are described as: 2 to 8 percent slopes - aridisols that are gravelly fine sandy loams with high runoff rates, are well-drained, and categorized in Hydrologic Group C.*

3.5 POTENTIAL STORM WATER POLLUTANTS AND THEIR SOURCES

Potential pollutant sources have been identified in order to develop BMPs for their control. Historical, current, and future pollution sources were reviewed and are discussed in the following subsections.

3.5.1 Potential Historical Pollutants

Historically, impact to surface water or groundwater involving cyanide have been very rare at Castle Mountain Mine, with the most relevant leak occurring during interim closure of the heap leach pad in 2005. During closure monitoring, low levels of cyanide were detected in a groundwater monitoring well. Cyanide levels were monitored over the course of a few years and attenuated back to below laboratory detectable concentration. Shortly thereafter, the operator received final Closure Water Board Order No. R7-2010-0047 in 2010, which confirmed the mine site was closed with no evidence of groundwater pollution resulting from the 1991-2004 operation of the Castle Mountain Mine. Storm water runoff from the Site will not come into contact with any known sources of historical pollutants.

3.5.2 Potential Pollutants from Industrial Activities

A summary of the potential pollution source areas and their associated pollutant(s) is provided in Table 1.

Table 1
Potential Pollution Source Areas and Associated Pollutants Summary

Source Area	Activity	Potential Pollutant
Open pit mines	Existing ore/protore is excavated from open pit mines.	Sediment, dust
Haul roads	Haul roads are used to transfer ore from open pit mines to either the crushing plant or directly to the heap leach pad.	Sediment, dust
Crushing and agglomeration plant	Ore is crushed at the crushing plant and then transported to the heap leach via a conveyor belt.	Sediment, dust, vehicle and equipment fluids
Lime silo	Lime is introduced at the crushing plant onto a ore conveyor, or alternatively it is placed into loaded mine trucks enroute to heap leach pad.	Lime (windblown)
Heap leach pad	Ore is stock piled on the heap leach pad that is underlined with a primary and secondary containment system. Leaching solution (sodium cyanide solution) or barren leach solution is applied to the heap leach pad. Heap leach pad is completely contained and no storm water or non-storm water discharges are expected. Storm water contained within the heap leach pad is directed to the event pond.	Sodium cyanide solution (contained)
Solution conveyance channel	Gold-impregnated leaching solution and transporting the leaching solution via the solution conveyance channel to the tank pond and other onsite processing facilities for recovery. The solution conveyance is composed of closed pipe situated in a double HDPE lined earthen channel and no storm water or non-storm water discharges are expected.	Sodium cyanide solution (contained)
Tank pond	The tank pond contains two steel tanks with pregnant leaching solution and barren solution. The latter is recirculated back onto the heap leach pad. Pregnant leaching solution is routed to the gold recovery plant. The tank pond includes a HDPE liner system as secondary containment and a vadose zone leak detection monitoring system; no storm water or non-storm water discharges are expected.	Sodium cyanide solution (contained)
Gold recovery plant	Pregnant solution is pumped to the carbon-in-column units (CICs) for recovery. Loaded activated carbon from the CICs are stripped of gold in a pressure strip circuit and electrowinning cells are used to recover gold from the strip solution. The recovered gold is then dried and placed into a furnace to produce pure gold.	Sodium cyanide solution, sodium hydroxide, anti-scillant, desorbed mercury (contained)
Event Pond	The event pond is designed to hold storm water that falls on any of the regulated lined facilities. It consists of both a primary and secondary HDPE liner system with both a leak collection and recovery system and a vadose zone monitoring system. Stormwater reporting to the Event Pond is recirculated back to the gold recovery plant and to the heap leach pad. No storm water or non-storm water discharges are expected.	Sodium cyanide solution (contained)

Table 1, Page 1 of 2

Table 1 (Continued)
Potential Pollution Source Areas and Associated Pollutants Summary

Source Area	Activity	Potential Pollutant
Overburden stockpiles	Overburden rock from the open pit mines is stored within the North or South overburden stockpiles.	Sediment, dust
Topsoil stockpiles	Topsoil from mining operations is stored within the North or South topsoil stockpiles and will be used for revegetation during reclamation activities.	Sediment, dust
Hazardous materials storage area	The hazardous waste storage area contains fleet vehicle engine oil, used oil, used oil filters, hydraulic fluid, grease, and transmission fluid.	Vehicle and equipment fluids
Contractor maintenance/refueling area	The lube and fuel station contains fleet vehicle engine oil, used oil, gasoline/diesel tanks, and transmission oil.	Vehicle and equipment fluids
On-site power generators	On-site power generators (varying quantities of diesel) are placed throughout the Site. All generator fuel tanks are equipped with secondary containment and/or situated in a HDPE-lined earthen berm.	Diesel
Solid waste (Non-hazardous) loading, unloading, handling, and storage areas	Solid waste receptacles and/or bins with closed lids are placed throughout the Site.	General litter and scrap
Stormwater conveyance channel	The storm water conveyance channel is constructed to divert and convey stormwater runoff from upland areas away from the heap leach.	Sediment
Portable restroom	Portable restrooms placed throughout the Site.	Septic waste

Table 1, Page 2 of 2

Note: * May contain non-visible pollutants.

A complete list of potential pollutants to be used on-site, their physical properties; storage, handling, and disposal locations; and potential storm water exposure rating is included in Table 2. Materials will be added to the list if necessary as construction progresses.

Table 2
Potential Pollutant Properties, Handling, Storage, Disposal Locations, and Exposure Rating

Material	Liquid (L), Powder (P), or Solid (S)?	Hazardous? (Yes/No)	Storage Location	Area to be Handled	Disposal Location	Potential Storm Water Exposure (Rate 1-5)*
Sediment, dust	S, P	N	Not applicable	Entire Site	Not applicable	4
Lime	P	N	Lime silos	Near lime silo	Not applicable	3

Table 2, Page 1 of 2

Table 2 (Continued)
Potential Pollutant Properties, Handling, Storage, Disposal Locations, and Exposure Rating

Material	Liquid (L), Powder (P), or Solid (S)?	Hazardous? (Yes/No)	Storage Location	Area to be Handled	Disposal Location	Potential Storm Water Exposure (Rate 1-5)*
Sodium cyanide solution	L	Y	Heap leach pad, solution conveyance channel, tank pond, gold recovery plant	Heap leach pad, solution conveyance channel, tank pond, gold recovery plant	Not applicable	1
Sodium hydroxide, desorbed mercury	L	Y	Gold recovery plant	Gold recovery plant	Not applicable	2
Stockpiled materials	S	N	Overburden and topsoil stockpiles	Overburden and topsoil stockpiles; mining areas	Authorized overburden and growth media storage sites at Site	4
General litter	S	N	Throughout Site	Throughout Site	Dumpster and off-site	3
Septic waste	L	Y	Sanitary/septic waste management area	Sanitary/septic waste management area	Off-site	2
Vehicle and equipment fluids	L	Y	Hazardous materials storage area and contractor maintenance/ refueling area	Hazardous materials storage area and contractor maintenance / refueling area	Off-site	2

Table 2, Page 2 of 2

Note: * A rating of 1 indicates a low potential for the material to contact storm water or authorized non-storm water discharges; 5 indicates a high potential.

3.1 NON-STORM WATER DISCHARGES

Authorized non-storm water discharges include de-chlorinated potable water sources, such as fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water used for dust control, uncontaminated groundwater dewatering, and other discharges not subject to a separate NPDES permit, provided that the discharges cannot be eliminated, comply with BMPs described herein, and do not contain pollutants that would cause an exceedance of water quality standards in receiving waters. In the event discharges of authorized non-storm water occur, they will be monitored to verify they do not cause erosion or discharge sediment or other pollutants from the site.

4.0 STORM WATER BEST MANAGEMENT PRACTICES

The goal of this BMP Plan is to reduce or eliminate pollutant discharges by identifying pollutant-generating sources and activities and implementing appropriate Minimum and Advanced BMPs. The

BMPs listed within this section are practices to be used to prevent or mitigate pollution of storm water during activities at the Site. Applicable BMPs include source and treatment controls, operating procedures, and management practices to control site runoff, spills and leaks, waste disposal, and discharges from material storage. The BMPs will be updated as appropriate to address any changes to pollutants sources or significant materials handled and stored on-site.

4.1 BMPS SELECTED FOR IMPLEMENTATION

BMPs were selected from the *Stormwater Best Management Practice Manual Portal: Industrial/Commercial Activity* (California Stormwater Quality Association [CASQA] 2014) to address the specific pollutant sources and activities previously described in Table 1 that have a reasonable chance of discharging offsite, which are provided in Appendix D. As such, potential pollutant sources associated with the heap leach pad, solution conveyance channel, and tank pond are not included in this BMP Plan. In addition to the selected CASQA BMPs, additional Minimum and Advanced BMPs will be implemented throughout the site, as described in the following sections. The BMPs will be implemented by Castle Mountain Mine staff and its contractors.

Table 3 (next page) summarizes potential pollutant sources and associated BMPs that must be implemented to minimize the pollutant contact with storm water runoff. Many Minimum and Advanced BMPs are already in place and maintained throughout the Site. Additional BMPs will be implemented as required when the industrial processes of the Site change, or deficiencies are identified.

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Table 3
Description and Assessment of Potential Pollutant Sources and Associated BMPs

Location	Potential Pollutant Source	Potential Pollutant(s)	Best Management Practices/Control Practices	Required Equipment/Tools
Open pit mines and haul roads	Dust generation, disturbed soils, leaks from haul trucks.	Sediment, dust, diesel, diesel exhaust fluid, hydraulic fluid, lubricating oil, antifreeze/coolant.	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Outdoor Loading/Unloading, SC-30; Outdoor Equipment Operations; SC-32; Contaminated or Erodible Areas, SC-40; Dust suppressant on haul roads (water and magnesium chloride).	Dust control (water truck, application of dust suppressant). Spill containment and clean up kits.
Limo silo	Lime dust generation	Lime	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Outdoor Loading/Unloading, SC-30; Outdoor Storage of Raw Materials, SC-33; Employee training; Ensuring rubber sock from silo is in proper working order.	None
Overburden stockpiles	Dust generation, disturbed soils, leaks from haul trucks.	Sediment, dust	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Outdoor Loading/Unloading, SC-30; Outdoor Storage of Raw Materials, SC-33; Contaminated or Erodible Areas, SC-40; track walking; vegetation cover.	Dust control (water truck, application of dust suppressant).
Topsoil stockpiles	Dust generation, disturbed soils, leaks from haul trucks.	Sediment, dust	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Outdoor Loading/Unloading, SC-30; Outdoor Storage of Raw Materials, SC-33; Contaminated or Erodible Areas, SC-40; Track walking; Vegetation cover; Earthen berm perimeter control.	Dust control (water truck, application of dust suppressant).

Table 3, Page 1 of 4

Table 3 (Continued)
Description and Assessment of Potential Pollutant Sources and Associated BMPs

Location	Potential Pollutant Source	Potential Pollutant(s)	Best Management Practices/Control Practices	Required Equipment/Tools
Hazardous materials storage area	Hazardous waste	Diesel, diesel exhaust fluid, hydraulic fluid, lubricating oil, grease, antifreeze/coolant, universal wastes and other misc. wastes (e.g., lab wastes).	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Outdoor Loading/Unloading, SC-30; Outdoor Liquid Container Storage, SC-31; Outdoor Storage of Raw Materials, SC-33; Waste Handling and Disposal, SC-34; Parking/Storage Area Maintenance, SC-43; Regular inspection of material storage areas; Employee training; Preventive maintenance; Secondary containment throughout area (HDPE liner); See <i>SPCC Plan</i> for additional BMPs.	Spill containment and clean up kits. Segregated, covered, waste storage containers. Secondary containment pallets, containers, and dikes.
Contractor maintenance/refueling area	Solid and liquid hazardous materials	Diesel, diesel exhaust fluid, hydraulic fluid, lubricating oil, grease, antifreeze/coolant.	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Vehicle and Equipment Fueling; SC-20 Vehicle and Equipment Cleaning; SC-21 Vehicle and Equipment Repair; SC-22; Outdoor Loading/Unloading, SC-30; Outdoor Liquid Container Storage, SC-31; Outdoor Equipment Operations; SC-32; Outdoor Storage of Raw Materials, SC-33; Waste Handling and Disposal, SC-34; Parking/Storage Area Maintenance, SC-43; Regular inspection of material storage areas; Employee training; Preventive maintenance; See <i>SPCC Plan</i> for additional BMPs.	Spill containment and clean up kits. Segregated, covered, waste storage containers. Secondary containment pallets, containers, and dikes.

Table 3, Page 2 of 4

Table 3 (Continued)
Description and Assessment of Potential Pollutant Sources and Associated BMPs

Location	Potential Pollutant Source	Potential Pollutant(s)	Best Management Practices/Control Practices	Required Equipment/Tools
Gold recovery plant	Leaks from gold recovery process	Sodium cyanide solution, sodium hydroxide, anti-scalant, desorbed mercury (contained)	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Outdoor Loading/Unloading, SC-30; Outdoor Equipment Operations; SC-32; Waste Handling and Disposal, SC-34.	Spill containment and clean up kits. Secondary containment pallets, containers, and dikes.
Crush and agglomeration plant	Dust generation, solid and liquid hazardous materials, leaks from equipment	Sediment, lime, diesel exhaust fluid, hydraulic fluid, lubricating oil, grease, antifreeze/coolant (contained)	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Vehicle and Equipment Fueling; SC-20 Vehicle and Equipment Cleaning; SC-21 Vehicle and Equipment Repair; SC-22; Outdoor Loading/Unloading, SC-30; Outdoor Liquid Container Storage, SC-31; Outdoor Equipment Operations; SC-32; Outdoor Storage of Raw Materials, SC-33; Waste Handling and Disposal, SC-34; Parking/Storage Area Maintenance, SC-43; Regular inspection of material storage areas; Employee training; Preventive maintenance; See SPCC Plan for additional BMPs.	Spill containment and clean up kits. Segregated, covered, waste storage containers. Secondary containment pallets, containers, and dikes. Dust control (polymer dust suppressant).

Table 3, Page 3 of 4

Table 3 (Continued)
Description and Assessment of Potential Pollutant Sources and Associated BMPs

Location	Potential Pollutant Source	Potential Pollutant(s)	Best Management Practices/Control Practices	Required Equipment/Tools
On-site power generators	Diesel tanks	Diesel	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Vehicle and Equipment Fueling; SC-20 Outdoor Loading/Unloading, SC-30; Outdoor Liquid Container Storage, SC-31; Waste Handling and Disposal, SC-34; Parking/Storage Area Maintenance, SC-43; Regular inspection of material storage areas; Employee training; Preventive maintenance; See SPCC Plan for additional BMPs.	Spill containment and clean up kits. Segregated, covered, waste storage containers. Secondary containment liner with earthen berm.
Solid waste (Non-hazardous) loading, unloading, handling, and storage areas	General litter and scrap	General litter and scrap	Non-Storm water Discharges, SC-10; Spill Prevention, Control and Cleanup, SC-11; Outdoor Loading/Unloading, SC-30; Waste Handling and Disposal, SC-34.	Lidded waste receptacles.
Natural ephemeral drainages	Concentrated stormwater flows from or to disturbed areas	Sediment	Velocity dissipation device (rock) installed in areas with concentrated flow susceptible to erosion; Check dams (rock or fiber roll) installed downstream of disturbed areas susceptible erosion. Check dams to be periodically inspected for repair and maintained.	6-8" rock, fiber roll
Stormwater conveyance channel	Concentrated stormwater flows to disturbed areas	Sediment	Repair and armor with riprap areas showing erosion. Existing rock check dams to be periodically inspected for repair and maintained.	Riprap

Table 3, Page 4 of 4

Notes: SC source control
SPCC Spill Prevention, Countermeasure, and Control
TC treatment control

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5.0 REFERENCES

California Stormwater Quality Association

2014 *Stormwater Best Management Practice Handbook Portal: Industrial/Commercial*.
September.

State Water Resources Control Board

2015 *General Permit for Storm Water Discharges Associated with Industrial Activities*
(General Permit) Order No. 2014-0057-DWQ (NPDES No. CAS000001) *Waste Discharge*
Requirements for Discharges of Storm Water Associated with Industrial Activities.

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APPENDIX A - NOTICE OF NON-APPLICABILITY

APPENDIX B – TRAINING RECORD

Appendix B
Trained Contractor Personnel Log

Storm Water Management Topic

(Check as appropriate and use additional copies as necessary)

- | | |
|--|--|
| ☒ Temporary Soil Stabilization | ☒ Temporary Sediment Control |
| ☒ Wind Erosion Control | ☒ Tracking Control |
| ☒ Non-storm water management | ☒ Waste and Materials Management |
| ☐ Other: _____ | |

Specific Training Objective: _____ Industrial Stormwater BMPs**Location:** _____ **Date:** 8/2/2022**Instructor:** _____ **Telephone:** _____**Course Length (hours):** 0.75

Attendee Roster

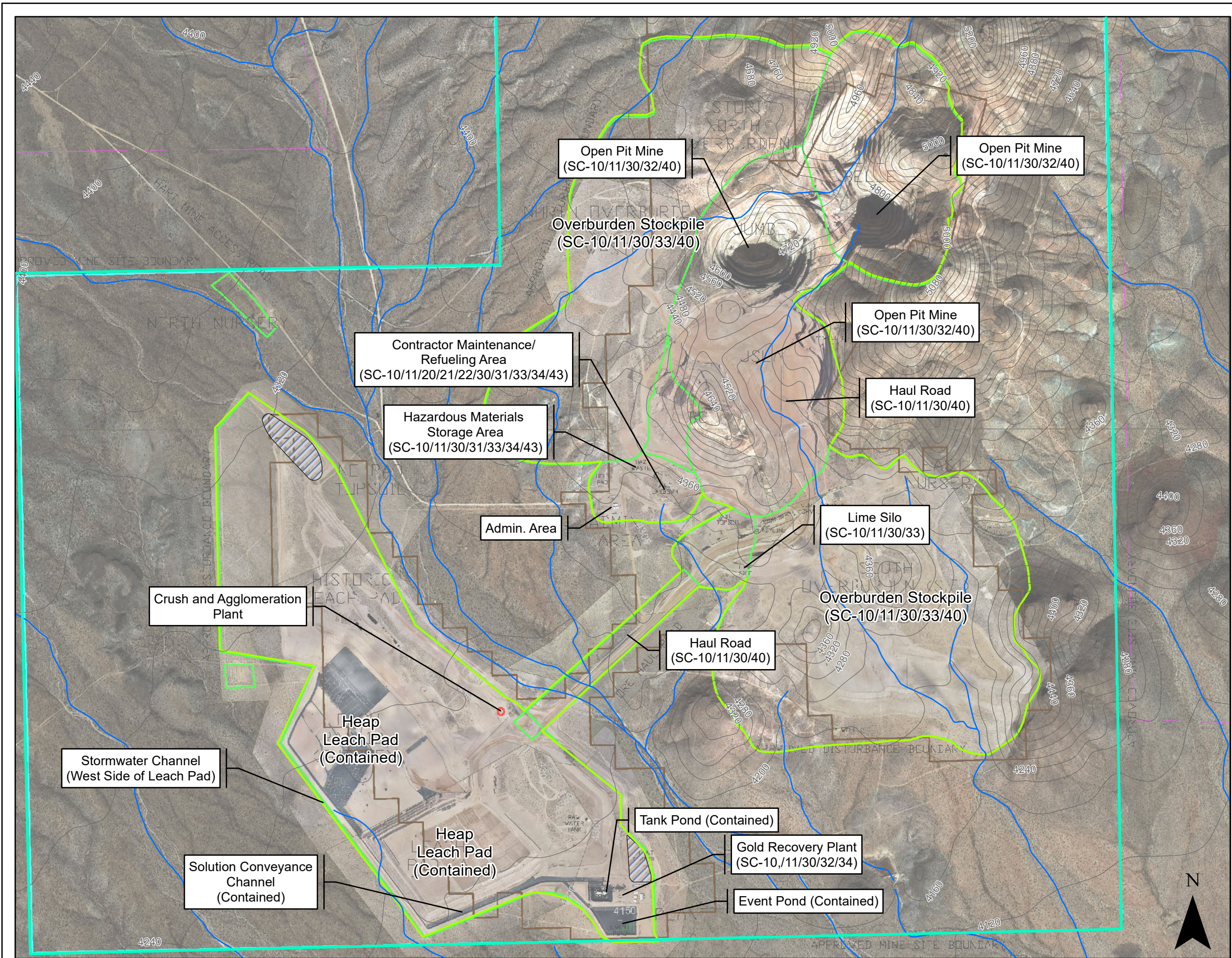
(Attach additional forms if necessary)

Name	_____ Aren Hall	Name	_____ Ralph McCullers
Company	_____ Castle Mountain Mine	Company	_____ Castle Mountain Mine
Phone	_____	Phone	_____
Email	_____	Email	_____

Comments:

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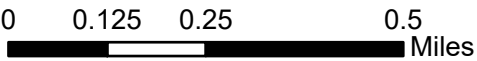
APPENDIX C – SITE MAP



Legend

- Mine Boundary
- Permitted Activity
- Elevation Contour (40ft)
- Ephemeral Watercourse
- Topsoil Stockpile (SC-10/11/30/33/40)

- Notes:
- No offsite discharges of stormwater are anticipated from the heap leach pads, solution conveyance change, and tank pond.
 - Monitor the site for dust generation and apply water and/or dust suppressant when needed.
 - Ensure spill containment and clean up equipment are readily available near hazardous materials storage area, gold recovery plant, contractor maintenance/refueling area, and power generators.
 - Ensure all solid waste receptacles are closed when not in use.
 - Install velocity dissipation device (rock) in areas with concentrated flow that are susceptible to erosion.
 - Install check dams (rock or fiber roll) downstream of disturbed areas susceptible erosion. Check dams should be periodically inspected for repair and maintained.
 - Repair and armor with riprap areas showing erosion within the stormwater conveyance channel. Existing rock check dams to be periodically inspected for repair and maintained.
 - Track walk and establish vegetation cover on topsoil stockpiles and other disturbed areas where feasible.



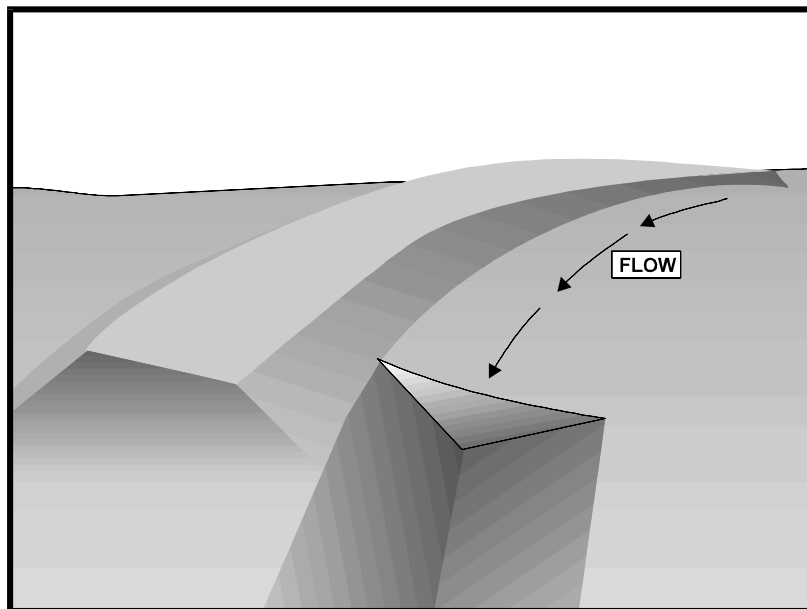
Castle Mountain Venture
Industrial Best Management
Practice Plan

**Appendix A
Site Map**



3201 Airpark Drive, Suite 108
Santa Maria, CA 93455

APPENDIX D - CASQA BMP FACTSHEETS



Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

- Earth dikes and drainage swales may be used:
 - To convey surface runoff down sloping land
 - To intercept and divert runoff to avoid sheet flow over sloped surfaces
 - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
 - To intercept runoff from paved surfaces
 - To intercept and divert run-on
 - Below steep grades where runoff begins to concentrate

Categories

EC	Erosion Control	☒
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ **Primary Objective**
- ☒ **Secondary Objective**

Targeted Constituents

Sediment	☒
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Along roadways and facility improvements subject to flood drainage
- At the top of slopes to divert runoff from adjacent or undisturbed slopes
- At bottom and mid slope locations to intercept sheet flow and convey concentrated flows
- Divert sediment laden runoff into sediment basins or traps

Limitations

Dikes should not be used for drainage areas greater than 10 acres or along slopes greater than 10 percent. For larger areas more permanent drainage structures should be built. All drainage structures should be built in compliance with local municipal requirements.

- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately, which adds cost and maintenance concerns.
- Diverted stormwater may cause downstream flood damage.
- Dikes should not be constructed of soils that may be easily eroded.
- Regrading the site to remove the dike may add additional cost.
- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.
- Earth dikes/drainage swales are not suitable as sediment trapping devices.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales, and ditches.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in drainage swales.

Implementation

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

An earth dike does not itself control erosion or remove sediment from runoff. A dike prevents erosion by directing runoff to an erosion control device such as a sediment trap or directing runoff away from an erodible area. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations, and should not be used in areas with slopes steeper than 10%.

Slopes that are formed during cut and fill operations should be protected from erosion by runoff. A combination of a temporary drainage swale and an earth dike at the top of a slope can divert runoff to a location where it can be brought to the bottom of the slope (see EC-11, Slope Drains). A combination dike and swale is easily constructed by a single pass of a bulldozer or grader and compacted by a second pass of the tracks or wheels over the ridge. Diversion structures should be installed when the site is initially graded and remain in place until post construction BMPs are installed and the slopes are stabilized.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur, a swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

General

- Care must be applied to correctly size and locate earth dikes, drainage swales. Excessively steep, unlined dikes, and swales are subject to erosion and gully formation.
- Conveyances should be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earth Dikes

Temporary earth dikes are a practical, inexpensive BMP used to divert stormwater runoff. Temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.

- May be covered with hydromulch, hydroseed, wood mulch, compost blanket, or RECP for stabilization.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin (SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.
- Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain.
- If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	Riprap Stabilization
0.5-1.0%	4 in. Rock
1.1-2.0%	6 in. Rock
2.1-4.0%	8 in. Rock
4.1-5.0%	8 in. -12 in. Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual). Unless local drainage design criteria state otherwise, drainage swales should be designed as follows:

- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft.
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.
- Drainage or swales should be laid at a grade of at least 1 %, but not more than 15 %.

- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.
- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 %, and use rip-rap or sod for swales with a slope between 5 and 15 %. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

Costs

- Cost ranges from \$19 to \$70 per ft. for both earthwork and stabilization and depends on availability of material, site location, and access (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.).
- Small dikes: \$3 - \$8/linear ft.; Large dikes: \$3/yd³ (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.).
- The cost of a drainage swale increases with drainage area and slope. Typical swales for controlling internal erosion are inexpensive, as they are quickly formed during routine earthwork.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.

- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction

References

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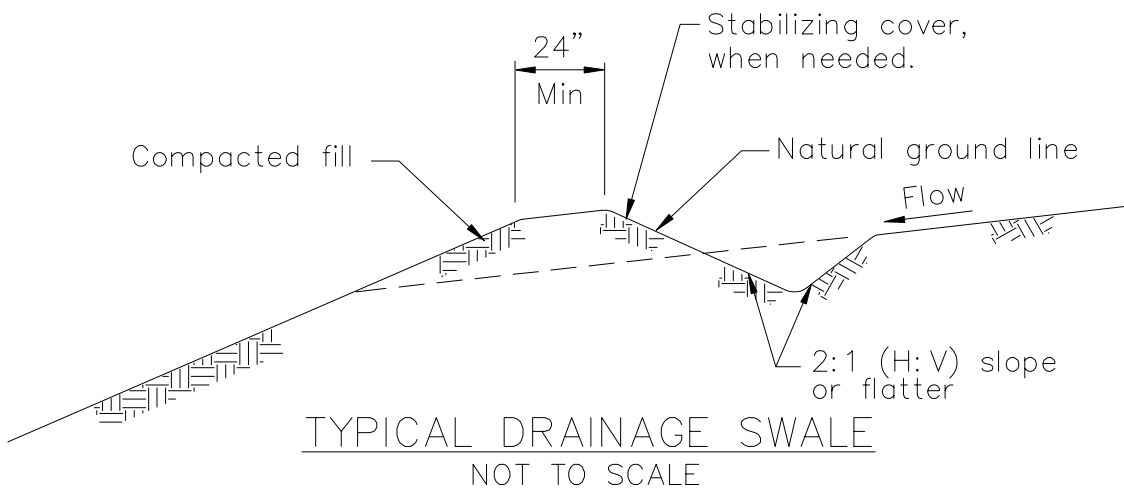
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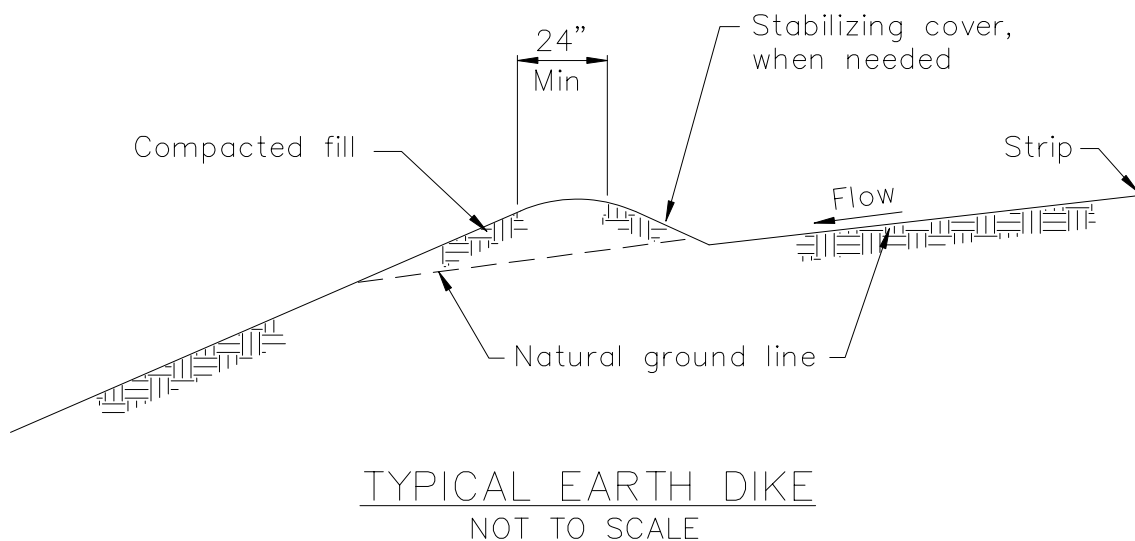
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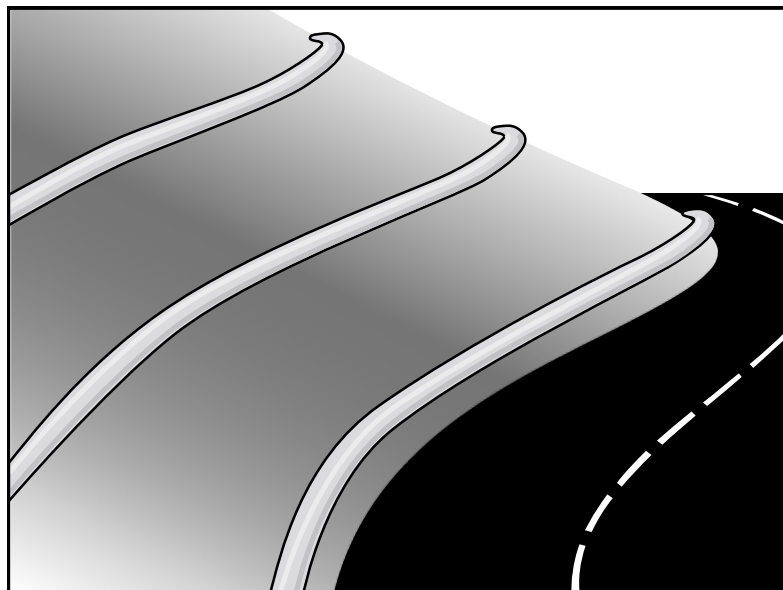
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NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.





Description and Purpose

A fiber roll (also known as wattles or logs) consists of straw, coir, curled wood fiber, or other biodegradable materials bound into a tight tubular roll wrapped by plastic netting, which can be photodegradable, or natural fiber, such as jute, cotton, or sisal. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.

Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ **Primary Category**
- ☒ **Secondary Category**

Targeted Constituents

Sediment	☒
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles.

Limitations

- Fiber rolls should be used in conjunction with erosion control, such as hydroseed, RECPs, etc.
- Only biodegradable fiber rolls containing no plastic can remain on a site applying for a Notice of Termination due to plastic pollution and wildlife concerns (State Water Board, 2016). Fiber rolls containing plastic that are used on a site must be disposed of for final stabilization.
- Fiber rolls are not effective unless trenched in and staked. If not properly staked and trenched in, fiber rolls will not work as intended and could be transported by high flows.
- Not intended for use in high flow situations (i.e., for concentrated flows).
- Difficult to move once saturated.
- Fiber rolls have a limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months, depending upon local conditions and roll material.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed-free rice straw, flax, curled wood fiber, or coir bound into a tight tubular roll by netting or natural fiber (see *Limitations* above regarding plastic netting).
- Typical fiber rolls vary in diameter from 6 in. to 20 in. Larger diameter rolls are available as well. The larger the roll, the higher the sediment retention capacity.
- Typical fiber rolls lengths are 4, 10, 20 and 25 ft., although other lengths are likely available.

Installation

- Locate fiber rolls on level contours spaced as follows:
 - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

- Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
- Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be $\frac{1}{4}$ to $\frac{1}{3}$ of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.
- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.
 - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
 - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Fiber rolls encased with plastic netting or containing any plastic material will need to be removed from the site for final stabilization. Fiber rolls used in a permanent application are to be encased with a non-plastic material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance; therefore, during the BMP planning phase, the areas where fiber rolls will be used on final slopes, only fiber rolls wrapped in non-plastic material should be selected.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But, they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

Costs

Material costs for straw fiber rolls range from \$26 - \$38 per 25-ft. roll¹ and curled wood fiber rolls range from \$30 - \$40 per roll².

Material costs for PAM impregnated fiber rolls range between \$9.00-\$12.00 per linear foot, based upon vendor research¹.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.
- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

References

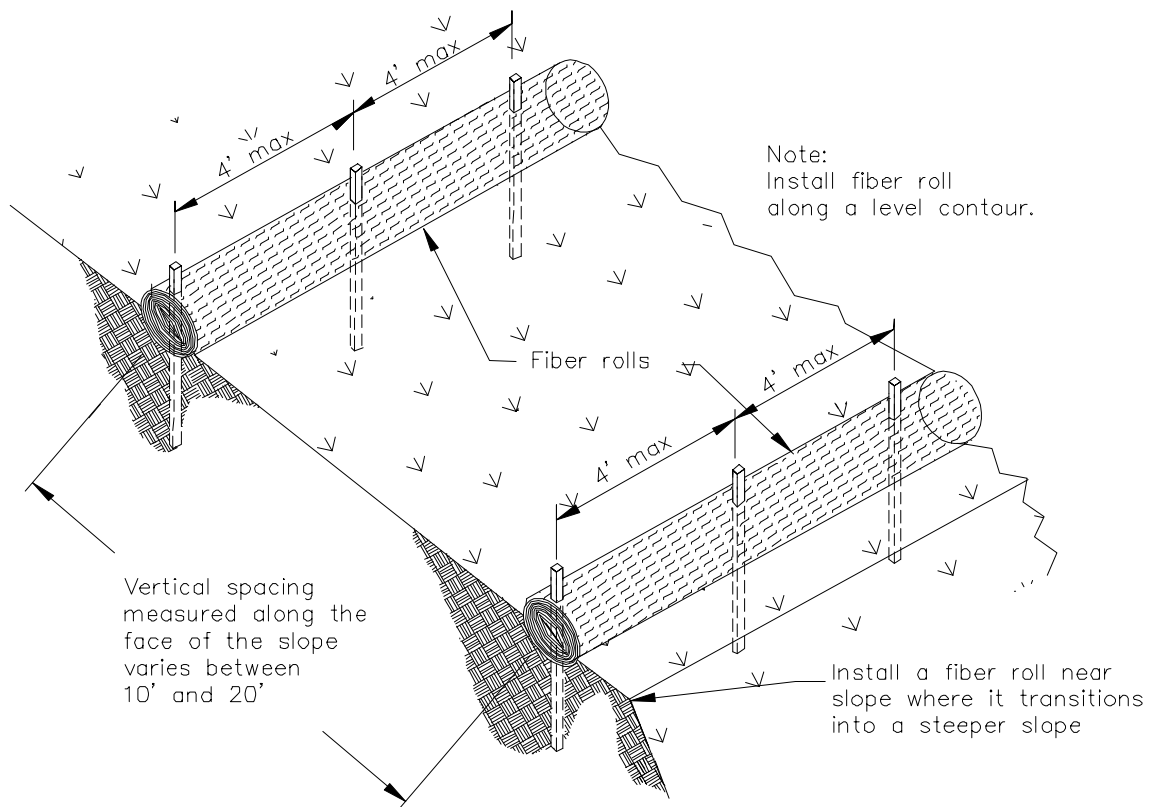
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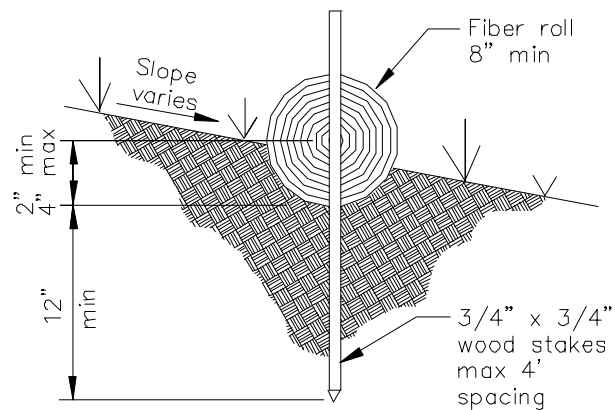
¹ Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

² Costs estimated based on vendor query by Tetra Tech, Inc. 2016.



TYPICAL FIBER ROLL INSTALLATION

N.T.S.



ENTRENCHMENT DETAIL

N.T.S.



Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

- Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).
- Sweeping may be less effective for fine particle soils (i.e., clay).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused and perhaps save money.
- Inspect potential sediment tracking locations daily.

Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☒
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ **Primary Objective**
- ☒ **Secondary Objective**

Targeted Constituents

Sediment	☒
Nutrients	
Trash	☒
Metals	
Bacteria	
Oil and Grease	☒
Organics	

Potential Alternatives

None

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- Visible sediment tracking should be swept or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from \$ 650/day to \$2,500/day¹, plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

¹ Based on contractor query conducted by Tetra Tech, Inc. November 2016.

SC-10 Non-Stormwater Discharges

Description

Non-Stormwater discharges (NSWDs) are flows that do not consist entirely of stormwater. Some NSWDs do not include pollutants and may be discharged to the storm drain if local regulations allow. These include uncontaminated groundwater and natural springs. There are also some NSWDs that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include potable water sources, fire hydrant flushing, air conditioner condensate, landscape irrigation drainage and landscape watering, and emergency firefighting, as discussed in section 2 of the Handbook.

However, there are certain NSWDs that pose environmental concerns. These discharges may originate from illegal dumping of industrial material or wastes or from internal floor drains, appliances, industrial processes, sinks, and toilets that are illegally connected to the nearby storm drainage system through on-site drainage and piping. These unauthorized discharges (e.g., process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances such as paint, oil, fuel and other automotive fluids, chemicals, and other pollutants into storm drains.

NSWDs must be addressed through a combination of detection and elimination. The ultimate goal is to effectively eliminate unauthorized NSWDs to the stormwater drainage system by implementing measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants onto streets and into the storm drain system and downstream water bodies.

Approach

Initially a discharger must make an assessment of NSWDs to determine which types must be eliminated or addressed through best management practices (BMPs). The focus of the following approach is eliminating unauthorized NSWDs. See

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Substitute Products*

Targeted Constituents

<i>Sediment</i>	
<i>Nutrients</i>	✓
<i>Trash</i>	
<i>Metals</i>	✓
<i>Bacteria</i>	✓
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

Minimum BMPs Covered

 <i>Good Housekeeping</i>	✓
 <i>Preventative Maintenance</i>	
 <i>Spill and Leak Prevention and Response</i>	✓
 <i>Material Handling & Waste Management</i>	
 <i>Erosion and Sediment Controls</i>	
 <i>Employee Training Program</i>	✓
 <i>Quality Assurance and Record Keeping</i>	✓



SC-10 Non-Stormwater Discharges

other BMP fact sheets in this series for activity-specific pollution prevention procedures.

General Pollution Prevention Protocols

- ❑ Implement waste management controls described in SC-34 Waste Handling and Disposal.
- ❑ Develop clear protocols and lines of communication for effectively prohibiting NSWDs, especially those that are not classified as hazardous. These are often not responded to as effectively as they should be.
- ❑ Clearly identify storm drains by stenciling or otherwise demarcating them, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste - Drains to Stream” or similar wording on or next to them to warn against ignorant or unintentional dumping of pollutants into the storm drainage system.
- ❑ Manage and control sources of water such as hose bibs, faucets, wash racks, and irrigation heads. Identify hoses and faucets in the stormwater pollution prevention plan (SWPPP), and post signage for appropriate use.

NSWD Investigation Protocols

Identifying the sources of NSWDs requires the discharger to conduct an investigation of the facility at regular intervals. There are several categories of NSWDs, including the following:

- ❑ Visible, easily identifiable discharges typically generated as surface runoff such as uncontained surface runoff from vehicle or equipment washing.
- ❑ Nonvisible (e.g., subsurface) discharges into the site drainage system through a variety of pathways that are not obvious.

The approach to detecting and eliminating NSWDs will vary considerably, as discussed below:

Visible and Identifiable Discharges

- ❑ Conduct routine inspections of the facilities and of each major activity area, and identify visible evidence of unauthorized NSWDs. This may include the following:
 - ✓ Visual observations of actual discharges occurring
 - ✓ Evidence of surface staining or discoloring, which indicates that discharges have occurred
 - ✓ Pools of water in low-lying areas when a rain event has not occurred
 - ✓ Discussions with operations personnel to understand practices that might lead to unauthorized discharges
- ❑ If evidence of NSWDs is discovered:

SC-10 Non-Stormwater Discharges

- ✓ Document the location and circumstances using worksheets 5 and 6 (in section 2 of the Handbook), including digital photos.
 - ✓ Identify and implement any quick remedy or corrective action (e.g., moving uncovered containers inside or to a proper location).
 - ✓ Develop a plan to eliminate the discharge. Consult the appropriate activity-specific BMP fact sheet for alternative approaches to manage and eliminate the discharge.
- Make sure the facility SWPPP is up-to-date and includes applicable BMPs to address the NSW.

Other Illegal Discharges (Nonvisible)

Illicit Connections

- Locate discharges from the industrial storm drainage system to the municipal storm drain system through review of as-built piping schematics.
- Isolate problem areas and plug illicit discharge points.
- Locate and evaluate discharges to the storm drain system.
- Perform a visual inspection and inventory:
 - ✓ Inventory and inspect each discharge point during dry weather.
 - ✓ Keep in mind that drainage from a storm event can continue for 1 or 2 days following the end of a storm and groundwater might infiltrate the underground stormwater collection system.
 - ✓ NSWs are often intermittent and might require periodic inspections.

Infield Piping

- A review of the as-built piping schematics is a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of loading/unloading area drain inlets and floor drains in older buildings.
- Never assume that storm drains are connected to the sanitary sewer system.

Monitor Investigation/Detection of Illegal Discharges

- If a suspected illegal or unknown discharge is detected, monitoring the discharge might help identify the content and/or the source. This may be done with a field screening analysis or flow meter measurements, or by collecting a sample for laboratory analysis. Section 5 and appendix D in the Handbook describe the necessary field equipment and procedures for field investigations.

SC-10 Non-Stormwater Discharges

- ❑ Investigative monitoring can be conducted over time. For example, if a discharge is intermittent, monitoring might be conducted to determine the timing of the discharge to determine the source.
- ❑ Investigative monitoring may be conducted over a spatial area. For example, if a discharge is observed in a pipe, monitoring might be conducted at accessible upstream locations to pinpoint the source of the discharge.
- ❑ Generally, investigative monitoring requiring collection of samples and submittal for laboratory analysis requires proper planning and specially trained staff.

Smoke Testing

Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two piping systems. Smoke testing is generally performed at a downstream location, and the smoke is forced upstream using blowers to create positive pressure. The advantage to smoke testing is that it can potentially identify multiple potential discharge sources at once.

- ❑ Smoke testing uses a harmless, nontoxic smoke cartridges developed specifically for this purpose.
- ❑ Smoke testing requires specialized equipment (e.g., cartridges, blowers) and generally should be conducted only by specially trained staff.
- ❑ A standard operating procedure (SOP) for smoke testing is highly desirable. The SOP should address the following elements:
 - ✓ Proper planning and notification of nearby residents and emergency services since introducing smoke into the system could result in false alarms.
 - ✓ During dry weather, filling the stormwater collection system with smoke and then tracing the smoke back to sources.
 - ✓ Temporary isolation of segments of pipe using sand bags to force the smoke into leaking pipes.
 - ✓ The appearance of smoke in a waste vent pipe, at a sewer manhole, or even the base of a toilet, indicating that there might be a connection between the sanitary and storm water systems.
- ❑ Most municipal wastewater agencies having necessary staff and equipment to conduct smoke testing that should be contacted if cross-connections with the sanitary sewer are suspected. See SC-44 Drainage System Maintenance for more information.

SC-10 Non-Stormwater Discharges

Dye Testing

- ❑ Dye testing is typically performed when there is a suspected specific pollutant source and location (i.e., leaking sanitary sewer) and evidence of dry weather flows in the stormwater collection system.
- ❑ Dye is released at a probable upstream source location, either the facility's sanitary or process wastewater system. The dye must be released with a sufficient volume of water to flush the system.
- ❑ Operators then visually examine the downstream discharge points from the stormwater collection system for the presence of the dye.
- ❑ Dye testing can be performed informally using commercially available products to conduct an initial investigation for fairly obvious cross-connections.
- ❑ More detailed dye testing should be performed by properly trained staff following SOPs. Specialized equipment such as fluorometers might be necessary to detect low concentrations of dye.
- ❑ Most municipal wastewater agencies will have necessary staff and equipment to conduct dye testing, and they should be contacted if cross-connections with the sanitary sewer are suspected.

TV Inspection of Drainage System

- ❑ Closed circuit television (CCTV) can be employed to visually identify illicit connections to the industrial storm drainage system. Two types of CCTV systems are available: (1) a small specially designed camera that can be manually pushed on a stiff cable through storm drains to observe the interior of the piping, and (2) a larger remotely operated video camera on treads or wheels that can be guided through storm drains to view the interior of the pipe.
- ❑ CCTV systems often include a high-pressure water jet and camera on a flexible cable. The water jet cleans debris and biofilm off the inside of the pipes so the camera can take video images of the pipes' condition.
- ❑ CCTV units can detect large cracks and other defects such as offsets in pipe ends caused by root intrusions or shifting substrate.
- ❑ CCTV can also be used to detect dye introduced into the sanitary sewer.
- ❑ CCTV inspections require specialized equipment and properly trained staff and are generally best left to specialized contractors or municipal public works staff.

Illegal Dumping

- ❑ Substances illegally dumped on streets and into the storm drain systems and creeks may include paints, used oil and other automotive fluids, construction debris, chemicals, fresh

SC-10 Non-Stormwater Discharges

concrete, leaves, grass clippings, and pet wastes. These substances can cause quality problems in stormwater and receiving waters as well as clog the storm drain system itself.

- ❑ Establish a system for tracking incidents. The system should be designed to identify the following:
 - ✓ 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 (e.g., abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, and accidents/spills)
 - ✓ An anonymous tip/reporting mechanism
 - ✓ Evidence of responsible parties (e.g., tagging or encampments)
- ❑ One of the keys to successful reduction or elimination of illegal dumping is increasing the number of people at the facility who are aware of the problem and who have the tools to at least identify the incident, if not correct it. Therefore, train field staff to recognize and report the incidents.

Once a site has been cleaned:

- ❑ Post “No Dumping” signs with a phone number for reporting dumping and disposal.
- ❑ Add some landscaping and beautification to hot spots to discourage future dumping as well as to provide open space and increase property values.
- ❑ Lighting or barriers might also be needed to discourage future dumping.
- ❑ See fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Inspection

- ❑ Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- ❑ Conduct field investigations of the industrial storm drain system for potential sources of NSWDS.
- ❑ Proactively conduct investigations of high-priority areas. Based on historical data, prioritize specific geographic areas and/or incident type for proactive investigations.



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Spill and Leak Prevention and Response

- ❑ 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 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.
- ❑ Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- ❑ For larger spills, a private spill cleanup company or hazmat team may be necessary.
- ❑ See SC-11 Spill Prevention, Control, and Cleanup.



Employee Training Program

- ❑ Training of technical staff in identifying and documenting illegal dumping incidents is required. The frequency of training must be specified in the SWPPP and depends on site-specific industrial materials and activities.
- ❑ Consider posting a quick reference table near storm drains to reinforce training.
- ❑ Train employees to identify NSWDS and report discharges to the appropriate department.
- ❑ Educate employees about spill prevention and cleanup.
- ❑ 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 should one occur. Employees should be familiar with the spill prevention control and countermeasure plan. Employees should be able to identify work/jobs with high potential for spills and suggest methods to reduce the potential.
- ❑ Determine and implement appropriate outreach efforts to reduce non-permissible NSWDS.
- ❑ Conduct spill response drills annually (if no events occurred) to evaluate the effectiveness of the plan.
- ❑ When a responsible party is identified, educate the party on the impacts of his or her actions.
- ❑ Document training activities.



Quality Assurance and Record Keeping

Performance Evaluation

- ❑ Annually review internal investigation results; assess whether goals were met and what changes or improvements are necessary.

SC-10 Non-Stormwater Discharges

- ❑ Obtain feedback from personnel assigned to respond to, or inspect for, illicit connections and illegal dumping incidents.
- ❑ Develop document and data management procedures.
- ❑ A database is useful for defining and tracking the magnitude and location of the problem.
- ❑ Report prohibited NSWDS observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
- ❑ Document that NSWDS have been eliminated by recording tests performed, methods used, dates of testing, and any on-site drainage points observed.
- ❑ Annually document and report the results of the program.
- ❑ Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.
- ❑ Document training activities.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing, and time limitations that can preclude implementation of BMPs. Following are some typical limitations and recommended “work-arounds:”

- ❑ Many facilities do not have accurate, up-to-date as-built plans or drawings that might be necessary to conduct NSWDS assessments.
 - ✓ Online tools such as Google Earth can provide an aerial view of the facility and may be useful in understanding drainage patterns and potential sources of NSWDS.
 - ✓ Local municipal jurisdictions may have useful drainage systems maps.
- ❑ Video surveillance cameras are commonly used to secure the perimeter of industrial facilities against break-ins and theft. These surveillance systems may also be useful for capturing illegal dumping activities. Minor, temporary adjustments to the field of view of existing surveillance camera systems to target known or suspected problem areas may be a cost-effective way of capturing illegal dumping activities and identifying the perpetrators.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- ❑ Capital facility cost requirements may be minimal unless cross-connections to storm drains are detected.

SC-10 Non-Stormwater Discharges

- Indoor floor drains may require replumbing if cross-connections are detected.
- Leaky sanitary sewers will require repair or replacement, which can have significant costs depending on the size and industrial activity at the facility.

Maintenance (including administrative and staffing)

- The primary effort is for staff time and depends on how aggressively a program is implemented.
- Costs for containment and disposal of any leak or discharge is borne by the discharger.
- Illicit connections can be difficult to locate, especially if there is groundwater infiltration.
- Illegal dumping and illicit connection violations require technical staff to detect and investigate them.

Supplemental Information Permit Requirements

The IGP authorizes certain NSWs, provided BMPs are included in the SWPPP and implemented to:

- Reduce or prevent the contact of authorized NSWs with materials or equipment that are potential sources of pollutants;
- Reduce, to the extent practicable, the flow or volume of authorized NSWs;
- Ensure that authorized NSWs do not contain quantities of pollutants that cause or contribute to an exceedance of a water quality standards; and
- Reduce or prevent discharges of pollutants in authorized NSWs in a manner that reflects best industry practice considering technological availability and economic practicability and achievability.

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SC-11 Spill Prevention, Control, and Cleanup

Description

Many activities that occur at an industrial or commercial site have the potential to cause accidental spills. Preparation for these spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of stormwater pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify hazardous material storage areas, specify material handling procedures, describe spill response procedures, and provide locations of spill cleanup equipment and materials. The plan should include steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the stormwater drainage system, and train personnel to prevent and control future spills. An adequate supply of spill cleanup materials must be maintained on-site.

Approach

General Pollution Prevention Protocols

- ☐ Develop procedures to prevent/mitigate spills to storm drain systems.
- ☐ Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- ☐ Establish procedures and/or controls to minimize spills and leaks. The procedures should provide the following:
 - ✓ A description of the facility, owner and address, activities, chemicals, and quantities present

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

Sediment

Nutrients

Trash

Metals ✓

Bacteria

Oil and Grease ✓

Organics ✓

Minimum BMPs Covered



Good Housekeeping



Preventative Maintenance ✓



Spill and Leak Prevention and Response ✓



Material Handling & Waste Management



Erosion and Sediment Controls



Employee Training Program ✓



Quality Assurance and Record Keeping ✓



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SC-11 Spill Prevention, Control, and Cleanup

- ✓ A facility map of the location(s) of industrial materials
- ✓ Notification and evacuation procedures
- ✓ Cleanup instructions
- ✓ Identification of responsible departments
- ✓ Identification of key spill response personnel
- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of process materials brought into the facility.



Spill and Leak Prevention and Response

Spill Prevention

- Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.
- If illegal dumping is observed at the facility:
 - ✓ Post “No Dumping” signs with a phone number for reporting illegal dumping and disposal. Signs should also indicate fines and penalties applicable for illegal dumping.
 - ✓ Add some landscaping and beautification to hot spots to discourage illegal dumping.
 - ✓ Bright lighting and/or entrance barriers might also be needed to discourage illegal dumping.
- Store and contain liquid materials so if the container ruptures, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.
- If the liquid is oil, gas, or other material that separates from and floats on water, install a spill control device (such as a tee section) in the catch basins that collect runoff from the storage tank area.



Preventative Maintenance

- Place drip pans or absorbent materials beneath all mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.

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- ❑ Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
- ❑ Sweep and clean the storage area monthly if it is paved, *do not hose down the area to a storm drain*.
- ❑ Check tanks (and any containment sumps) daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.
- ❑ Label all containers according to their contents (e.g., solvent, gasoline).
- ❑ Label hazardous substances regarding the potential hazard (corrosive, radioactive, flammable, explosive, poisonous).
- ❑ Prominently display required labels on transported hazardous and toxic materials (per US DOT regulations).
- ❑ Identify key spill response personnel.

Spill Response

- ❑ Clean up leaks and spills immediately.
- ❑ Place a stockpile of spill cleanup materials where it will be readily accessible (e.g., near storage and maintenance areas).
- ❑ 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 a certified laundry (rags) or disposed of as hazardous waste.
 - ✓ If possible use physical methods for the cleanup of dry chemicals (e.g., brooms, shovels, sweepers, or vacuums).
- ❑ Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- ❑ Chemical cleanups of material can be achieved with the use of adsorbents, gels, and foams. Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.

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

Reporting

- Report spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board or local authority as location regulations dictate.
- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center at 800-424-8802 (24 hours).
- Report spills to 911 for dispatch and cleanup assistance when needed. Do not contact fire agencies directly.
- Establish a system for tracking incidents. The system should be designed to identify the following incident-related information:
 - ✓ Types and quantities (in some cases) of wastes
 - ✓ Patterns in time of occurrence (time of day/night, month, or year)
 - ✓ Mode of dumping (e.g., abandoned containers, “midnight dumping” from moving vehicles, direct dumping of materials, and accidents/spills)
 - ✓ Cleanup procedures
 - ✓ Responsible parties



Employee Training Program

- Educate employees about spill prevention and cleanup.
- Well-trained employees can reduce human errors that lead to accidental releases or spills:
 - ✓ Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
 - ✓ Employees should be familiar with the spill prevention, control, and countermeasure (SPCC) plan.
- Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the SPCC plan, and the plan should be readily available.
- Train employees to recognize and report illegal dumping incidents.

SC-11 Spill Prevention, Control, and Cleanup

Other Considerations (Limitations and Regulations)

- ❑ State regulations require that facilities with a storage capacity of 10,000 gallons or more of petroleum prepare a SPCC plan (California Health & Safety Code Chapter 6.67).
- ❑ State regulations also exist for storage of hazardous materials, including the preparation of area and business plans for emergency response to releases or threatened releases (California Health & Safety Code Chapter 6.95).
- ❑ Consider requiring smaller secondary containment areas (less than 200 square feet) to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.

Requirements

Costs (including Capital and Operation & Maintenance)

- ❑ Costs will vary depending on the size of the facility and the necessary controls.
- ❑ Prevention of leaks and spills is inexpensive. Treatment and/or disposal of contaminated soil or water can be quite expensive.

Maintenance (including Administrative and Staffing)

- ❑ Develop an SPCC plan, provide and document training, conduct inspections of material storage areas, and supply spill kits.
- ❑ Extra time is needed to properly handle and dispose of spills, which results in increased labor costs.



Quality Assurance and Record Keeping

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the facility and the effectiveness of best management practices (BMPs). A good record keeping system helps the facility minimize incident recurrence, correctly respond with appropriate cleanup activities, and comply with legal requirements. Set up a record keeping and reporting system for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm sewer. These records should contain the following information:

- ❑ Date and time of the incident
- ❑ Weather conditions
- ❑ Duration of the spill/leak/discharge
- ❑ Cause of the spill/leak/discharge

SC-11 Spill Prevention, Control, and Cleanup

- ☐ Response procedures implemented
- ☐ Persons notified
- ☐ Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- ☐ Date and time the inspection was performed
- ☐ Name of the inspector
- ☐ Items inspected
- ☐ Problems noted
- ☐ Corrective action required
- ☐ Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Supplemental Information

Aboveground Tank Leak and Spill Control

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

The most common causes of unintentional releases are the following:

- ☐ 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
- ☐ Leaks during pumping of liquids or gases from a truck or rail car to a storage tank or from a storage tank to a truck or rail car

SC-11 Spill Prevention, Control, and Cleanup

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Employ the following practices to enhance the code requirements:

- ❑ Place tanks in a designated area.
- ❑ Encapsulate tanks located in areas where firearms are discharged in concrete or the equivalent.
- ❑ Ensure that designated areas are impervious, paved with Portland cement concrete, and free of cracks and gaps to contain leaks and spills.
- ❑ Store liquid materials in double walled tanks approved by Underwriters Laboratories 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, install a dead-end sump in the drain.
- ❑ Drain all other liquids 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.
- ❑ Pass accumulated stormwater in petroleum storage areas through an oil/water separator.

Maintenance is critical to preventing leaks and spills. Conduct routine 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, flanges, coupling, hoses, and valves).
- ❑ Check for leaks or spills during pumping of liquids or gases from a truck or rail car to a storage facility or from a storage facility to a truck or rail car.
- ❑ Visually inspect a new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- ❑ Inspect tank foundations, connections, coatings, tank walls, and the piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that might weaken the tank or container system.
- ❑ Frequently relocate accumulated stormwater during the wet season.

SC-11 Spill Prevention, Control, and Cleanup

- Have a qualified professional periodically conduct integrity testing.

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. In addition to implementing the spill prevention, control, and clean up practices above, use the following measures related to specific activities and pertaining to leaks and smaller spills at vehicle maintenance shops.

Vehicle and Equipment Maintenance

- Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of stormwater and the runoff of spills.
- Regularly inspect vehicles and equipment for leaks, and repair any identified leaks 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 drip 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 absorbent 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. Do not leave full drip pans or other open containers lying around.
- Oil filters disposed of in trash cans or dumpsters can leak oil and contaminate stormwater. 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 nonleaking 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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Vehicle and Equipment Fueling

- ❑ Design the fueling area to prevent the run-on of stormwater 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 a 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 a tank truck to a fuel tank.
- ❑ Use absorbent materials on small spills and general cleaning rather than hosing down the area. Remove the absorbent materials promptly.
- ❑ Carry out all federal and state requirements regarding underground storage tanks, or install aboveground tanks.
- ❑ Do not use mobile fueling of mobile industrial equipment around the facility; instead, transport the equipment to designated fueling areas.
- ❑ Keep your SPCC plan up to date.
- ❑ Train employees in proper fueling and cleanup procedures.

Industrial Spill Prevention Response

In developing a spill prevention and response program to meet stormwater regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheets in this handbook for specific activities.

The program should:

- ❑ Integrate with existing emergency response/hazardous materials programs (e.g., the fire department);
- ❑ Contain procedures to prevent/mitigate spills to storm drain systems;
- ❑ Identify responsible departments;
- ❑ Contain standardized reporting procedures; containment, storage, and disposal activities; documentation; and follow-up procedures;

SC-11 Spill Prevention, Control, and Cleanup

- Address spills at municipal facilities, as well as public areas; and
- Provide training concerning spill prevention, response, and cleanup for all appropriate personnel.

SC-11 Spill Prevention, Control, and Cleanup

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SC-20 Vehicle and Equipment Fueling

Description

Spills and leaks that occur during vehicle and equipment fueling can contribute hydrocarbons, oil and grease, and heavy metals to stormwater runoff. Implementing the following best management practices (BMPs) can help prevent fuel spills and leaks.

Approach

Reduce the potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Use properly maintained off-site fueling stations whenever possible. These businesses are better equipped to handle fuel and spills properly.
- ☐ Focus pollution prevention activities on containment of spills and leaks, most of which may occur during liquid transfers.



Good Housekeeping

- ☐ “Spot clean” leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.
- ☐ Manage materials and waste properly to reduce adverse impacts on stormwater quality (see the section on material handling and waste management).
- ☐ Paint signs on storm drain inlets to indicate the drains are not to receive liquid or solid wastes.
- ☐ Post signs at sinks to remind employees not to pour wastes down the drains.
- ☐ Clean yard storm drain inlet(s) regularly and especially after large storms.
- ☐ Do not pour materials down storm drains.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

Sediment	
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

 Good Housekeeping	✓
 Preventative Maintenance	✓
 Spill and Leak Prevention and Response	✓
 Material Handling & Waste Management	✓
 Erosion and Sediment Controls	
 Employee Training Program	✓
 Quality Assurance and Record Keeping	✓



SC-20 Vehicle and Equipment Fueling

- ❑ Build a shed or temporary roof over fueling area to limit exposure to rain.
- ❑ Post signs that remind employees and customers not to “top off” when filling fuel tanks and that ban customers and employees from changing engine oil or other fluids at the fueling location.
- ❑ Report leaking vehicles to fleet maintenance.
- ❑ Ensure the following safeguards are in place:
 - ✓ Overflow protection devices on tank systems to warn the operator or automatically shut down transfer pumps when the tank reaches full capacity.
 - ✓ Protective guards around tanks and piping to prevent vehicle or forklift damage.
 - ✓ Clear tagging or labeling of all valves to reduce human error.
 - ✓ Emergency shut-off devices and posting of emergency phone numbers.



Preventative Maintenance

Fuel Dispensing Areas

- ❑ Inspect vehicles and equipment for leaks regularly, and repair any identified leaks immediately.
- ❑ If the fueling area is paved, sweep it weekly to collect loose particles, and wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.
- ❑ Fit underground storage tanks with spill containment and overfill prevention systems meeting the requirements of section 2635(b) of Title 23 of the California Code of Regulations.
- ❑ Fit fuel dispensing nozzles with “hold-open latches” (automatic shutoffs) except where prohibited by local fire departments.
- ❑ Post signs at the fuel dispenser or fuel island warning vehicle owners/operators against “topping off” vehicle fuel tanks.
- ❑ Design fueling area to prevent stormwater runoff and spills. Use a perimeter drain or slope pavement inward with drainage to a sump; regularly remove materials accumulated in the sump.
- ❑ Pave the area with concrete rather than asphalt.
- ❑ Cover the fueling area with an overhanging roof structure or canopy so that precipitation cannot come in contact with the fueling area. Where covering is not

SC-20 Vehicle and Equipment Fueling

feasible and the fuel island is surrounded by pavement, apply a suitable sealant that protects the asphalt from spilled fuels.

- ❑ Install vapor recovery nozzles to help control drips as well as air pollution.
- ❑ Use secondary containment when transferring fuel from the tank truck to the fuel tank. Cover storm drains in the vicinity during transfer.

Air/Water Supply Area

- ❑ Minimize the possibility of stormwater pollution from air/water supply areas by doing at least one of the following:
 - ✓ “Spot clean” leaks and drips routinely to prevent runoff of spillage.
 - ✓ Grade and pave the air/water supply area to prevent run-on of stormwater.
 - ✓ Install a roof over the air/water supply area.
 - ✓ Install a low containment berm around the air/water supply area.

Inspection

- ❑ For aboveground tank leak and spill control:
 - ✓ Check for external corrosion and structural failure.
 - ✓ Check for spills and overfills caused by operator error.
 - ✓ Check for failure of the piping system.
 - ✓ Check for leaks or spills during pumping of liquids or gases from a truck or rail car to a storage facility or from a storage facility to a truck or rail car.
 - ✓ Visually inspect a new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
 - ✓ Inspect tank foundations, connections, coatings, tank walls, and the piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that might weaken the tank or container system.
 - ✓ Have a qualified professional conduct integrity testing periodically.
- ❑ Inspect and clean, if necessary, storm drain inlets and catch basins within the facility boundary before October 1 each year.



Spill and Leak Prevention and Response

- ❑ Keep your spill prevention, control, and countermeasure (SPCC) plan up to date.

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- ❑ Maintain an adequate stockpile of spill cleanup materials at locations where they are readily accessible.
- ❑ Clean leaks, drips, and other spills with as little water as possible.
 - ✓ Use rags for small spills.
 - ✓ Use a damp mop for general cleanup.
 - ✓ Use 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 the floor using dry absorbent material.
 3. Mop the floor. Mop water may be discharged to the sanitary sewer via a toilet or sink.
- ❑ When using absorbent materials on small spills, remove the materials promptly and dispose of them properly.
- ❑ Store portable absorbent booms (long flexible shafts or barriers made of absorbent material) in unbermed fueling areas.
- ❑ Report spills promptly.
- ❑ If a dead-end sump is not used to collect spills, install an oil/water separator.



Material Handling and Waste Management

- ❑ Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- ❑ Do not put used or leftover cleaning solutions, solvents, and automotive fluids in the sanitary sewer.
- ❑ Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- ❑ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- ❑ Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
 - ✓ Use only watertight waste receptacles and keep the lids closed.

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- ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
- ✓ Install a roof over the waste receptacle area.
- ✓ Install a low containment berm around the waste receptacle area.
- ✓ Use and maintain drip pans under waste receptacles.
- Post “No littering” signs.



Employee Training Program

- Educate employees about facility-wide pollution prevention measures and goals.
- Train designated employees (e.g., those involved with handling or managing fuels) on proper fueling and cleanup procedures.
- Train designated employees upon hiring and annually thereafter on proper methods for handling and disposing of waste. Make sure that all employees understand stormwater discharge prohibitions, wastewater discharge requirements, and these BMPs.
- Ensure that employees are familiar with the site’s SPCC plan and/or proper spill cleanup procedures.
- Use a training log or similar method to document training. The training log should include entries for:
 - ✓ Training topic
 - ✓ Trainer
 - ✓ Attendees
 - ✓ Frequency
 - ✓ Comments
 - ✓ Target date for completion of training
 - ✓ Date completed



Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for vehicle and equipment fueling, quantities of materials removed, and improvement actions.

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- ❑ Keep accurate logs of spill response actions that document the types of liquids spilled, how they were cleaned up, and the method of disposal.
- ❑ Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation and Maintenance Requirements Facilities

- ❑ The retrofitting of existing fueling areas to minimize stormwater 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 stormwater runoff is of modest cost.
- ❑ Capital investments will likely be required at some sites if adequate cover and containment facilities do not exist and can vary significantly depending upon site conditions.

Maintenance

- ❑ Most of the operations and maintenance (O&M) activities associated with implementing these BMPs are integrally linked to routine operations as previously described. Therefore, additional O&M is not required.
- ❑ For facilities responsible for pretreating their wastewater prior to discharging, the proper functioning of the structural treatment system is an important maintenance consideration.
- ❑ Routine cleanout of sumps and oil/water separators is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the system. Sediment removal is also required on a regular basis to keep the device working efficiently.

Supplemental Information Designing New Installations

The elements listed below should be included in the design and construction of new or substantially remodeled facilities.

Fuel Dispensing Areas

- ❑ Fuel dispensing areas must be paved with Portland cement concrete (or equivalent smooth impervious surface) with a 2- to 4-percent slope to prevent ponding, and they must be separated from the rest of the site by a grade break that prevents runoff of stormwater to the maximum extent practicable. The fuel dispensing area is defined as extending 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus 1 foot, whichever is less.

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The paving around the fuel dispensing area may exceed the minimum dimensions of the fuel dispensing area.

- ❑ The fuel dispensing area must be covered, and the cover's minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area, as defined above. The cover must not drain onto the fuel dispensing area.
- ❑ If necessary, install and maintain an oil control device in the appropriate catch basin(s) to treat runoff from the fueling area.

Outdoor Waste Receptacle Area

- ❑ Grade and pave the outdoor waste receptacle area to prevent run-on of stormwater to the maximum extent practicable.

Air/Water Supply Area

- ❑ Grade and pave the air/water supply area to prevent run-on of stormwater to the maximum extent practicable.

Designated Fueling Area

- ❑ If your facility has a large amount of mobile equipment working throughout the site and you currently fuel it with a mobile fuel truck, consider establishing a designated fueling area. 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 and manhole covers so that if a spill occurs it is prevented from entering the storm drain.

Examples

The SPCC plan, which is required by law for some facilities, is an effective program to reduce the number of accidental spills and minimize contamination of stormwater runoff.

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 and Resources

City of Palo Alto. 2012. *Vehicle Pollution Prevention*. Available online at <http://www.cityofpaloalto.org/news/displaynews.asp?NewsID=335&TargetID=147>.

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SC-20 Vehicle and Equipment Fueling

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SC-21 Vehicle and Equipment Cleaning

Description

Wash water from vehicle and equipment cleaning activities performed outdoors or in areas where wash water flows onto the ground can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, phosphates, heavy metals, and suspended solids to stormwater runoff. Use of the procedures outlined in this fact sheet can prevent or reduce the discharge of pollutants to stormwater during vehicle and equipment cleaning.

Approach

Reduce the potential for pollutant discharge through source control pollution prevention and best management practice (BMP) implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ❑ Use properly maintained off-site commercial washing and steam cleaning businesses whenever possible. These businesses are better equipped to handle and properly dispose of the wash waters.
- ❑ Use dry cleaning methods to remove debris and sweep the area; avoid washing with water when possible.
- ❑ Good housekeeping practices can minimize the risk of contamination from wash water discharges.
- ❑ Use biodegradable, phosphate-free detergents for washing vehicles as appropriate.
- ❑ Emphasize the connection between the storm drain system and runoff, and help reinforce that vehicle and equipment washing activities affect local water quality through storm drain stenciling programs.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Addressed

	Good Housekeeping	✓
	Preventative Maintenance	✓
	Spill and Leak Prevention and Response	✓
	Material Handling & Waste Management	✓
	Erosion and Sediment Controls	
	Employee Training Program	✓
	Quality Assurance and Record Keeping	✓



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SC-21 Vehicle and Equipment Cleaning

- ❑ Map on-site storm drain locations to avoid discharges to the storm drain system.
- ❑ Designate specific wash areas with clarifier or place wash areas away from storm drain connections.



Good Housekeeping

- ❑ Mark the area clearly as a wash area by:
 - ✓ Posting signs stating that only washing is allowed in that area; and
 - ✓ Providing information on how washing is to be done.
- ❑ Provide trash containers in wash area.
- ❑ Have all vehicle and equipment washing done in areas designed to collect and hold the wash and rinse water or effluent generated from the process. Recycle, collect, or treat wash water effluent prior to discharge to the sanitary sewer system.
- ❑ If washing/cleaning must occur on-site, consider washing vehicles and equipment inside a building or on an impervious surface to control the targeted constituents by directing them to the sanitary sewer.
- ❑ If washing must occur on-site and outdoors:
 - ✓ Use designated paved wash areas. This area must be covered or bermed to collect the wash water and graded to direct the wash water to a treatment or disposal facility.
 - ✓ Do not perform oil changes and other engine maintenance in the designated washing area. Perform those activities in a place designated for them.
 - ✓ Cover the wash area when not in use to prevent contact with rainwater.
- ❑ Do not permit steam cleaning wash water to enter the storm drain system.
- ❑ If possible, conduct pressure and steam cleaning at appropriate off-site areas to avoid generating runoff with high pollutant concentrations.



Preventative Maintenance

- ❑ Install sumps or drain lines to collect wash water for treatment.
- ❑ Use hoses with nozzles that automatically turn off when left unattended.
- ❑ Conduct routine inspections of drain lines, holding tanks, and hoses, and repair leaks immediately.

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- ❑ Conduct routine inspection and maintenance of wash water recycling and treatment systems.



Spill and Leak Prevention and Response

- ❑ Keep the spill prevention, control, and countermeasure (SPCC) plan up to date.
- ❑ Have an emergency plan, equipment, and trained personnel ready at all times to deal immediately with major spills.
- ❑ Collect all spilled liquids, and properly dispose of them.
- ❑ Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.



Material Handling and Waste Management

- ❑ Collect all wash water from vehicle and equipment cleaning operations. Consider either treating and reusing or discharging wash waters to a sanitary sewer system.
- ❑ Large quantities of wash waters might require treatment at the facility. Treatment using a process treatment system (e.g., holding tank, filtration system, and related appurtenances) will require engineering and capital expenditures.
- ❑ Collect and treat small amounts of wash water at the facility and either recycle or discharge to the sanitary sewer system or collect and dispose of as an industrial waste.
- ❑ Discharge wash waters into a sanitary sewer only after contacting the local sewer authority to find out if pretreatment is required.



Employee Training Program

- ❑ Train employees on proper cleaning and wash water disposal procedures and conduct refresher courses on a regular basis.
- ❑ Train staff on proper maintenance measures for the wash area.
- ❑ Train employees and contractors on proper spill containment and cleanup. Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- ❑ Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- ❑ Keep accurate maintenance/inspection logs that document the minimum BMP activities performed for vehicle and equipment cleaning activities and improvement actions.

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- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and what method was used to dispose of the waste.
- ❑ Establish procedures to complete logs, and file them in the central office.

Other Facility-Specific Considerations

- ❑ Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer.
- ❑ Steam cleaning can generate significant pollutant concentrations requiring that careful consideration be given to the environmental impacts and compliance issues related to the condensate wastewater generated from the process.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing, and time limitations that preclude implementation of certain BMPs. The following are typical limitations and recommended work-arounds:

- ❑ Most car washing BMPs are inexpensive and rely more on good housekeeping practices (e.g., where vehicles are washed, planning for the collection of wash water) than on expensive technology. However, the construction of a specialized area for vehicle washing can be expensive. Also, for facilities that cannot recycle their wash water, the cost of pretreating the water through either structural practices or planning for collection and hauling of contaminated water to sewage treatment plants can be cost-prohibitive.
- ❑ A potential work-around is to use properly maintained off-site commercial washing and steam cleaning businesses whenever possible.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- ❑ Many facilities already have indoor covered areas for vehicle and equipment cleaning activities and will require no additional capital expenditures for providing cover.
- ❑ Capital investments will be required at some sites if systems are not in place to collect and recycle/treat and properly discharge wash water. The cost associated with these investments will vary depending on the size of the washing facility and local regulations regarding effluent wash water.

Maintenance

- ❑ Routinely inspect wash and collection systems and repair them as necessary.
- ❑ Sweep washing areas frequently to remove solid debris.

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- Repair berms and dikes as necessary.
- Inspect and maintain sumps, oil/water separators, and on-site treatment/recycling units.

Supplemental Information Designated Cleaning Areas

- Washing operations outdoors should be conducted in a designated wash area having the following characteristics:
 - ✓ Paved with Portland cement concrete.
 - ✓ Covered and bermed to prevent contact with stormwater and contain wash water.
 - ✓ Sloped for wash water collections.
 - ✓ A wash water drainage system to the sanitary or recycle treatment process waste sewer, or to a dead-end sump equipped with an oil/water separator if necessary.

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SC-22 Vehicle and Equipment Repair

Description

Vehicle and equipment maintenance and repair are potentially significant sources of stormwater pollution because of the harmful materials and wastes used during the maintenance and repair processes. Engine repair and service (e.g., parts cleaning), replacement of fluids (e.g., oil change), and outdoor equipment storage and parking (leaking vehicles) can impact water quality if stormwater runoff from areas where these activities are performed becomes polluted by a variety of contaminants. Implementation of the following activities must be done where applicable to prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment maintenance and repair activities.

Approach

The best management practice (BMP) approach is to reduce the potential for pollutant discharges through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives. This fact sheet presents general pollution prevention protocols followed by applicable minimum BMPs as required by the Industrial General Permit.

General Pollution Prevention Protocols

- ☐ Designate a vehicle maintenance area designed to prevent stormwater pollution.
- ☐ Minimize contact of stormwater with outdoor operations through berming and appropriate drainage routing.
- ☐ Keep accurate maintenance logs to evaluate materials removed and improvements made.
- ☐ Switch to nontoxic chemicals for maintenance when possible.
- ☐ Choose cleaning agents that can be recycled.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

Sediment

Nutrients

Trash

Metals ✓

Bacteria

Oil and Grease ✓

Organics ✓

Minimum BMPs Covered

- | | | |
|---|---|---|
|  | <i>Good Housekeeping</i> | ✓ |
|  | <i>Preventative Maintenance</i> | ✓ |
|  | <i>Spill and Leak Prevention</i> | ✓ |
|  | <i>Material Handling & Waste Management</i> | ✓ |
|  | <i>Erosion and Sediment Controls</i> | |
|  | <i>Employee Training Program</i> | ✓ |
|  | <i>Quality Assurance and Record Keeping</i> | ✓ |



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- ☐ Minimize use of solvents. Clean parts without using solvents whenever possible, or use water-based solvents for cleaning.
- ☐ Use drop cloths and drip pans.
- ☐ Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible.

Operational Protocols

- ☐ Move maintenance and repair activities indoors whenever feasible.
- ☐ Place curbs around the immediate boundaries of process equipment.



Good Housekeeping

- ☐ Store idle equipment under cover.
- ☐ Use a vehicle maintenance area designed to prevent stormwater pollution, minimizing contact of stormwater with outdoor operations through berming and appropriate drainage routing.
- ☐ Avoid hosing down your work areas. If work areas are washed, collect and direct wash water to a sanitary sewer. Use dry sweeping if possible.
- ☐ Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- ☐ Post signs at sinks to remind employees not to pour wastes down drains.
- ☐ Clean yard storm drain inlets(s) regularly and especially after large storms.
- ☐ Do not pour materials down storm drains.
- ☐ Cover the work area to limit exposure to rain.
- ☐ Place curbs around the immediate boundaries of process equipment.
- ☐ Build a shed or temporary roof over areas where vehicles are parked awaiting repair or salvage, especially wrecked vehicles. Also build a roof over vehicles being kept for parts.



Preventative Maintenance and Repair

- ☐ Provide a designated area for vehicle maintenance.
- ☐ Inspect vehicles and equipment for leaks regularly, and repair identified leaks immediately.
- ☐ Make sure incoming vehicles are checked for leaking oil and fluids. Do not allow leaking vehicles or equipment on-site without correcting the source of the leak and cleaning up any spill.

SC-22 Vehicle and Equipment Repair

- ❑ Keep equipment clean; do not allow excessive buildup of oil and grease.
- ❑ Perform all vehicle fluid removal and changing inside or under cover if possible to prevent the run-on of stormwater and the runoff of spills.
- ❑ Use a tarp, ground cloth, or drip pans beneath the vehicle or equipment to capture all spills and drips if temporary work is being performed outdoors. Collected drips and spills must be disposed of, reused, or recycled properly.
- ❑ If the maintenance area is paved, it is important to sweep it weekly to collect loose particles and to wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.
- ❑ Establish standard procedures to prevent spillage/leakage of fluids, including:
 - ✓ Keeping 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 it is being worked on to keep splatters and drips off the shop floor.
 - ✓ Promptly transferring used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
 - ✓ Keeping drip pans or containers under vehicles or equipment that might drip during repairs.
 - ✓ Not changing motor oil or performing equipment maintenance in non-appropriate areas.
- ❑ If a vehicle or equipment is to be stored outdoors, first drain oil and other fluids. Elevate and tarp stored vehicles and equipment.
- ❑ Monitor parked vehicles closely for leaks. Pans should be placed under any leaks to collect the fluids for proper disposal or recycling.
- ❑ Mechanics should clean vehicle parts without using liquid cleaners whenever possible to reduce waste.
- ❑ Steam cleaning and pressure washing can be used instead of solvents for cleaning parts. The wastewater generated from steam cleaning must be discharged to an on-site oil water separator that is connected to a sanitary sewer or blind sump. Non-caustic detergents should be used instead of caustic cleaning agents, detergent-based or water-based cleaning systems in place of organic solvent degreasers, and non-chlorinated solvent in place of chlorinated organic solvents for parts cleaning. Refer to SC-21 Vehicle and Equipment Cleaning for more information on steam cleaning.
- ❑ Fifth-wheel bearings on trucks require routine lubrication. Typically chassis grease is applied to the fifth-wheel bearing at rates that result in grease dripping off the bearing into the environment. To address this concern, the following options are available:

SC-22 Vehicle and Equipment Repair

- ✓ Use specialized lubricants with good adhesion properties (e.g., they stay in place). Carefully follow manufacturer's label instructions regarding the use of adhesive lubricant for truck fifth wheels. Typically this means applying no more than 8 ounces of grease. No visible extrusion of lubricant should be present from the fifth-wheel bearing when the truck and trailer are connected.
- ✓ Use onboard truck or trailer automatic lubrication systems. If the system applies lube thinner than National Grease Lubrication Institute #2, equipment for collection of used lubricant is needed to prevent excess lubricant from dripping off the truck.
- ✓ Use plastic or Teflon plates instead of grease or other lubricants. Carefully follow manufacturer's instructions for installation and operation.
- Use one of the following for lubricating vehicle-trailer couplings:
 - ✓ Specialized adhesive lubricants
 - ✓ Grease-free fifth-wheel slip plates (e.g., plastic or Teflon coatings)
 - ✓ Onboard automatic lubricating systems



Spill and Leak Prevention and Response

- Keep your spill prevention, control, and countermeasure (SPCC) plan up to date.
- Place an adequate stockpile of spill cleanup materials where they are readily accessible.
- 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 the floor.

Mop water may be discharged to the sanitary sewer via a toilet or sink.

- When using adsorbent materials on small spills, remove the materials promptly and dispose of them properly.



Material Handling and Waste Management

- Designate a special area for draining and replacing 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.

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- ❑ Drain all fluids immediately from wrecked vehicles. Ensure that the drip pan is large enough to contain the drained fluids (e.g., larger pans are needed to contain antifreeze, which may gush from some vehicles).
- ❑ Do not pour liquid waste into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- ❑ Do not put used or leftover cleaning solutions, solvents, or automotive fluids in a sanitary sewer.
- ❑ Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- ❑ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- ❑ Place oil filters in a funnel over a waste oil recycling drum to drain excess oil before disposing of them since municipalities prohibit or discourage disposal of these items in solid waste facilities.
- ❑ Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters. Oil filters disposed of in trash cans or dumpsters can leak oil and contaminate stormwater.
- ❑ Store cracked batteries in a nonleaking secondary container and dispose of them properly at recycling or household hazardous waste facilities.



Employee Training Program

- ❑ Train employees and contractors in the proper handling and disposal of engine fluids and waste materials.
- ❑ Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
- ❑ Conduct annual training to ensure that employees are familiar with the facility's SPCC plan and/or proper spill cleanup procedures. (You can use reusable cloth rags to clean up small drips and spills instead of disposables; these can be washed by a permitted industrial laundry. Do not clean them at home or at a coin-operated laundry business).
- ❑ Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- ❑ Keep accurate maintenance logs to evaluate materials removed and improvements made.
- ❑ Establish procedures to collect and file maintenance logs in the central office.

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Other Facility-Specific Considerations

Parts Cleaning

Vehicle and equipment maintenance facilities often must clean parts as a part of day-to-day operations. The following practices should be considered:

- ❑ Clean vehicle parts without using liquid cleaners whenever possible to reduce waste.
- ❑ Steam cleaning and pressure washing can be used instead solvents for parts cleaning.
- ❑ Wastewater generated from steam cleaning must be discharged to an on-site oil/water separator that is connected to a sanitary sewer or blind sump.
- ❑ Use non-caustic detergents instead of caustic cleaning agents, detergent- or water-based cleaning systems in place of organic solvent degreasers, and non-chlorinated solvent in place of chlorinated organic solvents for parts cleaning. Refer to SC-21 Vehicle and Equipment Cleaning for more information on steam cleaning.

Potential Limitations and Work-Arounds

- ❑ Some facilities may have space constraints and time limitations that preclude any work from being performed indoors.
 - ✓ Designate specific areas for outdoor activities.
 - ✓ Require employees to understand and follow preventive maintenance and spill and leak prevention BMPs.
- ❑ It may not be possible to contain and clean up spills from vehicles/equipment brought on-site after working hours.
 - ✓ Provide a designated area for after-hours deliveries.
 - ✓ Install spill kits.
- ❑ Drip pans (usually 1 foot by 1 foot) are generally too small to contain antifreeze.
 - ✓ Purchase or fabricate large drip pans (3 feet by 3 feet) with sufficient volume to contain expected quantities of liquids based on equipment/vehicle specifications.
- ❑ Dry floor cleaning methods might not be sufficient for some spills.
 - ✓ Use the three-step method instead specified in “Spill and Leak Prevention and Response,” earlier in this fact sheet.
- ❑ Identification of engine leaks may require some use of solvents.
 - ✓ Minimize the use of solvents, and use drip pans to collect spills and leaks.
- ❑ Prices for recycled materials and fluids might be higher than those for nonrecycled materials.

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- Some facilities may be limited by a lack of providers of recycled materials and by the absence of businesses that provide services such as hazardous waste removal, structural treatment practice maintenance, and solvent equipment and solvent recycling.

Potential Facilities and Maintenance Requirements

Facility Requirements

- Facilities that already have covered areas for maintenance activities, have berms or other means to retain spills and leaks, and/or have other appropriate constructed systems for containment might not need to make any significant new capital investment. Capital costs will likely be required at some sites if they have inadequate cover and containment facilities and can vary significantly depending upon site conditions.

Maintenance Requirements

- Most of the operations and maintenance (O&M) activity associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore, significant additional O&M efforts are not likely to be required.
- For facilities responsible for pretreating their wastewater prior to discharging, the proper functioning of structural treatment system is an important maintenance consideration. Routine cleanout of oil and grease is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the device working efficiently.
- If the maintenance area is paved, it is important to sweep it weekly to collect loose particles and to wipe up spills with rags and other absorbent material immediately. Do not hose down the area to a storm drain.

Supplemental Information

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 hazardous waste. Cleaning without using liquid cleaners (e.g., using 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 reuse. 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.

- Clean parts without using liquid cleaners whenever possible to reduce waste.
- Prevent spills and drips of solvents and cleansers to the shop floor.

SC-22 Vehicle and Equipment Repair

- ❑ 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 reuse.

Recycling

Separating wastes allows for easier recycling and might reduce treatment costs. Keep hazardous and nonhazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents (e.g., 1,1,1-trichloroethane) separate from non-chlorinated solvents (e.g., 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.

- ❑ Recycling is always preferable to disposal of unwanted materials.
- ❑ Separate wastes for easier recycling. Keep hazardous and nonhazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents separate from non-chlorinated solvents.
- ❑ Label and track the recycling of waste material (e.g., used oil, spent solvents, and batteries).
- ❑ Purchase recycled products to support the market for recycled materials.

Safer Alternatives

If possible, eliminate or reduce the amount of hazardous materials and waste by substituting nonhazardous or less hazardous material:

- ❑ Use non-caustic detergents instead of caustic cleaning for parts cleaning.
- ❑ Use detergent- or water-based cleaning systems in place of organic solvent degreasers. Wash water might require treatment before it can be discharged to the sewer.
- ❑ Replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene and mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents.
- ❑ Choose cleaning agents that can be recycled.

SC-22 Vehicle and Equipment Repair

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SC-30 Outdoor Loading and Unloading

Description

The loading and unloading of materials usually occurs outdoors on docks or terminals. If materials are spilled, leak, or are lost during those activities, they may collect in the soil or on other surfaces and have the potential to be carried away by wind or stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move the materials. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading and unloading of materials.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and best management practice (BMP) implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- ☐ Limit exposure of material to rainfall whenever possible.
- ☐ Prevent stormwater run-on.
- ☐ Check equipment regularly for leaks.



Good Housekeeping

- ☐ Develop an operations plan that provides procedures for loading and unloading activities.
- ☐ Conduct loading and unloading activities in dry weather if possible.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

<i>Sediment</i>	✓
<i>Nutrients</i>	✓
<i>Trash</i>	
<i>Metals</i>	✓
<i>Bacteria</i>	
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

Minimum BMPs Covered

 <i>Good Housekeeping</i>	✓
 <i>Preventative Maintenance</i>	
 <i>Spill and Leak Prevention and Response</i>	✓
 <i>Material Handling & Waste Management</i>	✓
 <i>Erosion and Sediment Controls</i>	
 <i>Employee Training Program</i>	✓
 <i>Quality Assurance and Record Keeping</i>	✓



SC-30 Outdoor Loading and Unloading

- ❑ Cover designated loading/unloading areas to reduce exposure of materials to rain.
- ❑ Consider placing a seal or door skirt between delivery vehicles and a building to prevent exposure of the materials to rain.
- ❑ Design loading and unloading areas to prevent stormwater run-on, which would include grading or berming the area, and position roof downspouts so they direct stormwater away from the loading and unloading areas.
- ❑ Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks when feasible.
- ❑ Load and unload only in designated loading areas.
- ❑ Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip-collected materials must be disposed of properly.
- ❑ Pave loading areas with concrete instead of asphalt.
- ❑ Avoid placing storm drains inlets in the area.
- ❑ Grade and/or berm the loading and unloading area with drainage to a sump; regularly remove materials accumulated in the sump.



Spill and Leak Response and Prevention

- ❑ Keep your spill prevention, control, and countermeasure (SPCC) plan up to date or have an emergency spill cleanup plan readily available, as applicable.
- ❑ Contain leaks during transfer of liquid materials.
- ❑ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees.
- ❑ Ensure that employees are familiar with the site's SPCC plan and proper spill cleanup procedures.
- ❑ Use drip pans or comparable devices when transferring oils, solvents, and paints.



Material Handling and Waste Management

- ❑ “Spot clean” leaks and drips routinely to prevent runoff of spillage.
- ❑ Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- ❑ Do not put used or leftover cleaning solutions, solvents, or automotive fluids in the storm drain or sanitary sewer.

SC-30 Outdoor Loading and Unloading

- ❑ Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- ❑ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- ❑ Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
 - ✓ Use only watertight waste receptacles and keep the lids closed.
 - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
 - ✓ Install a roof over the waste receptacle area.
 - ✓ Install a low containment berm around the waste receptacle area.
 - ✓ Use and maintain drip pans under waste receptacles.
- ❑ Post “No littering” signs.
- ❑ Perform work area cleanup and dry sweep after daily operations.



Employee Training Program

- ❑ Train employees (e.g., forklift operators) and contractors on proper spill containment and cleanup.
- ❑ Have employees trained in spill containment and cleanup present during loading and unloading.
- ❑ Train employees in proper handling techniques during liquid transfers to avoid spills.
- ❑ Make sure forklift operators are properly trained on loading and unloading procedures.



Quality Assurance and Record Keeping

- ❑ Keep accurate maintenance logs that document activities performed, quantities of materials removed, and improvement actions taken.
- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and what method was used to dispose of it.
- ❑ Establish procedures to complete logs and file them in the central office.
- ❑ Keep accurate logs of daily cleanup operations.

SC-30 Outdoor Loading and Unloading

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing, and time limitations that preclude implementation of BMPs. Provided below are typical limitations and recommended work-arounds.

- ❑ Space and time limitations might preclude all transfers from being performed indoors or under cover.
 - ✓ Designate specific areas for outdoor loading and unloading.
 - ✓ Require employees to understand and follow spill and leak prevention BMPs.
- ❑ It may not be possible to conduct transfers only during dry weather.
 - ✓ Limit exposure of materials and equipment to rainfall to the maximum extent practicable.
 - ✓ Require employees to understand and follow spill and leak prevention BMPs.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

Many facilities already have indoor or covered areas for loading and unloading activities and will require no additional capital expenditures.

If outdoor activities are required, construction of berms or other means to retain spills and leaks may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.

Capital investments will likely be required at some sites if cover and containment facilities are inadequate and can vary significantly depending upon site conditions.

Maintenance

Most of the operations and maintenance (O&M) activities associated with implementing this BMP are integrally linked to routine operations as previously described. Therefore, additional O&M is not required.

- ❑ Conduct regular inspections and make repairs and improvements as necessary.
- ❑ Check loading and unloading equipment regularly for leaks.
- ❑ Conduct regular broom dry-sweeping of area. Do not wash with water.

Supplemental Information

Loading and Unloading of Liquids

- ❑ Loading and unloading of liquids should occur in a manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer

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or treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to aboveground and underground 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.
 - ✓ The transfer area should be designed to prevent run-on of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.
 - ✓ The 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 outdoors, use the following procedures:
 - ✓ Place drip pans 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 the tank cars.

SC-30 Outdoor Loading and Unloading

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SC-31 Outdoor Liquid Container Storage

Description

Accidental releases of liquid materials from aboveground storage tanks, drums, and dumpsters present the potential for contaminating storm water with many different pollutants. Many potential storm water runoff pollutants are stored in tanks, including gasoline, aviation gas, diesel fuel, kerosene, oils, greases, lubricants, and other distilled, blended, and refined products derived from crude petroleum. Materials spilled, leaked, or lost from storage tanks can accumulate in soils or on other surfaces and be carried away by rainfall runoff. These source controls apply to containers located outside of a building used to temporarily store liquid materials and include installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

Approach

General Pollution Prevention Protocols

- ☐ Educate employees about pollution prevention measures and goals.
- ☐ Keep an accurate, up-to-date inventory of the materials delivered and stored on-site.
- ☐ Try to keep chemicals in their original containers, and keep them well labeled.
- ☐ Develop an operations plan that provides procedures for loading and/or unloading. Refer to SC-30 Outdoor Loading and Unloading for more detailed best management practice (BMP) information pertaining to loading and unloading liquids.
- ☐ Protect materials from rainfall, run-on, runoff, and wind dispersal:
 - ✓ Cover the storage area with a roof.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

<i>Sediment</i>	
<i>Nutrients</i>	✓
<i>Trash</i>	
<i>Metals</i>	✓
<i>Bacteria</i>	
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

Minimum BMPs Covered

	<i>Good Housekeeping</i>	✓
	<i>Preventative Maintenance</i>	✓
	<i>Spill and Leak Prevention and Response</i>	✓
	<i>Material Handling & Waste Management</i>	✓
	<i>Erosion and Sediment Controls</i>	
	<i>Employee Training Program</i>	✓
	<i>Quality Assurance and Record Keeping</i>	✓



SC-31 Outdoor Liquid Container Storage

- ✓ Minimize stormwater run-on by enclosing the area or building a berm around it.
- ✓ Use a walled structure for storage of liquid containers.
- ✓ Use only watertight containers and keep the lids closed.
- Employ safeguards against accidental releases:
 - ✓ Provide overflow protection devices to warn the operator or automatic shutdown transfer pumps.
 - ✓ Provide protection guards (bollards) around tanks and piping to prevent damage from a vehicle or forklift.
 - ✓ Provide clear tagging or labeling, and restrict access to valves to reduce human error.
 - ✓ Build a berm or surround tanks or containers with a secondary containment system, including dikes, liners, vaults, or double-walled tanks.
 - ✓ Find out whether the local government (or responsible utility) requires secondary containment areas to be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
 - ✓ Contact the appropriate regulatory agency regarding environmental compliance for facilities with spill ponds designed to intercept, treat, and/or divert spills.
 - ✓ Have registered and specifically trained professional engineers identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets for newly installed tank systems.
- Use safety data sheets (SDSs) to identify hazardous components and keep incompatible products apart. Also list/have available appropriate personal protective equipment and cleanup products.



Good Housekeeping

- Provide storage tank piping located below product level with a shutoff valve at the tank; ideally this valve should be an automatic shear valve with the shutoff located inside the tank.
- Provide barriers such as posts or guardrails where tanks are exposed to prevent damage from vehicle collisions.
- Provide secure storage to prevent vandalism-caused contamination.
- Place tight-fitting lids on containers.

SC-31 Outdoor Liquid Container Storage

- ❑ Enclose or cover the containers where they are stored.
- ❑ Raise the containers off the ground using a pallet or similar method, with provisions for spill control.
- ❑ Do not store liquid containers near a storm drainage system or surface waters.
- ❑ If the storage area is paved, sweep and clean the area regularly. Do not hose down the area to a storm drain.



Preventative Maintenance

- ❑ Inspect storage areas regularly for leaks or spills.
- ❑ Conduct routine inspections and check for external corrosion of liquid containers. Also check for structural failure, spills and overfills resulting from operator error, and failure of the piping system.
- ❑ Check for leaks or spills during pumping of liquids or gases from a truck or rail car to a storage facility or from a storage facility to a truck or rail car.
- ❑ Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.
- ❑ Inspect tank foundations, connections, coatings, tank walls, and the piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- ❑ Replace containers that are leaking, corroded, or otherwise deteriorating with ones in good condition. If the liquid chemicals are corrosive, use containers made of compatible materials instead of metal drums.
- ❑ New or secondary containers must be labeled with the product name and hazards.



Spill and Leak Prevention and Response

- ❑ Keep your spill prevention, control, and countermeasure (SPCC) plan up to date.
- ❑ Maintain an adequate stockpile of spill cleanup materials at locations where they are readily accessible.
- ❑ Have an emergency plan, equipment, and trained personnel ready at all times to deal immediately with major spills.
- ❑ Collect spilled liquids, and properly dispose of them.
- ❑ When using adsorbent materials on small spills, remove the materials promptly and dispose of them properly.
- ❑ Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.

SC-31 Outdoor Liquid Container Storage

- ❑ Prevent operator errors by using engineering safeguards to reduce accidental releases of pollutants.



Material Handling and Waste Management

- ❑ Contain the material in such a way that, if the container leaks or spills, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.
- ❑ Place drip pans or absorbent materials beneath mounted container taps, and at potential drip and spill locations during filling and unloading of containers. Any collected liquids or soiled absorbent materials must be reused/recycled or disposed of properly.
- ❑ Ensure that any underground or aboveground storage tanks are designed and managed in accordance with applicable regulations, identified as a potential pollution source, and have secondary containment such as a berm or dike with an impervious surface.
- ❑ Do not pour liquids into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- ❑ Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- ❑ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.



Employee Training Program

- ❑ Train employee (e.g., fork lift operators) and contractors in proper spill containment and cleanup. Employees should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
- ❑ Train employees in proper spill response and prevention, materials handling, and waste management.
- ❑ Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- ❑ Keep accurate maintenance/inspection logs that document minimum BMP activities performed for liquid container storage and improvement actions.
- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and what method was used to dispose of the waste.
- ❑ Establish procedures to complete logs and file them in the central office.

Other Facility-Specific Considerations

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

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- ❑ The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.
- ❑ All specific standards set by federal and state laws concerning the storage of oil and hazardous materials must be met.
- ❑ Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code.
- ❑ Storage of oil and hazardous materials must meet specific federal and state standards, including:
 - ✓ The SPCC plan;
 - ✓ Secondary containment;
 - ✓ Integrity and leak detection monitoring; and
 - ✓ Emergency preparedness plans.

Potential Capital Facility Costs and Operation & Maintenance Requirements Facilities

- ❑ Capital investments such as sheds, covers, dikes, and curbs will likely be required at some sites where cover and containment facilities are inadequate and can vary significantly depending upon site conditions.

Maintenance

- ❑ Most of the operations and maintenance (O&M) activities associated with implementing these BMPs are integrally linked to routine operations as previously described. Therefore additional O&M is not required.
- ❑ Conduct regular inspections, and make repairs and improvements as necessary.
- ❑ Conduct regular broom dry-sweeping of area. Do not wash with water.

Supplemental Information

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 resulting from operator error
- ❑ Leaks during pumping of liquids or gases from a truck or rail car to a storage tank or from a storage tank to a truck or rail care.

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Aboveground Tank Leak and Spill Control

Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code. Employ the following practices to enhance the code requirements:

- ☐ Place tanks in a designated area.
- ☐ Encapsulate in concrete or the equivalent tanks located in areas where firearms are discharged.
- ☐ Pave designated areas with Portland cement concrete and ensure that it is free of cracks and gaps, and impervious to contain leaks and spills.
- ☐ Liquid materials should be stored in double-walled tanks approved by Underwriters Laboratories or surrounded by a curb or dike to provide the volume to contain 10 percent of the volume 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, install a dead-end sump in the drain.
- ☐ 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 stormwater in petroleum storage areas should be passed through an oil/water separator.

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 resulting from operator error.
- ☐ Check for failure of the piping system (pipes, pumps, flanger, coupling, hoses, and valves).
- ☐ Check for leaks or spills during pumping of liquids or gases from a truck or rail car to a storage facility or from a storage facility to a truck or rail car.
- ☐ Inspect new tank or container installation visually for loose fittings, poor welding, and improper or poorly fitted gaskets.
- ☐ Inspect tank foundations, connections, coatings, tank walls, and the piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- ☐ Frequently release accumulated stormwater during the wet season.
- ☐ Have a qualified professional conduct periodic integrity testing.

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Dikes

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

- ❑ For single-wall tanks, containment dikes should be large enough to hold the contents of the storage tank for the facility plus rainwater.
- ❑ 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 are stored, alternative dike materials should be considered. More active organic chemicals may need certain special liners for dikes.
- ❑ Dikes can also be designed with impermeable materials to increase containment capabilities.
- ❑ Dikes should be inspected during and after significant storms or spills to check for washouts or overflows.
- ❑ Regular checks of containment dikes should be conducted to ensure the dikes are capable of holding spills.
- ❑ Inability of a structure to retain stormwater, dike erosion, soggy areas, or changes in vegetation indicate problems with dike structures. Damaged areas should be patched and stabilized immediately.
- ❑ Earthen dikes might require special maintenance of vegetation such as mulching and irrigation.
- ❑ Remove accumulated stormwater after precipitation events and dispose of it according to local regulations.

Curbing

Curbing is a barrier that surrounds an area of concern and is similar to containment diking in the way that it prevents spills and leaks from being released into the environment. It is usually used on a small scale and cannot contain large spills to the degree that dikes can. Curbing is common at many facilities in small areas where

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handling and transfer of liquid materials occur. It can redirect contaminated stormwater away from the storage area and 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 can 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.
- ❑ Remove accumulated stormwater after precipitation events and dispose of it according to local regulations.
- ❑ Curbing has the following advantages. It:
 - ✓ Provides excellent run-on control;
 - ✓ Is inexpensive;
 - ✓ Is easy to install;
 - ✓ Provides an option to recycle materials spilled in curb areas; and
 - ✓ Is a common industry practice.

SC-31 Outdoor Liquid Container Storage

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SC-32 Outdoor Equipment Operations

Description

Outdoor process equipment operations and maintenance can contaminate stormwater runoff. Activities such as grinding, painting, coating, sanding, degreasing or cleaning parts, landfills and waste piles, and solid waste treatment and disposal are examples of process operations that can lead to contamination of stormwater runoff. The targeted constituents vary for each site depending on the operation being performed.

Approach

Implement source control best management practices (BMPs) to limit exposure of outdoor equipment to direct precipitation and stormwater run-on. Refer to SC-22 Vehicle and Equipment Repair for additional information.

General Pollution Prevention Protocols

- ☐ Perform the activity during dry periods whenever possible.
- ☐ Install secondary containment measures where leaks and spills might occur.
- ☐ Use nontoxic chemicals for maintenance and minimize or eliminate the use of solvents.
- ☐ Connect process equipment areas to a public sanitary sewer or facility wastewater treatment system when possible. Some jurisdictions require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.



Good Housekeeping

- ☐ Manage materials and waste properly to reduce adverse impacts on stormwater quality (see “Material Handling and Waste Management” later in this fact sheet).

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

<i>Sediment</i>	✓
<i>Nutrients</i>	✓
<i>Trash</i>	✓
<i>Metals</i>	✓
<i>Bacteria</i>	✓
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

Minimum BMPs

 <i>Good Housekeeping</i>	✓
 <i>Preventative Maintenance</i>	✓
 <i>Spill and Leak Prevention and Response</i>	✓
 <i>Material Handling & Waste Management</i>	✓
 <i>Erosion and Sediment Controls</i>	
 <i>Employee Training Program</i>	✓
 <i>Quality Assurance and Record Keeping</i>	✓



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SC-32 Outdoor Equipment Operations

- ❑ Cover the work area with a permanent roof if possible.
- ❑ Use drop cloths for sanding and painting operations.
- ❑ Use a vacuum for fine particle cleanup in pavement cracks and crevices.
- ❑ Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (run-on prevention).
- ❑ “Spot clean” leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.
- ❑ Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- ❑ Use roll-down or permanent walls when conditions are windy or breezy to prevent wind transport of particulates or pollutants.



Preventative Maintenance

- ❑ Design outdoor equipment areas to prevent stormwater runoff and spills. Use a perimeter drain or slope pavement inward with drainage to a sump.
- ❑ Dry clean the work area regularly. Do not wash outdoor equipment with water if there is a direct connection to a storm drain.
- ❑ Pave the equipment operation area with concrete rather than asphalt.
- ❑ Inspect outdoor equipment regularly for leaks or spills. Also check for structural failure, spills and overfills resulting from operator error, and failure of the piping system.
- ❑ Inspect and clean, if necessary, storm drain inlets and catch basins within the outdoor equipment area before October 1 each year.



Spill and Leak Prevention and Response

- ❑ Keep your spill prevention, control, and countermeasure (SPCC) plan up to date.
- ❑ Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.
- ❑ Place a stockpile of spill cleanup materials where they are readily accessible.
- ❑ Prevent operator errors by using engineering safe guards and thus reducing accidental releases of pollutant.



SC-32 Outdoor Equipment Operations

Material Handling and Waste Management

- ❑ Do not pour liquid wastes into floor drains, sinks, outdoor storm drain inlets, or other storm drain or sewer connections.
- ❑ Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.
- ❑ Promptly transfer used fluids to the proper waste or recycling drums. Do not leave drip pans or other open containers lying around.
- ❑ Minimize the possibility of stormwater pollution from outside waste receptacles by doing at least one of the following:
 - ✓ Use only watertight waste receptacles and keep the lids closed.
 - ✓ Grade and pave the waste receptacle area to prevent run-on of stormwater.
 - ✓ Install a roof over the waste receptacle area.



Employee Training Program

- ❑ Educate employees about pollution prevention measures and goals.
- ❑ Train employees on proper equipment operation and maintenance procedures.
- ❑ Train all employees upon hiring and annually thereafter on proper methods for handling and disposing of waste. Ensure that all employees understand stormwater discharge prohibitions, wastewater discharge requirements, and these BMPs.
- ❑ Use a training log or similar method to document training.
- ❑ Ensure that employees are familiar with the site's SPCC plan and/or proper spill cleanup procedures.



Quality Assurance and Record Keeping

- ❑ Keep accurate maintenance logs that document minimum BMP activities performed for outdoor equipment, types and quantities of materials removed and disposed of, and any improvement actions.
- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and the method used to dispose of the waste.
- ❑ Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing, and time limitations that preclude implementation of BMPs. The following are typical limitations and recommended work-arounds.

- ❑ Providing cover over outdoor equipment may be impractical or cost-prohibitive.

SC-32 Outdoor Equipment Operations

- ✓ Operate outdoor equipment only during periods of dry weather.
- Regular operations and time limitations might require outdoor activities during wet weather.
 - ✓ Designate specific areas for outdoor activities.
 - ✓ Allow time for work area cleanup after each shift.
 - ✓ Require employees to understand and follow preventive maintenance and spill and leak prevention BMPs.
 - ✓ Design and install secondary containment and good housekeeping BMPs for outdoor equipment area.
- Storage sheds often must meet building and fire code requirements.

Potential Capital Facility Costs and Operation & Maintenance Requirements Facilities

- Many facilities already have indoor covered areas for vehicle and equipment repairs activities and will require no additional capital expenditures.
- If outdoor activities are required, construction of berms or other means to retain spills and leaks might require appropriate constructed systems for containment. These containment areas could require significant new capital investment.
- Capital investments will likely be required at some sites if cover and containment facilities are inadequate and can vary significantly depending upon site conditions.

Maintenance

- Most of the operations and maintenance (O&M) activities associated with implementing these BMPs are integrally linked to routine operations as previously described. Therefore additional O&M is not required.
- For facilities responsible for pretreating their wastewater prior to discharging, the proper functioning of structural treatment system is an important maintenance consideration.
- Routine cleanout of oil and grease is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the devices working efficiently.

References and Resources

Minnesota Pollution Control Agency. 2015. *Industrial Stormwater Best Management Practices Guidebook BMP 26 Fueling and Liquid Loading/Unloading Operations*.

SC-32 Outdoor Equipment Operations

Available online at <http://www.pca.state.mn.us/index.php/view-document.html?gid=10557>.

New Jersey Department of Environmental Protection. 2013. *Basic Industrial Stormwater General Permit Guidance Document NJPDES General Permit No NJ0088315*. Available online at http://www.nj.gov/dep/dwq/pdf/5G2_guidance_color.pdf.

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SC-33 Outdoor Storage of Raw Materials

Description

Stockpiles of raw materials, by-products, and finished products exposed to rain and/or runoff can pollute stormwater. Improper outdoor storage and containment can result in stormwater becoming contaminated from materials washing off or dissolving in the rainwater or runoff. To prevent or reduce the discharge of pollutants to stormwater from raw material delivery and storage, pollution prevention and source control measures must be implemented, including minimizing the storage of hazardous materials on-site, enclosing or covering materials, storing materials in a designated area, installing secondary containment, conducting regular inspections, preventing stormwater run-on and runoff, and training employees and subcontractors. This fact sheet focuses on source control best management practices (BMPs) for stockpiles of solid materials. If the raw material, by-product, or product is a liquid, more information for outside storage of liquids is available in SC-31 Outdoor Liquid Container Storage.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Emphasize employee education for successful BMP implementation.
- ☐ Store materials that could contaminate stormwater inside or under permanent cover. If that is not feasible, cover all outside storage areas with a roof and bermed or enclosed to prevent stormwater contact.
- ☐ Elevate and cover with a tarp solid materials such as beams and metal products.
- ☐ Minimize the inventory of raw materials kept outside.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

 Good Housekeeping	✓
 Preventative Maintenance	✓
 Spill and Leak Prevention and Response	✓
 Material Handling & Waste Management	
 Erosion and Sediment Controls	✓
 Employee Training Program	✓
 Record Keeping	✓



SC-33 Outdoor Storage of Raw Materials

- ❑ Keep an accurate, up-to-date inventory of the materials delivered and stored on-site.
- ❑ Stormwater runoff that could potentially be contaminated by materials stored outdoors should be drained to a sanitary sewer if available. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.



Good Housekeeping

- ❑ If raw materials cannot be stored inside or under permanent cover, prevent exposure to direct precipitation and stormwater run-on by installing a storm-resistant waterproof covering made of polyethylene, polypropylene, or hypalon over all materials stored outside. The covers must be in place at all times when work with the stockpiles is not occurring (applicable to small stockpiles only).
- ❑ If the stockpiles are so large that they cannot feasibly be covered and contained, implement erosion control practices at the perimeter of the facility site and at any catch basins to prevent erosion of the stockpiled material off-site.
- ❑ Minimize stormwater run-on by enclosing the area or building a berm around it.
- ❑ Keep storage areas clean and dry.
- ❑ Slope paved areas in a manner that minimizes pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater such as compost, logs, and wood chips. A minimum slope of 1.5 percent is recommended.
- ❑ Secure drums in an area where unauthorized persons may not gain access to prevent accidental spillage, pilferage, or any unauthorized use.
- ❑ Install curbing or berms along the perimeter of the area to prevent the run-on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas.
- ❑ Slope the area inside the curb or berm to a drain into a sump. The sump should be equipped with an oil/water separator if applicable for materials stored on-site.
- ❑ Do not store materials on top of or directly adjacent to storm drain inlets.
- ❑ Cover all treated wood products treated with chromated copper arsenate, ammoniacal copper zinc arsenate, creosote, or pentachlorophenol with properly secured tarps or store them indoors.



Preventative Maintenance

- ❑ Maintain outdoor storage containers in good condition. Replace leaky or otherwise inadequate containers as necessary.
- ❑ Maintain outdoor waterproof covers (e.g., tarps) in good condition and properly secure them to be storm resistant. Replace tarps damaged by ultraviolet exposure or wear and tear on a regular basis.

SC-33 Outdoor Storage of Raw Materials

- ☐ Perform routine inspections of storm drains and sumps and regularly remove accumulated materials.
- ☐ Dry clean the work area regularly. Do not wash outdoor material storage areas with water if there is a direct connection to the storm drain.
- ☐ Pave with concrete rather than asphalt outdoor storage areas for liquids such as solvents.
- ☐ Conduct regular inspections of storage areas to detect leaks and spills as soon as possible.
- ☐ Routinely inspect berms, curbing, containment, and sediment controls for proper function and repair as necessary.



Spill and Leak Prevention and Response

- ☐ Keep the facility spill prevention, control, and countermeasure (SPCC) plan up to date.
- ☐ Place a stockpile of spill cleanup materials such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where they are readily accessible.
- ☐ Have employees trained in spill containment and cleanup present during the loading/unloading of hazardous or otherwise dangerous materials.



Erosion and Sediment Controls

- ☐ Keep materials covered to prevent erosion of stockpiles. This may not be feasible for large stockpiles.
- ☐ Install sediment controls such as fiber rolls around the perimeter of stockpiles to prevent transport of raw materials to the storm drain.
- ☐ Install drain inlet protection around all inlets to prevent raw materials from entering the storm drain.
- ☐ Install sediment controls such as silt fence around the perimeter of the site to prevent transport of raw materials to the storm drain or off-site surface waters.



Employee Training Program

- ☐ Educate employees about pollution prevention measures and goals.
- ☐ Train employees how to properly store outdoor raw materials using the source control BMPs described above.
- ☐ Use a training log or similar method to document training.
- ☐ Ensure that employees are familiar with the site's SPCC plan and/or proper spill cleanup procedures.

SC-33 Outdoor Storage of Raw Materials



Quality Assurance and Record Keeping

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for outdoor storage of raw materials, types and quantities of materials removed and disposed of, and any improvement actions.
- ☐ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and the method used to dispose of the waste.
- ☐ Establish procedures to complete logs and file them in the central office.

Other Facility-Specific Considerations

- ☐ Storage sheds often must meet building and fire code requirements. Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code and the National Electric Code.
- ☐ Some municipalities require that secondary containment areas (regardless of size) be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
- ☐ Consult the local fire district on limitations on clearance of roof covers over containers used to store flammable materials.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing, and time limitations that preclude implementation of BMPs. The following is a typical limitation and a recommended work-around:

- ☐ Space limitations may preclude storing all materials indoors.
 - ✓ Implement good housekeeping, preventative maintenance, and erosion and sediment controls as described above.

Potential Capital Facility Costs and Operation & Maintenance Requirements Facilities

- ☐ Many facilities already have indoor covered areas where raw materials will be stored and will require no additional capital expenditures.
- ☐ If outdoor storage of materials is required, construction of berms or other means to prevent stormwater run-on and runoff from getting to the materials may require appropriate constructed systems for containment. These containment areas may require significant new capital investment.
- ☐ Purchase and installation of erosion and sediment controls will require additional capital investments, and this amount will vary depending on site characteristics.
- ☐ Capital investments will likely be required at some sites if cover and containment facilities are inadequate and can vary significantly depending upon site conditions.

SC-33 Outdoor Storage of Raw Materials

Maintenance

- ❑ Accurate and up-to-date inventories should be kept of all stored materials.
- ❑ Berms and curbs may require periodic repair and patching.
- ❑ Parking lots or other surfaces near bulk material storage areas should be swept periodically to remove debris blown or washed from storage areas.
- ❑ Sweep paved storage areas regularly for collection and disposal of loose solid materials. Do not hose down the area to a storm drain or conveyance ditch.
- ❑ Erosion and sediment controls require regular inspection and periodic replacement or reinstallation.

Supplemental Information

Raw Material Containment

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

- ❑ Curbing or berms should be placed along the perimeter of the area to prevent the run-on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from stockpile areas.
- ❑ The storm drainage system should be designed to minimize use of catch basins in the interior of the area as they tend to rapidly fill with manufacturing material.

The area should be sloped to drain stormwater to the perimeter where it can be collected or to internal drainage alleyways where material is not stockpiled.

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.

SC-33 Outdoor Storage of Raw Materials

References and Resources

Minnesota Pollution Control Agency. 2015. *Industrial Stormwater Best Management Practices Guidebook BMP 26 Fueling and Liquid Loading/Unloading Operations*. Available online at <http://www.pca.state.mn.us/index.php/view-document.html?gid=10557>.

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SC-34 Waste Handling and Disposal

Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and best management practice (BMP) implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- Accomplish reduction in the amount of waste generated using the following source controls:
 - ✓ Production planning and sequencing;
 - ✓ Process or equipment modification;
 - ✓ Raw material substitution or elimination;
 - ✓ Loss prevention and housekeeping;
 - ✓ Waste segregation and separation; and
 - ✓ Close loop recycling.
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

Sediment

Nutrients

Trash

Metals

✓

Bacteria

✓

Oil and Grease

✓

Organics

✓

Minimum BMPs Covered



Good Housekeeping

✓



Preventative Maintenance

✓



Spill and Leak Prevention and Response

✓



Material Handling & Waste Management

✓



Erosion and Sediment Controls



Employee Training Program

✓



Quality Assurance and Record Keeping

✓



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SC-34 Waste Handling and Disposal

- ❑ Use the entire product before disposing of the container.
- ❑ To the maximum extent possible, store wastes under cover or indoors after ensuring that all safety concerns such as fire hazard and ventilation have been addressed.
- ❑ Provide containers for each waste stream at each work station. Allow time after each shift to clean area.



Good Housekeeping

- ❑ Cover storage containers with leakproof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater run-on and runoff with a berm. The waste containers or piles must be covered except when in use.
- ❑ Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- ❑ Dispose of rinse water and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain. Clean the containers in a designated wash area that drains to a clarifier.
- ❑ Transfer waste from damaged containers into safe containers.
- ❑ Take special care to minimize losses when loading or unloading wastes. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.
- ❑ Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- ❑ When cleaning around restaurant/food handling dumpster areas, use dry methods when possible (e.g., sweeping, use of absorbents). If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- ❑ Stencil or demarcate storm drains on the facility's property with a prohibitive message regarding waste disposal.
- ❑ Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene, or hypalon.
- ❑ If possible, move the activity indoor after ensuring that all safety concerns such as fire hazard and ventilation have been addressed.



Preventative Maintenance

- ❑ Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm around the area.

SC-34 Waste Handling and Disposal

- ❑ Prevent rain from directly contacting waste materials.
- ❑ Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene, or hypalon.
- ❑ Cover the area with a permanent roof if feasible.
- ❑ Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- ❑ Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- ❑ Sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, vacuuming, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- ❑ Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- ❑ Repair leaking equipment such as valves, lines, seals, and pumps promptly.



Spill and Leak Prevention and Response

- ❑ Keep your spill prevention, control, and countermeasure (SPCC) plan up to date.
- ❑ Have an emergency plan, equipment, and trained personnel ready at all times to deal immediately with major spills.
- ❑ Collect all spilled liquids, and properly dispose of them.
- ❑ Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.
- ❑ Ensure that vehicles transporting waste have spill prevention equipment that can minimize the possibility of spills during transport. Spill prevention equipment includes:
 - ✓ Baffles for liquid waste; and
 - ✓ Sealed gates and spill guards for solid waste.



Material Handling and Waste Management

Litter Control

- ❑ Post “No littering” signs, and enforce antilitter laws.
- ❑ Provide a sufficient number of litter receptacles for the facility.
- ❑ Clean out and cover litter receptacles frequently to prevent spillage.

SC-34 Waste Handling and Disposal

Waste Collection

- ☐ Keep waste collection areas clean.
- ☐ Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
- ☐ Secure solid waste containers; containers must be closed tightly when not in use.
- ☐ Do not fill waste containers with washout water or any other liquid.
- ☐ Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, and pesticides may not be disposed of in solid waste containers (see the chemical/hazardous wastes section below).
- ☐ Do not mix wastes; that can cause chemical reactions, make recycling impossible, and complicate disposal. Affix labels to all waste containers clearly identifying what they contain.

Chemical/Hazardous Wastes

- ☐ Select designated hazardous waste collection areas on-site.
- ☐ Store hazardous materials and wastes in covered containers and protect them from vandalism.
- ☐ Place hazardous waste containers in secondary containment.
- ☐ Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- ☐ Hazardous waste cannot be reused or recycled; it must be disposed of by a licensed hazardous waste hauler.



Employee Training Program

- ☐ Educate employees about pollution prevention measures and goals.
- ☐ Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- ☐ Train employees and subcontractors in proper hazardous waste management.
- ☐ Use a training log or similar method to document training.
- ☐ Ensure that employees are familiar with the site's SPCC plan and/or proper spill cleanup procedures.



Quality Assurance and Record Keeping

- ☐ Keep accurate maintenance logs that document minimum BMP activities performed for waste handling and disposal, types and quantities of waste disposed of, and any improvement actions.

SC-34 Waste Handling and Disposal

- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and the method used to dispose of the waste.
- ❑ Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements Facilities

- ❑ Capital costs will vary substantially depending on the size of the facility and the types of waste handled. Significant capital costs might be associated with reducing wastes by modifying processes or implementing closed-loop recycling.
- ❑ Many facilities already have indoor covered areas where waste materials are stored and require no additional capital expenditures for providing cover.
- ❑ If outdoor storage of wastes is required, construction of berms or other means to prevent stormwater run-on and runoff might require appropriate constructed systems for containment.
- ❑ Capital investments will likely be required at some sites if cover and containment facilities are inadequate and can vary significantly depending upon site conditions.

Maintenance

- ❑ Check waste containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- ❑ When cleaning around restaurant/food handling dumpster areas, sweep and clean the waste management area regularly. Use dry methods when possible (e.g., sweeping, use of absorbents). If water must be used after sweeping/using absorbents, collect water and discharge through a grease interceptor to the sewer.
- ❑ Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
- ❑ Repair leaking equipment such as valves, lines, seals, and pumps promptly.

SC-34 Waste Handling and Disposal

References and Resources

Minnesota Pollution Control Agency. 2015. *Industrial Stormwater Best Management Practices Guidebook BMP 26 Fueling and Liquid Loading/Unloading Operations*.

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SC-35 Safer Alternative Products

Description

Promote the use of less harmful products and products that contain little or no total maximum daily load (TMDL) or 303(d) list pollutants. Alternatives exist for most product classes, including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (e.g., batteries and fluorescent lamps).

Approach

Pattern a new program after the many established programs around the state and country. Integrate this best management practice (BMP) as much as possible with existing programs at your facility.

Develop a comprehensive program based on the following:

- ❑ The Precautionary Principle, which is an alternative to the Risk Assessment model, which says it is acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it is acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is really necessary, and whether alternative products would perform just as well.
- ❑ The Environmentally Preferable Purchasing Program to minimize the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- ❑ The Integrated Pest Management or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by

Objectives

- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

Sediment	
Nutrients	✓
Trash	
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

	Good Housekeeping	
	Preventative Maintenance	
	Spill and Leak Prevention and Response	
	Material Handling & Waste Management	
	Erosion and Sediment Controls	
	Employee Training Program	✓
	Quality Assurance and Record Keeping	



SC-35 Safer Alternative Products

methods that pose a lower risk to employees, the public, and the environment.

- ❑ The Energy Efficiency Program, which includes no-cost and low-cost energy conservation and efficiency actions that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.

Consider the following mechanisms for developing and implementing a comprehensive program:

- ❑ Policies
- ❑ Procedures
 - ✓ Standard operating procedures
 - ✓ Purchasing guidelines and procedures
 - ✓ Bid packages (services and supplies)
- ❑ Materials
 - ✓ Preferred or approved product and supplier lists
 - ✓ Product and supplier evaluation criteria
 - ✓ Training sessions and manuals
 - ✓ Fact sheets for employees

Implement this BMP in conjunction with the Vehicle and Equipment Management fact sheets (SC-20–SC-22) and SC-41 Building and Grounds Maintenance.



Employee Training Program

- ❑ Employees who handle potentially harmful materials should be trained in the use of safer alternatives.
- ❑ Purchasing departments should be trained on safer alternative products and encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.
- ❑ Employees and contractors / service providers can be educated about safer alternatives by using information developed by a number of organizations, including those listed in the references and resources section of this fact sheet.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing, and time limitations that preclude implementation of BMPs. The following are typical limitations and recommended work-arounds.

SC-35 Safer Alternative Products

- ❑ Alternative products may not be available, suitable, or effective in every case.
 - ✓ Minimize use of hazardous/harmful products if no alternative product is available.

Regulatory Considerations

This BMP has no regulatory requirements unless a local/municipal ordinance applies. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:

- ❑ Specialized equipment storage and handling requirements;
- ❑ Stormwater runoff sampling requirements;
- ❑ Training and licensing requirements; and
- ❑ Record keeping and reporting requirements.

Cost Considerations

- ❑ The primary cost is for staff time to (1) develop new policies and procedures and (2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.
- ❑ Some alternative products might be slightly more expensive than conventional products.

Supplemental Information

This section provides some general information on safer alternatives. More specific information on particular hazardous materials and available alternatives is available in the references and resources section.

- ❑ Automotive products—Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Refined motor oil is also available.
- ❑ Vehicle/trailer lubrication—Fifth-wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- ❑ Cleaners—Vegetable- or citrus-based soaps are available to replace petroleum-based soaps and detergents.
- ❑ Paint products—Water-based paints, wood preservatives, stains, and finishes with low volatile organic compounds (VOC) content are available.
- ❑ Pesticides—Specific alternative products or methods exist to control most insects, fungi, and weeds.
- ❑ Chemical fertilizers—Compost and soil amendments are natural alternatives.

SC-35 Safer Alternative Products

- Consumables—Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury; however, low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.
- Janitorial chemicals—Even biodegradable soap can harm fish and wildlife before it biodegrades. *Biodegradable* does not mean nontoxic. Safer products and procedures are available for floor stripping and cleaning as well as for carpet, glass, metal, and restroom cleaning and disinfecting. Use paper products with postconsumer recycled content and implement electric hand dryers.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent ones are listed in the references and resources section.

SC-35 Safer Alternative Products

References and Resources

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

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control at <https://dtsc.ca.gov/dtsc-website-archive/pollution-prevention-green-technology/>.

CalRecycle at <http://www.calrecycle.ca.gov/Business/Regulated.htm>.

City of Santa Monica Office of Sustainability and Environment at <http://www.smgov.net/departments/ose/>.

City of Palo Alto at <http://cleanbay.org>.

City and County of San Francisco, Department of the Environment at <http://www.sfenvironment.org/toxics-health/greener-business-practices>.

Green Business Program at <http://www.greenbiz.ca.gov/GRlocal.html>.

Product Stewardship Institute at <http://www.productstewardship.us>.

Sacramento Clean Water Business Partners at <https://www.cityofsacramento.org/Utilities/Stormwater/Clean-Water-Business-Partners>.

U.S. Environmental Protection Agency. *National Pollutant Discharge Elimination System (NPDES) Stormwater Discharges from Industrial Facilities* at <https://www.epa.gov/npdes/stormwater-discharges-industrial-activities>.

U.S. Environmental Protection Agency. *Region 9 Pollution Prevention Program* at <http://www.epa.gov/region9/waste/p2/business.html>.

Western Sustainability and Pollution Prevention Network at <http://wsppn.org/>.

Metals (mercury, copper)

National Electrical Manufacturers Association Environmental Stewardship at <http://www.nema.org/Policy/Environmental-Stewardship/pages/default.aspx>.

California Environmental Protection Agency Department of Toxic Substance Control. *New Regulations for Brake Pads Sold in California* at <https://dtsc.ca.gov/scp/brake-pad-legislation/>.

California Environmental Protection Agency Department of Toxic Substance Control. *Limiting Copper in Brake Pads* at <https://dtsc.ca.gov/scp/limiting-copper-in-brake-pads/>.

SC-35 Safer Alternative Products

State of Washington Department of Ecology. *Better Brakes Law* at <https://ecology.wa.gov/Waste-Toxics/Reducing-toxic-chemicals/Better-Brakes-law>.

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center at <http://www.birc.org>.

California Department of Pesticide Regulation at <http://www.cdpr.ca.gov/dprprograms.htm>.

University of California Statewide Integrated Pest Management Program at <http://www.ipm.ucdavis.edu/default.html>.

Dioxins

Bay Area Dioxins Project at <https://abag.ca.gov/>.

SC-40 Contaminated and Erodible Areas

Description

Areas within an industrial site that are bare of vegetation or are subject to activities that promote the suppression of vegetation are often subject to erosion. In addition, they may or may not be contaminated from past or current activities. If the area is temporarily bare because of construction, see SC-42 Building Repair and Construction. Sites with excessive erosion or the potential for excessive erosion should consider employing the soil erosion best management practices (BMPs) identified in the *Construction BMP Handbook*.

Note: This fact sheet addresses soils that do not exceed hazardous waste criteria (see Title 22 California Code of Regulations for hazardous waste criteria).

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

Implement erosion and sediment control BMPs to stabilize soils and reduce pollutant discharges from contaminated or erodible surfaces.



Erosion and Sediment Controls

- ❑ Preserve natural vegetation whenever possible. See also EC-2 Preservation of Existing Vegetation in the *Construction BMP Handbook*.
- ❑ Analyze soil conditions.
- ❑ Remove contaminated soil and dispose of it properly.
- ❑ Stabilize loose soils by revegetating whenever possible. See also EC 4 Hydroseeding in the *Construction BMP Handbook*.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

	Good Housekeeping	
	Preventative Maintenance	
	Spill and Leak Prevention and Material Handling & Waste Management	
	Erosion and Sediment Controls	✓
	Employee Training Program	✓
	Quality Assurance and Record Keeping	✓



SC-40 Contaminated and Erodible Areas

- ❑ Use nonvegetative stabilization methods for areas prone to erosion where vegetative options are not feasible. Examples include:
 - ✓ Areas of vehicular or pedestrian traffic such as roads or paths;
 - ✓ Arid environments where vegetation would not provide timely ground coverage or would require excessive irrigation;
 - ✓ Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
 - ✓ Areas where vegetation will not grow adequately within the construction time frame.

There are several nonvegetative stabilization methods, and selection should be based on site-specific conditions. See also EC-16 Non-Vegetative Stabilization in the *Construction BMP Handbook*.

- ❑ Use chemical stabilization when needed. See also EC-5 Soil Binders in the *Construction BMP Handbook*.
- ❑ Use geosynthetic membranes to control erosion if feasible. See also EC-7 Geotextiles and Mats in the *Construction BMP Handbook*.
- ❑ Stabilize all roadways, entrances, and exits to sufficiently control discharges of erodible materials from discharging or being tracked off the site. See also TC 1-3 Tracking Control in the *Construction BMP Handbook*.
- ❑ Implement wind erosion control measures as necessary. See also WE-1 Wind Erosion Control in the *Construction BMP Handbook*.



Employee Training Program

- ❑ Educate employees about pollution prevention measures and goals.
- ❑ Train employees how to properly install and maintain the erosion and sediment source control BMPs described above. Detailed information is provided in the *Construction BMP Handbook*.
- ❑ Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- ❑ Keep accurate logs that document actions taken to maintain and improve the effectiveness of the erosion and sediment control BMPs described above.
- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and the method used to dispose of the waste.
- ❑ Establish procedures to complete logs and file them in the central office.

SC-40 Contaminated and Erodible Areas

Potential Capital Facility Costs and Operation & Maintenance Requirements Facilities

- ❑ Many facilities do not have contaminated or erodible areas and will require no additional capital expenditures.
- ❑ For sites with contaminated or erodible areas, purchase and installation of erosion and sediment controls will require additional capital investments. That amount will vary depending on site characteristics and the types of BMPs being implemented.
- ❑ Minimize costs by maintaining existing vegetation and limiting site operations on bare soils.

Maintenance

- ❑ The erosion and sediment control BMPs described above require periodic inspection and maintenance to remain effective. The cost of these actions will vary depending on site characteristics and the types of BMPs being implemented.
- ❑ Irrigation costs might be required to establish and maintain vegetation.

Supplemental Information Stabilization of Erodible Areas

Preserving stabilized areas minimizes erosion potential, protects water quality, and provides aesthetic benefits. 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 stormwater and capture of pollutants in the soil matrix. This practice can be used as a permanent source control measure.

Vegetation preservation should be incorporated into the site. Preservation requires good site management to minimize operations on bare soils where vegetation exists. 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.

The preferred approach is to leave as much native vegetation on-site as possible, thereby reducing or eliminating any erosion problem. However, assuming the site already has contaminated or erodible surface areas, consider the following courses of action:

- ❑ The area can be revegetated if it is not in use and, therefore, not subject to damage from site activities. Since the area is already devoid of vegetation, special measures are likely necessary. Lack of vegetation could have been caused by lack of water and/or poor soils. Fertilizing can possibly solve the latter problem or the ground might simply be too compacted from prior use. Improving soil conditions may be sufficient to support the recovery of vegetation. Use process wastewater for irrigation

SC-40 Contaminated and Erodible Areas

if possible, and see the *Construction BMP Handbook* for further procedures on establishing vegetation.

- Watering trucks can prevent dust.
- Chemical stabilization can be used as an alternate method 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 products from forming ponds and creating large areas where moisture cannot penetrate the soil. See also EC-5 Soil Binders in the *Construction BMP Handbook* for more information. Advantages of chemical stabilization include:
 - ✓ Easy surface application
 - ✓ Effective stabilization of the areas
 - ✓ Immediate protection of soils that are in danger of eroding
- Contaminated soils should be cleaned up or removed. First the level and extent of the contamination must be determined. Removal must comply with state and federal regulations; permits must be acquired and fees paid.
- Non-vegetated stabilization methods are suitable for permanently protecting areas from erosion by water and wind. These methods should be used only when vegetation cannot be established because of soil or climactic conditions, or where vegetation could be a potential fire hazard.

The following are examples of nonvegetative stabilization BMPs:

- ✓ **Decomposed Granite (DG) and Gravel Mulch** are suitable for use in areas where vegetation establishment is difficult; on flat surfaces, trails, and pathways; and when used in conjunction with a stabilizer or tackifier on shallow slopes (i.e., 10:1 [H:V]). DG and gravel can also be used for permanent erosion control on shallow rocky slopes where vegetation cannot be established.
- ✓ **Degradable Mulches** can be used to cover and protect soil surfaces from erosion both in temporary and permanent applications. In many cases, the use of mulches by themselves requires routine inspection and reapplication. See EC-3 Hydraulic Mulch, EC-6 Straw Mulch, EC-8 Wood Mulch, and EC-14 Compost Blankets in the *Construction BMP Handbook* for more information.
- ✓ **Geotextiles and Mats** can be used as a temporary stand-alone soil stabilization method. Depending on material selection, geotextiles and mats can be a short-term (3 months–1 year) or long-term (1–2 years) temporary stabilization method. For more information, see EC-7 Geotextiles and Mats in the *Construction BMP Handbook*.

SC-40 Contaminated and Erodible Areas

- ✓ **Rock Slope Protection** can be used when the slopes are subject to scour or have a high erosion potential, such as slopes adjacent to flowing waterways or slopes subject to overflow from detention facilities (spillways).
- ✓ **Soil Binders** can be used for temporary stabilization of stockpiles and disturbed areas not subject to heavy traffic. See EC-5 Soil Binders in the *Construction BMP Handbook* for more information.

References and Resources

California Stormwater Quality Association. 2019. *Construction Stormwater Best Management Practices Handbook*. Available online at <http://www.casqa.org>.

City of Seattle, Seattle Public Utilities Department of Planning and Development. 2009. *Stormwater Manual Vol. 1 Source Control Technical Requirements Manual*. Available online at http://www.seattle.gov/util/cs/groups/public/@spuweb/@policy/documents/webcontent/02_008440.pdf.

Orange County Stormwater Program. n.d. *Best Management Practices for Industrial/Commercial Business Activities*. Available online at <http://ocwatersheds.com/documents/bmp/industrialcommercialbusinessesactivities>.

Sacramento Stormwater Management Program. n.d. *Best Management Practices for Industrial Storm Water Pollution Control*. Available online at <http://www.waterresources.saccounty.net/stormwater/documents/industrial-BMP-manual.pdf>.

Santa Clara Valley Urban Runoff Pollution Prevention Program. Available online at <https://scvurppp.org/>.

Tahoe Regional Planning Agency. 2012. *Best Management Practices Handbook*. Available online at [http://www.tahoebmp.org/Documents/2012 BMP Handbook.pdf](http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf).

The Storm Water Managers Resource Center. Available online at <http://www.stormwatercenter.net>.

U.S. Environmental Protection Agency. 2005. *Construction Site Stormwater Runoff Control*. Available online at <https://www3.epa.gov/npdes/pubs/fact2-6.pdf>.

SC-41 Building and Grounds Maintenance

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers, and pesticides; suspended solids; heavy metals; abnormal pH; and oils and greases. Using the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and best management practice (BMP) implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Switch to nontoxic chemicals for maintenance to the maximum extent possible.
- ☐ Choose cleaning agents that can be recycled.
- ☐ Encourage proper lawn management and landscaping, including use of native vegetation.
- ☐ Encourage use of integrated pest management techniques for pest control.
- ☐ Encourage proper on-site recycling of yard trimmings.
- ☐ Recycle residual paints, solvents, lumber, and other material as much as possible.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Minimum BMPs Covered

	Good Housekeeping	✓
	Preventative Maintenance	
	Spill and Leak Prevention and Response	✓
	Material Handling & Waste Management	✓
	Erosion and Sediment Controls	✓
	Employee Training Program	✓
	Quality Assurance & Record Keeping	



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- Clean work areas at the end of each work shift using dry cleaning methods such as sweeping and vacuuming.



Good Housekeeping

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations in which soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum, or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, and other collected vegetation as garbage or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils. See also SC-40 Contaminated and Erodible Areas for more information.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement or ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with nonwater-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner and turpentine) for recycling or proper disposal.
- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is especially necessary on rainy days. The containment device(s)

SC-41 Building and Grounds Maintenance

must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- ❑ If you need to dewater an excavation site, you might need to filter the water before discharging to a catch basin or off-site. If discharging off-site, direct the water through hay bales and filter fabric or use other sediment filters or traps.
- ❑ Store toxic material under cover during precipitation events and when not in use. A cover can include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- ❑ Dispose of leaves, sticks, and other collected vegetation as garbage, by composting, or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.
- ❑ When soils are exposed, use mulch or other erosion control measures.
- ❑ Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.
- ❑ Consider an alternative approach when bailing out muddy water: Do not put it in the storm drain; instead pour it over landscaped areas.
- ❑ Use hand weeding when practical.

Fertilizer and Pesticide Management

- ❑ Do not use pesticides if rain is expected.
- ❑ Do not mix or prepare pesticides for application near storm drains.
- ❑ Use the minimum amount needed for the job.
- ❑ Calibrate fertilizer distributors to avoid excessive application.
- ❑ Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.
- ❑ Apply pesticides only when wind speeds are low.
- ❑ Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- ❑ Irrigate slowly to prevent runoff and then only as much as is needed.
- ❑ Clean pavement and sidewalks if fertilizer is spilled on these surfaces before applying irrigation water.

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Inspection

- Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.



Spill and Leak Prevention and Response

- Keep your spill prevention, control, and countermeasure (SPCC) plan up to date.
- Place a stockpile of spill cleanup materials such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where they are readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the SPCC plan.
- Clean up spills immediately.



Material Handling and Waste Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Do not over-apply fertilizers, herbicides, and other 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 hydraulic application. 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 offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Dispose of empty pesticide containers according to the instructions on the container label.
- Rinse containers and use the rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and county agricultural commissioner. Provide secondary containment for pesticides.



- Refer to Fact Sheet BG-30 for additional pest control best practices.

Employee Training Program

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.

SC-41 Building and Grounds Maintenance

- ❑ Train employees and contractors in proper techniques for spill containment and cleanup.
- ❑ Be sure the frequency of training takes into account the complexity of the operations and the needs of individual staff members.



Quality Assurance and Record Keeping

- ❑ Keep accurate logs that document maintenance activities performed and minimum BMP measures implemented.
- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and the method used to dispose of the waste.
- ❑ Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- ❑ Additional capital costs are not anticipated for building and grounds maintenance. Implementation of the minimum BMPs described above should be conducted as part of regular site operations.

Maintenance

- ❑ Maintenance activities for the BMPs described above will be minimal, and no additional cost is anticipated.

Supplemental Information

Fire Sprinkler Line Flushing

Site fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, although in some areas it could be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; that coating will contaminate the water from the first flush but not from subsequent flushes. Nitrates, polyphosphates, and other corrosion inhibitors, as well as fire suppressants and antifreeze might be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and, between flushes, could accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This might result in a significant biochemical oxygen demand problem, and the water often smells. Consequently dispose of fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to enter the storm drain or infiltration because of the potentially high levels of pollutants in fire sprinkler line water.

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References and Resources

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Ventura Countywide Stormwater Management Program. 2005. *Clean Business Fact Sheets*. Available online at http://www.vcstormwater.org/documents/programs_business/building.pdf.

SC-42 Building Repair and Construction

Description

Site modifications are common, particularly at large industrial sites. The activity can range from minor and normal building repair to major remodeling and the construction of new facilities. These activities can generate pollutants that include solvents, paints, paint and varnish removers, finishing residues, spent thinners, soap cleaners, kerosene, asphalt and concrete materials, adhesive residues, and old asbestos insulation. Protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants to stormwater from building repair, remodeling, and minor construction by using soil erosion controls, enclosing or covering building material storage areas, using good housekeeping practices, using safer alternative products, and training employees.

This fact sheet is intended to be used for minor repairs and construction. If major construction is required, the guidelines in the *Construction BMP Handbook* should be followed.

Approach

The best management practice (BMP) approach is to reduce the potential for pollutant discharges through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Recycle residual paints, solvents, lumber, and other materials to the maximum extent practicable.
- ☐ Avoid outdoor repairs and construction during periods of wet weather.
- ☐ Use safer alternative products to the maximum extent practicable. See also SC-35 Safer Alternative Products for more information.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

<i>Sediment</i>	✓
<i>Nutrients</i>	
<i>Trash</i>	✓
<i>Metals</i>	✓
<i>Bacteria</i>	
<i>Oil and Grease</i>	✓
<i>Organics</i>	✓

Minimum BMPs Covered

	<i>Good Housekeeping</i>	✓
	<i>Preventative Maintenance</i>	
	<i>Spill and Leak Prevention and Response</i>	✓
	<i>Material Handling & Waste Management</i>	✓
	<i>Erosion and Sediment Controls</i>	✓
	<i>Employee Training Program</i>	✓
	<i>Quality Assurance and Record Keeping</i>	✓



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- ❑ Buy recycled products to the maximum extent practicable.
- ❑ Inform on-site contractors of company policy on these matters and include appropriate provisions in their contracts to ensure that certain proper housekeeping and disposal practices are implemented.
- ❑ Make sure that nearby storm drains are well marked to minimize the chance of inadvertent disposal of residual paints and other liquids.



Good Housekeeping

Repair and Remodeling

- ❑ Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep vacuum the area regularly to remove sediment and small debris.
- ❑ Cover raw materials of particular concern that must be left outside, especially during the rainy season. See also SC-33 Outdoor Storage of Raw Materials for more information.
- ❑ Use equipment and tools such as bag sanders to reduce accumulation of debris.
- ❑ Limit/prohibit work on windy days; implement roll-down walls or other measures to reduce wind transport of pollutants.
- ❑ Do not dump waste liquids down the storm drain.
- ❑ Dispose of wash water, sweepings, and sediments properly.
- ❑ Store liquid materials properly that are normally used in repair and remodeling such as paints and solvents. See also SC-31 Outdoor Liquid Container Storage for more information.
- ❑ Sweep out rain gutters 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 tight lined, 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.
- ❑ Clean the storm drain system in the immediate vicinity of the construction activity after it is completed. See also SC-44 Drainage System Maintenance for more information.

Painting

- ❑ Enclose painting operations consistent with local air quality and Occupational Safety and Health Administration (OSHA) regulations.
- ❑ Local air pollution regulations may, in many areas of the state, specify painting procedures that, if properly carried out, are usually sufficient to protect water quality.
- ❑ Develop paint-handling procedures for proper use, storage, and disposal.

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- ❑ Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- ❑ Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint containers.
- ❑ Mix paint indoors before using it so that any spill will not be exposed to rain. Do so even during dry weather because cleanup of a spill will never be 100 percent effective.
- ❑ Transfer and load paint and hot thermoplastic away from storm drain inlets.
- ❑ When there is risk of a spill reaching storm drains, plug nearby storm drain inlets prior to starting to paint and remove the plugs when the job is complete.
- ❑ If sandblasting is used to remove paint, cover nearby storm drain inlets prior to starting work.
- ❑ If painting requires scraping or sandblasting of the existing surface, use a ground cloth to collect the chips. Dispose of the residue properly.
- ❑ Cover or enclose painting operations properly to avoid drift.
- ❑ If water-based paints are being used, clean the application equipment in a sink that is connected to the sanitary sewer.
- ❑ Capture all cleanup-water and dispose of it properly.
- ❑ Dispose properly of paints containing lead or tributyl tin and considered a hazardous waste.
- ❑ If leftover paints are to be kept for the next job, store them properly, or dispose of them properly.
- ❑ Recycle paint when possible. Dispose of paint at an appropriate household hazardous waste facility.



Spill and Leak Prevention and Response

- ❑ Keep your spill prevention, control, and countermeasure (SPCC) plan up to date.
- ❑ Place a stockpile of spill cleanup materials where they are readily accessible.
- ❑ Clean up spills immediately.
- ❑ Excavate and remove the contaminated (stained) soil if a spill occurs on dirt.



Material Handling and Waste Management

- ❑ Post “No littering” signs, and enforce antilitter laws.
- ❑ Provide a sufficient number of litter receptacles for the facility.

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- ❑ Clean out litter receptacles frequently and cover them to prevent spillage.
- ❑ Keep waste collection areas clean.
- ❑ Inspect solid waste containers regularly for structural damage. Repair or replace damaged containers as necessary.
- ❑ Secure solid waste containers; containers must be closed tightly when not in use.
- ❑ Do not fill waste containers with washout water or any other liquid.
- ❑ Ensure that only appropriate solid wastes are put in the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, and pesticides may not be disposed of in solid waste containers
- ❑ Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal. Affix labels to all waste containers clearly stating what they contain.
- ❑ Make sure that hazardous waste is collected, removed, and disposed of properly. See also SC-34 Waste Handling and Disposal for more information.



Erosion and Sediment Controls

- ❑ Limit disturbance of bare soils and preserve natural vegetation whenever possible. See also EC-2 Preservation of Existing Vegetation in the *Construction BMP Handbook*.
- ❑ Stabilize loose soils by revegetating whenever possible. See also EC-4 Hydroseeding in the *Construction BMP Handbook*.
- ❑ Use nonvegetative stabilization methods for areas prone to erosion where vegetative options are not feasible. Examples include:
 - ✓ Areas of vehicular or pedestrian traffic such as roads or paths;
 - ✓ Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
 - ✓ Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
 - ✓ Areas where vegetation will not grow adequately within the construction time frame.

There are several nonvegetative stabilization methods and selection should be based on site-specific conditions. See also EC-16 Non-Vegetative Stabilization in the *Construction BMP Handbook*.

- ❑ Use chemical stabilization when needed. See also EC-5 Soil Binders in the *Construction BMP Handbook*.

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- ❑ Use geosynthetic membranes to control erosion if feasible. See also EC-7 Geotextiles and Mats in the *Construction BMP Handbook*.
- ❑ Stabilize all roadways, entrances, and exits to sufficiently control discharges of erodible materials from discharging or being tracked off the site. See also TC 1-3 Tracking Control in the *Construction BMP Handbook*.
- ❑ Refer to the supplemental information later in this fact sheet for projects that involve more extensive soil disturbance activities.



Employee Training Program

- ❑ Educate employees about pollution prevention measures and goals.
- ❑ Train employees how to properly implement the source control BMPs described above. Detailed information for erosion and sediment control BMPs is provided in the *Construction BMP Handbook*.
- ❑ Proper education of off-site contractors is often overlooked. The conscientious efforts of well-trained employees can be wasted by unknowing off-site contractors, so make sure they are well informed about pollutant source control responsibilities.
- ❑ Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- ❑ Keep accurate maintenance logs that document minimum BMP activities performed for building repair and construction, types and quantities of waste disposed of, and any improvement actions.
- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and the method used to dispose of the waste.
- ❑ Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Some facilities may have space constraints, limited staffing, and time limitations that preclude implementation of BMPs. The following are typical limitations and recommended work-arounds.

- ❑ This BMP is for minor construction only. The state's General Construction Activity Stormwater Permit has more extensive requirements for larger projects that would disturb 1 or more acres of surface.
 - ✓ Refer to the companion *Construction BMP Handbook* for specific guidance and BMPs for larger scale projects.
- ❑ Time constraints might require some outdoor repairs and construction during wet weather.

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- ✓ Require employees to understand and follow good housekeeping and spill and leak prevention BMPs.
- ✓ Inspect erosion and sediment control BMPs daily during periods of wet weather and repair or improve BMP implementation as necessary.
- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- ✓ Minimize use of hazardous materials to the maximum extent practicable.
- Be certain that actions to help stormwater quality are consistent with Cal/ and Fed/OSHA and air quality regulations.
- Prices for recycled/safer alternative materials and fluids may be higher than those of conventional materials.

Potential Capital Facility Costs and Operation & Maintenance Requirements Facilities

- Limited capital investments may be required at some sites if cover and containment facilities are inadequate for construction materials and wastes.
- Purchase and installation of erosion and sediment controls, if needed, will require additional capital investments, and this amount will vary depending on site characteristics and the types of BMPs being implemented.
- Minimize costs by maintaining existing vegetation and limiting construction operations on bare soils.

Maintenance

- The erosion and sediment control BMPs described above require periodic inspection and maintenance to remain effective. The cost of these actions will vary depending on site characteristics and the types of BMPs being implemented.
- Irrigation costs may be required to establish and maintain vegetation.

Supplemental Information Soil/Erosion Control

If the work involves exposing large areas of soil, employ the appropriate soil erosion and control techniques. See the *Construction BMP Handbook*. If old buildings are being torn down and not replaced in the near future, stabilize the site using measures described in SC-40 Contaminated and Erodible Areas.

If a building is to be placed over an open area with a storm drainage system, make sure the storm inlets within the building are covered or removed, or the storm line is connected to the sanitary sewer. If, because of the remodeling, a new drainage system is

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to be installed or the existing system is to be modified, consider installing catch basins as they serve as effective “in-line” treatment devices. Include in the catch basin a “turn-down” elbow or similar device to trap floatables.

References and Resources

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SC-43 Parking Area Maintenance

Description

Parking lots can contribute a number of substances such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking areas and include using good housekeeping practices, following appropriate cleaning best management practices (BMPs), and training employees.

BMPs for other outdoor areas on-site (loading/unloading, material storage, and equipment operations) are described in fact sheets SC-30 through SC-33.

Approach

The goal of this program is to ensure that stormwater pollution prevention practices are considered when conducting activities on or around parking areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ☐ Encourage advanced designs and maintenance strategies for impervious parking lots. Refer to the treatment control BMP fact sheets in this Handbook for additional information.
- ☐ Keep accurate maintenance logs to evaluate BMP implementation.



Good Housekeeping

- ☐ Keep all parking areas clean and orderly. Remove debris, litter, and sediments in a timely fashion.
- ☐ Post “No littering” signs, and enforce antilitter laws.
- ☐ Provide an adequate number of litter receptacles.

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Substitute Products

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

	Good Housekeeping	✓
	Preventative Maintenance	✓
	Spill and Leak Prevention and Response	✓
	Material Handling & Waste Management	
	Erosion and Sediment Controls	
	Employee Training Program	✓
	Quality Assurance and Record Keeping	✓



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- Clean out litter receptacles frequently and cover them to prevent spillage.



Preventative Maintenance

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below if water is used to clean surfaces:
 - ✓ Block the storm drain or contain runoff.
 - ✓ Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
- Follow the procedures below when cleaning heavy oily deposits:
 - ✓ Clean oily spots with absorbent materials.
 - ✓ Use a screen or filter fabric over inlet, then wash surfaces.
 - ✓ Do not allow discharges to the storm drain.
 - ✓ Vacuum/pump discharges to a tank or discharge to sanitary sewer.
 - ✓ Dispose of spilled materials and absorbents appropriately.

Surface Repair

- Check local ordinances for standard urban stormwater mitigation plan/low impact development (SUSMP/LID) ordinance.
- Preheat, transfer, or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, and so forth. Leave

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covers in place until the job is completed and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- ❑ Use only as much water as necessary for dust control during sweeping to avoid runoff.
- ❑ Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.



Spill and Leak Prevention and Response

- ❑ Keep your spill prevention, control, and countermeasure (SPCC) plan up to date.
- ❑ Place a stockpile of spill cleanup materials where they are readily accessible or at a central location.
- ❑ Clean up fluid spills immediately with absorbent rags or material.
- ❑ Dispose of spilled material and absorbents properly.



Employee Training Program

- ❑ Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- ❑ Train employees and contractors in proper techniques for spill containment and cleanup.
- ❑ Use a training log or similar method to document training.



Quality Assurance and Record Keeping

- ❑ Keep accurate maintenance logs that document minimum BMP activities performed for parking area maintenance, types and quantities of waste disposed of, and any improvement actions.
- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and the method used to dispose of the waste.
- ❑ Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements Facilities

- ❑ Capital investments may be required at some sites to purchase sweeping equipment, train sweeper operators, install oil/water/sand separators, or implement advanced BMPs. These costs can vary significantly depending upon site conditions and the number of BMPs required.

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Maintenance

- ❑ Sweep and clean parking lots regularly to minimize pollutant transport into storm drains from stormwater runoff.
- ❑ Clean out oil/water/sand separators regularly, especially after heavy storms.
- ❑ Maintain advanced BMPs such as vegetated swales, infiltration trenches, or detention basins as appropriate. Refer to the treatment control fact sheets for more information.

Supplemental Information

Advanced BMPs

Some parking areas may require advanced BMPs to further reduce pollutants in stormwater runoff, and a few examples are listed below. Refer to the treatment control fact sheets and the *Development BMP Handbook* for more information.

- ❑ When possible, direct sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- ❑ Use sand filters or oleophilic collectors for oily waste in low quantities.
- ❑ Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- ❑ Design lots to include semipermeable hardscape.

References and Resources

California Stormwater Quality Association. 2019. *Development Stormwater Best Management Practice Handbook*. Available online at <https://www.casqa.org/resources/bmp-handbooks>.

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SC-44 Drainage System Maintenance

Description

As a consequence of its function, the stormwater drainage facilities on site convey stormwater that may contain certain pollutants either to the off-site conveyance system that collects and transports urban runoff and stormwater, or directly to receiving waters. The protocols in this fact sheet are intended to reduce pollutants leaving the site to the offsite drainage infrastructure or to receiving waters through proper on-site conveyance system operation and maintenance. The targeted constituents will vary depending on site characteristics and operations.

Approach

Successful implementation depends on effective training of employees on applicable best management practices (BMPs) and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ❑ Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the proper hydraulic functioning of the system to avoid flooding.
- ❑ Develop and follow a site-specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.



Good Housekeeping

Illicit Connections and Discharges

- ❑ Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered

 Good Housekeeping	✓
 Preventative Maintenance	✓
 Spill and Leak Prevention and Response	✓
 Material Handling & Waste Management	✓
 Erosion and Sediment Controls	✓
 Employee Training Program	✓
 Quality Assurance and Record Keeping	✓



SC-44 Drainage System Maintenance

- ✓ Identify evidence of spills such as paints, discoloring, and odors.
- ✓ Record locations of apparent illegal discharges or illicit connections.
- ✓ Track flows back to potential discharges and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques that include zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, and television camera inspection.
- ✓ Eliminate the discharge once the origin of the flow is established.
- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste—Drains to Stream” or similar wording stenciled on or next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-stormwater Discharges for additional information.

Illegal Dumping

- Inspect regularly and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
 - ✓ 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)
 - ✓ Responsible parties
- Post “No Dumping” signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-stormwater Discharges for additional information.



Preventative Maintenance

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
 - ✓ Immediate repair of any deterioration threatening structural integrity.
 - ✓ Cleaning before the sump is 40 percent full. Catch basins should be cleaned as frequently as necessary to meet this standard.

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- ❑ Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- ❑ Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Prioritize storm drain inlets; clean and repair them as needed.
- ❑ Keep accurate logs of the number of catch basins cleaned.
- ❑ Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- ❑ Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and disposed of properly. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- ❑ Locate reaches of the storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- ❑ Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- ❑ Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- ❑ Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- ❑ Conduct routine maintenance at each pump station.
- ❑ Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- ❑ Modify storm channel characteristics to improve channel hydraulics, increase pollutant removal, and enhance channel/creek aesthetic and habitat value.
- ❑ Conduct channel modification and improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural state of any river, stream, or lake in California must enter into a stream or lake alteration agreement with the Department of Fish and Wildlife. The developer-applicant should also contact local governments (city, county, or special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, or Department of Water Resources), and the U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service.

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Spill and Leak Prevention and Response

- ❑ Keep your spill prevention, control, and countermeasure (SPCC) plan up to date.
- ❑ Investigate promptly all reports of spills, leaks, and illegal dumping.
- ❑ Place a stockpile of spill cleanup materials where they are readily accessible or at a central location.
- ❑ Clean up all spills and leaks using dry methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.



Employee Training Program

- ❑ Educate employees about pollution prevention measures and goals.
- ❑ Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- ❑ Train employees and subcontractors in proper hazardous waste management.
- ❑ Use a training log or similar method to document training.
- ❑ Ensure that employees are familiar with the site's SPCC plan and/or proper spill cleanup procedures.
- ❑ Have staff involved in detection and removal of illicit connections trained in the following:
 - ✓ OSHA-required health and safety training (Title 29 of the Code of Federal Regulations [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).



Quality Assurance and Record Keeping

- ❑ Keep accurate maintenance logs that document minimum BMP activities performed for drainage system maintenance, types and quantities of waste disposed of, and any improvement actions.
- ❑ Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and the method used to dispose of the waste.
- ❑ Keep accurate logs of illicit connections, illicit discharges, and illegal dumping into the storm drain system, including how wastes were cleaned up and disposed of.
- ❑ Establish procedures to complete logs and file them in the central office.

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Potential Limitations and Work-Arounds

The following are typical limitations and recommended work-arounds for drainage system maintenance:

- ❑ Cleanup activities might create a slight disturbance for local aquatic species. Access to items and material on private property might be limited. Tradeoffs might exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
 - ✓ Perform all maintenance on-site and do not flush accumulated material downstream to private property or riparian habitats.
- ❑ Storm drain flushing is most effective in small-diameter pipes (i.e., a pipe 36 inches in diameter or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing include the availability of a water source, finding a downstream area to collect sediments, and liquid/sediment disposal.
 - ✓ Develop and follow a site-specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.
- ❑ Regulations might include adoption of substantial penalties for illegal dumping and disposal.
 - ✓ Do not dump illegal materials anywhere on-site.
 - ✓ Identify illicit connections, illicit discharge, and illegal dumping.
 - ✓ Clean up spills immediately, and properly dispose of wastes.
- ❑ Local municipal codes might include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the sanitary sewer system.
 - ✓ Collect all materials and pollutants accumulated in the drainage system and dispose of them according to local regulations.
 - ✓ Install debris excluders in areas with a trash total maximum daily load.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- ❑ Capital costs will vary substantially depending on the size of the facility and characteristics of the drainage system. Significant capital costs may be associated with purchasing water trucks, vacuum trucks, and any other necessary cleaning equipment or improving the drainage infrastructure to reduce the potential.

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- Developing and implementing a site-specific drainage system maintenance plan will require additional capital if a similar program is not already in place.

Maintenance

- Two-person teams might be required to clean catch basins with vacuum trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.
- Methods used for illicit connection detection (e.g., smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors such as the amount of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Supplemental Information

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants from storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents plug flow discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drains usually are flushed along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An inflatable device is placed in an upstream manhole to temporarily plug the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed-up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream might be used to recollect the water after the force of the flushing wave has dissipated. A pump could then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure might be more practical or required to recollect the flushed waters.

Cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65–75 percent for organics and 55–65 percent for dry weather grit/inorganic

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material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used if allowed or that fire hydrant line flushing coincide with storm sewer flushing.

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