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February 14, 2024

City of Fort Smith Board of Directors
SUBJECT: Fuel Audit – Transit Fuel Audit

Board of Directors:

A planned 2023 City fuel audit was conducted, and the objective of the fuel audit was to evaluate whether City policies and procedures were adhered to during the purchasing process, refueling process and that there are proper internal controls in place to mitigate risk to theft of fuel.

Background

The City of Fort Smith supplies fuel to all City Departments who have vehicles, equipment, specialized equipment (i.e. Forklifts, off-road equipment, etc.) and for heating (i.e. buildings and water). The City utilizes unleaded, diesel, compressed natural gas (CNG) and propane. There are three fueling locations, Sanitation, Kelley Hwy, and Transit.

All fueling locations have unleaded and diesel, two fueling locations have CNG capabilities and one department utilizes propane. There are departments that use propane tanks for equipment and at water/sewer plants, however they are not refilled in large quantities and there is not a propane contract.

The City has approximately 674 vehicles and approximately 233 equipment assets that will refuel at one of the locations or if outside of the City limits will use their P-card to purchase fuel. The fuel purchased on the P-card is coded to 528500, however a department could also code the purchase to other account codes such as travel and/or conferences. We did note that two departments have fuel cards for their fleet and separate memos were written for the review of the fuel card purchases.

During the fiscal year (FY) 2022, The City purchased from the fuel vendor approximately 684,384 gallons, totaling \$2,541,234. From January 1, 2023, through August 7, 2023, the City purchased from the fuel vendor approximately 433,395 gallons, totaling \$1,255,265. Unleaded and diesel are tracked through the fuel system FuelMaster. The fuel card purchases for FY 2022 were approximately \$133,000 and from January 1 through October 24, 2023, was approximately \$206,764.

The fuel pumps at Sanitation were installed in 2012 and the cameras are not reviewed periodically. Yearly inspections are performed, however since the City does not sell gas to any outside customers, the pumps are not calibrated. Employees can access fuel by using vehicle fuel keys called Prokee. The P-cards are used to fuel City vehicles and equipment when traveling out of City limits, the fueling station is inoperable, and to refuel rental cars. The usage of the p-card is also inherently risky without adequate accountability and control.

A report was written for each fueling location and two additional reports were deemed necessary because of the two departments utilizing fuel cards through a separate vendor. Discrepancies were identified and recommendations were provided in those two reports.

Methodology

To accomplish our audit objectives, we interviewed key personnel, reviewed applicable City and State compliance requirements, reviewed written policies and procedures, tested a random sample of fuel orders and payments, and reviewed monthly journal entries. The risk of fraud, waste, and abuse was also considered.

This performance audit was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based upon our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

Objectives and Scope

The audit objective was to determine if the fueling stations and departments have adequate controls over fuel services. The scope of the audit focused on compliance with fuel requirements, fuel purchases, fuel deliveries, safety, and inventory control. The audit period covered activities for the fiscal year 2022 and January 1, 2023, through August 7, 2023. Due to the amounts identified from the audit period covered, IA reviewed the remaining invoices for 2023 and January 2024. This information was added to the total and identified below in the first finding.

Findings and Recommendations

The City of Fort Smith's (City) Internal Audit Department (IA) determined after reviewing the current FuelMaster fueling system to provide high-level suggestions on ways to improve the internal controls surrounding the fueling stations and fueling systems and FuelMaster at the Utilities Department Kelly Highway, Sanitation and Transit locations. These items were designed to provide basic recommendations to the department to consider improving the use and control over the fuel stations. Based on this assessment, it is likely that a follow-up procedure will be scheduled when

the three locations are connected on the cloud base system for the fueling systems and procedures. Fuel is a near-cash asset which is highly susceptible to potential misuse. Combined with the high volume of usage and cost, fueling stations are important to the control of fuel usage and storage throughout the City. The following recommendations pertain to this assessment:

- Invoices received by Frost were not reviewed for correct charges. IA noted that the invoices contained the incorrect charges and that credits were not properly added to the invoices. Furthermore, we noted the unleaded was assessed the diesel differential fee and the diesel assessed the unleaded differential fee. Therefore, the departments are assessed the incorrect amounts for their fuel purchases. Moreover, IA identified **\$78,741** that was overcharged to the City by the fuel vendor for all three fueling locations. (Note: the total amount is based off the incorrect billing from January 2022 through January 2024).

Recommendation: All invoices should be reviewed for the correct and allowable charges and the City receives the correct credits. The invoices should be verified with the delivery ticket to ensure the correct amount was charged for that specific delivery. Additionally, the invoices should be signed and dated by the reviewer before the requisition is entered into the system to document the reconciliation. Lastly, all fuel contracts should be provided to the fueling locations to allow them to ensure the correct prices are charged on the invoices.

Management Response:

Based on a review of the fuel purchase contract, provided to the transit department as a function of this audit, the language of the contract is unclear how to apply the discounts in what we understand to be an accurate invoice. The transit department staff now understands what to look for in the way of discounts, and how they are to be applied, following discussions from the internal auditor as a part of this audit process. Training should be provided when contracts are issued to ensure clarity. Concerning proper procedures going forward, please see the attached highlighted excerpt from the Transit Department Employee Manual (revised).

Responsible: Transit Director

Implementation Date: 2-14-24

Assessment of Managements Responses:

IA agrees with the procedure added to the Transit Department Employee Manual. IA recognizes that training should be provided when contracts are issued to ensure clarity. Departments should also take responsibility to ensure they understand the charges for any invoice and that it is accurate before approving it for payment.

- Transit does not have written procedures for tracking of fuel and issuing of keys. However, Transit does have written procedures for use of fuel and fuel safety protocols.

Recommendation: Transit should develop written procedures for tracking fuel and issuing of keys, types of keys, and purchasing of the City's fuel sources.

Management Response:

Please see the attached highlighted excerpt from the Transit Department Employee Manual (revised).

Responsible: Transit Director

Implementation Date: 2-14-24

Assessment of Managements Responses:

IA agrees with the procedure added to the Transit Department Employee Manual.

- Cameras are not periodically reviewed at Transit to ensure proper safety protocols are followed and only City assets are being fueled. This allows for fuel theft for non-vehicle fueling, determine a way to track and identify transactions to those items – bed tanks, small equipment, etc.

Recommendation: All cameras should be operable and periodically reviewed for safety and theft of fuel.

Management Response:

Transit Department security cameras have been operable for many years. Cameras at the Transit Department, including the fuel cameras, are reviewed frequently by the driver supervisor after office hours, but only in live feed because the historical view option is not available to anyone other than the department director. Perhaps the IT Department can verify camera monitoring via log-in records. Transit management terminated an employee in 2013 for fuel theft following a review of the camera system's historical data at that time.

Responsible: Transit Director

Implementation Date: 2010

Assessment of Managements Responses:

IA did recognize that Transits cameras are operable, however they are not periodically reviewed for safety and theft of fuel. If the driver supervisor only has live feed, and management does not want to give historical view permissions, then management should be proactive and periodically review the cameras, mainly to ensure safety and prevention of fuel theft sooner than later.

- Transit does not have locks and/or anti-siphon devices on underground or above ground fuel storage tanks.

Recommendation: Transit should consider installing locks and anti-siphon devices in all underground or aboveground fuel storage tanks. This will also assist with theft of fuel.

Management Response:

See attached photo of fuel tank locks

Responsible: Transit Director

Implementation Date: 2-14-24

Assessment of Managements Responses:

IA recognizes that Transit was proactive and installed locks on the fuel storage tanks. IA also recommends that Transit research into anti-siphon devices to assist with fuel theft.

- Transit does not sign off on the delivery ticket and they are not reconciled to the invoice when received by fuel vendor. Additionally, Transit does not ensure the rack rate is notated on the delivery ticket.

Recommendation: All fueling locations should formally reconcile all signed deliveries tickets to the invoices to determine if the quantities delivered were accurately charged. To ensure the City is charged the correct rate, the rack rate should be notated on the delivery ticket.

Management Response:

Please see the attached highlighted excerpt from the Transit Department Employee Manual (revised). Vendor rarely answers the phone to obtain rack rate information; staff must leave a message to order fuel.

Responsible: Transit Director

Implementation Date: 2-14-24

Assessment of Managements Responses:

IA agrees with the procedure added to the Transit Department Employee Manual. The fuel supervisors have the capability at the time of delivery to have the driver write on the delivery ticket the rack rate. Therefore, Transit does not have to call the fuel vendor to obtain this information. IA has communicated to the vendor that the rack rate should be on the delivery ticket at the time of service, however, it is upon Transit to make sure all necessary information is on the delivery ticket at the time of service.

- Transit does not stick the tanks before and after the delivery of fuel.

Recommendation: Transit should stick the tanks before and after to validate the number of gallons dropped are accurately reported on the delivery ticket. Additionally, the fueling locations should consider periodically “sticking” the tanks to reconcile to the accuracy of the fuel being dispensed is correct and because the fueling locations do not calibrate the pumps.

Management Response:

Please see the attached highlighted excerpt from the Transit Department Employee Manual (revised). Fuel pumps were calibrated on 2-12-24.

Responsible: Transit Director

Implementation Date: 2-14-24

Assessment of Managements Responses:

IA agrees with the procedure added to the Transit Department Employee Manual. Management should ensure the procedure is implemented. Additionally, utilizing the paste helps protect our assets and also makes sure no water is in the tanks.

- Fuel Safety (i.e. location of the washing station, emergency shut off valve, fuel clean up materials) protocols are not provided to the employees. Currently, the fuel safety protocols are provided to transit employees and not to city employees.

Recommendation: Fuel safety protocols should be developed and all employees who fuel assets should be trained, and the training documented in addition to transit employees.

Management Response:

Training for employees outside of the transit department should ideally be a function of the human resources department during on boarding. Regarding fuel safety protocols for transit personnel, each transit employee has received Class C training as a requirement of ADEQ that addresses safety concerns, spills, and mitigation procedures. Spill kits are located in the maintenance shop and on the fuel island. The eyewash station is located in the maintenance shop and is inspected routinely by the HR Generalist. Written and signed acknowledgements for each employee receiving Class C training sessions are available and can be reviewed at the Transit Department. The Engineering Department provides routine training materials from ADEQ as a condition of our storm water protection permit that is dispersed to all employees routinely. Please also see the attached Best Management Practices document that is included in the Transit Department Employee Manual as Attachment # 18.

Responsible: Transit Director

Implementation Date: 2010 or prior

Assessment of Managements Responses:

IA recognizes Transits position regarding training for employees outside of the transit department. Therefore, because Transit does have protocols already established and based upon their requirement of ADEQ, Transit should work with HR to implement those protocols with all employees fueling at this location. This will ensure that those requirements are communicated properly, and all employees are aware of where the spill kits are located and the location of the eyewash station.

IA did recognize that the transit employees are required to sign acknowledgement of receiving the class C training, however, all employees should be receiving fuel safety training.

As stated above, the recommendations are meant to provide general thoughts and feedback based on the current control structure. Each recommendation should be seriously considered by the department and other departments handling fuel. It is important that the City properly control and monitoring the fuel usage, storage, and reporting in order to avoid any potential misuse of the City's assets.

Observation:

- The City has the option to pay the Oklahoma tax rate instead of the Arkansas rate. Since Oklahoma is a neighboring state that the City of Fort Smith borders, the City is authorized to utilize their rate, which is lower than Arkansas rate by approximately .12 cents per gallon for unleaded fuel. The City should utilize this opportunity, which could save approximately \$2,000 a year in unleaded sales tax.
- The fueling locations should weekly provide the departments with the fuel rate so the departments can reconcile the fuel charges monthly to verify the correct amount was charged to their budget.

While this fueling location did not have the following exceptions, IA listed them below so that Transit can ensure they do not have these exceptions in the future.

- Fuel was charged to departments that did not have that assigned asset, the asset had been transferred to another department, auctioned, and/or the asset was no longer in use. All departments should review the transactional details of their activity within the fueling process. Any discrepancies should be reported immediately to the fuel location to be corrected. Additionally, departments should consider using a dual authentication method for each fueling transaction including a key for the vehicle, equipment, or tank as well as a badge swipe or employee pin for the individual employee performing the fueling. Lastly, an asset list should be sent to all the departments by the end of the year and have the department reconcile those assets. Any discrepancies should be communicated to the fueling department to assist with correcting the discrepancies.
- Fuel keys were still active for assets that were no longer in use and/or lost. Departments should perform periodic, surprise reviews of the keys. Any discrepancies should be reported immediately to the fuel location to be corrected. Lastly, an asset list with ProKee information should be sent to all the departments by the end of the year and have the department reconcile those assets. Any discrepancies should be communicated to the fueling department to assist with correcting the discrepancies.
- Miscellaneous fuel key(s) were used to fuel vehicles. Miscellaneous keys are for equipment and have a set gallon limit. Departments should eliminate all but absolutely necessary "Miscellaneous Fuel Keys" in order to provide more uniformity and transparency in fuel usage and reporting. Proper

protocols should be implemented to ensure miscellaneous fuel keys are used according to policy. The miscellaneous fuel keys are to be used to fill small containers, small equipment, etc. which have a fuel limit and be utilized for that purpose. Additionally, departments should consider using a dual authentication method for each fueling transaction including a key for the vehicle, equipment, or tank as well as a badge swipe or employee pin for the individual employee performing the fueling.

All departments were sent a memo identifying the discrepancies noted above to ensure they implement the recommendations needed for their department.

Pictures from Transit fueling location. Picture #1 is the diesel pump. Picture #2 is the Syntech system using the ProKee. Picture #3 is the spill kit next to the fuel pump.



Picture #1



Picture #2



Picture #3

Note: The items below were added by the Transit Director. Some items represent the changes transit made, some are inserts from the transit handbook and some inserts do not related directly to the fuel audit but are possibly informational.

O. Fuel Management

The transit director and superintendent monitor on-site and off-site fuel transactions electronically. The maintenance division monitors CNG fueling systems, fuel tank levels and provides monthly inspections concerning wet well monitoring for leak detection. The coordinator prepares billing for any onsite fueling of other departments, as well as the issuance of electronic fuel keys.

Effective February 14, 2024, the transit coordinator must receive an email from the authorized representative of the department(s) requesting a fuel key. The email (approvals) will be printed and scanned into an electronic file, available for auditing purposes. The department will dispose damaged or inoperable keys.

The Under Ground Storage Tanks (UST's) will be locked and secured and the fuel delivery driver will access the fill port by contacting the maintenance supervisor or designee. The maintenance supervisor, or designee, will take a picture of the dipstick measurement before and after the fill process is complete. The maintenance supervisor, or designee, will consolidate the pictures and add them to the delivery receipt following a signature and date, denoting acceptance of the fuel.

The transit clerk will receive, review and record the invoice. The transit superintendent will verify the proper charges and discounts are applied, denoted by applying a date and signature on the invoice prior to processing for payment.

The transit coordinator will review the monthly fuel report with the maintenance supervisor to determine any possible fuel discrepancies in quantities. The coordinator will then prepare the fuel billing and email the report and applicable supporting documents to the finance department,

June 24, 2020 | FORT SMITH TRANSIT EMPLOYEE MANUAL |

associated departments, and internal auditing. The coordinator will scan the complete fuel billing packet to an electronic file.





Department of Environmental Quality

Arkansas Class C UST Operator
Facility-Specific Checklist

The checklist has been designed to document that an ADEQ-certified Class A or Class B operator has trained the employee on facility-specific components and procedures as required by Arkansas Regulation 12.707. This checklist must be completed for the facility for which the Class C operator is designated.

Employee Name:
UST Facility Name:
UST Facility I.D. No.

- I have trained the Class C employee on the fueling system Emergency Shut-Off Switch.
- I have trained the Class C on how to monitor fuel dispensing, and delivery controls.
- I have provided and reviewed with the Class C employee written emergency response procedures for this facility and their posted location.
- I have provided the Class C employee with the list of contacts that should be notified in an emergency and posted the list in a clearly visible location at the facility.
- I have trained the Class C employee on the tank monitor (if applicable) and provided instructions on how to respond to various alarm messages that may appear on the display.
- I have trained the Class C employee on the location of emergency spill and all response equipment and materials available at this facility and their use.

I have trained the Class C employee on the location and use of the following equipment:

- Dispenser
- Hose
- Nozzle
- Breakaway Coupling
- Emergency Shut-Off Switch
- Tank Monitor (if applicable)

I have completed this checklist together with the Class C employee:

Certified Class A/ Class B Operator Name: _____ Date: _____
 Class A/Class B Operator # _____
 Certified Class A/ Class B Operator Signature: _____

I have completed this checklist together with an ADEQ-certified Class A or Class B Operator: Class C Operator Name: _____ Date: _____

Class C Operator Signature: _____

ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
5301 NORTHSHORE DRIVE / NORTH LITTLE ROCK / ARKANSAS 72118-5217 / TELEPHONE 501-682-0744 / FAX 501-6



Attachment #18

Fort Smith

TRANSIT

Best Management

Practices Handbook



Fort Smith Transit

Best Practices Handbook

Fort Smith Transit encourages department employees to reference this manual for training in an effort to comply with standards provided by the U.S. Environmental Protection Agency pertaining to the National Pollutant Discharge Elimination System.

The contents included in the manual are excerpts from the California Stormwater Best Management Practices Handbook. The focus is to prevent clean water from mixing with contaminants prior to being delivered downstream in rivers and lakes. This safeguard

process can be completed in a variety of ways and is primarily a common sense approach. The handbook includes a few defined methods that will guide employees on how to respond to spills, leaks or cleanup of any unintended fluids or chemicals in an appropriate manner.

The most notable areas of concern relate to the day-to-day activities associated with fueling fleet vehicles. Equipment staging presents the second most notable concern considering the quantity of fluids contained within each engine compartment. The transit department on Jenny Lind Road houses a covered canopy over the fuel island which serves as one method of environmental protection. Specific design considerations within this handbook will be referenced prior to future construction projects such as the bus parking canopy and automated bus wash facility.

The transit department will concentrate on procedural compliance and preventive maintenance to reduce the risk of spills and/or leaks associated with daily activities. To minimize potential blending with water or runoff, transit staff will adhere to policies that require swift remediation in the event spills do occur. Absorbents will be stored and located in areas where spills could potentially occur. Disposal methods of hazardous waste will be researched in advance and contact information will be posted to validate the disposal process.

An assessment of procedural practices and potential areas of concern was performed to establish a benchmark for the program. The assessment also includes drainage areas as well as a map of the properties which indicates the observed watershed patterns during heavy rains. Staff maintains a quarterly facility maintenance inspection program to keep facilities and equipment in good operating condition.

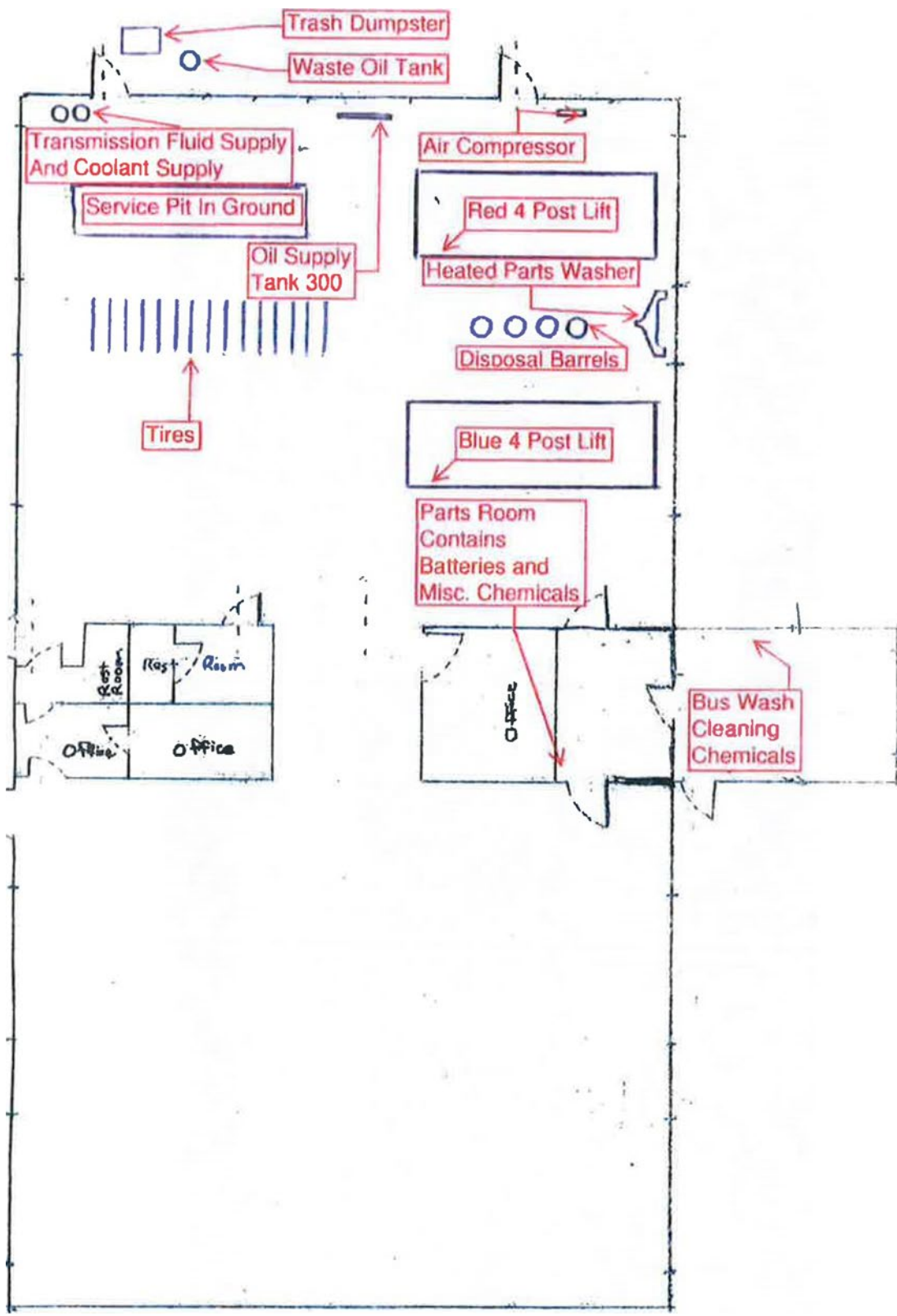
Future procedures will include assigning one department employee with the task of inspecting the predetermined areas of concern for spills, leaks or other potential contaminants. The department will continue its current practice of spot cleaning prior to steam cleaning the maintenance repair shop floors. Future design changes are anticipated to construct a trench drain at the base of the maintenance apron that will include an oil/sludge separator prior to being connected to the sewer system downstream.

Attached are the property assessments and training materials to be referenced by all department employees.

Attachment B

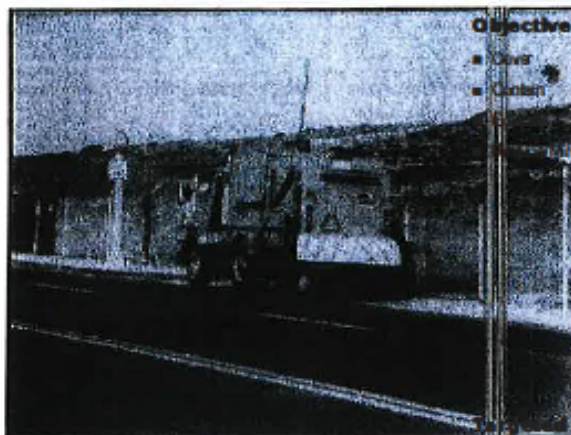
Transit Offices at 6821 Jenny Lind





Transit Maintenance Garage 6827 Jenny Lind Road

Vehicle and Equipment Fueling



Objectives

- Cover
- Contain

Minimize

Constituents

Sediment	
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>
Oxygen Demanding	

Description

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

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.

Pollution Prevention

- Use properly maintained offsite fueling stations whenever possible. These businesses are better equipped to handle fuel and spills properly.
- Educate employees about pollution prevention measures and goals.
- Focus pollution prevention activities on containment of spills and leaks, most of which may occur during liquid transfers.

Suggested Protocols

General

- "Spot clean" leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.



SC-20 Vehicle and Equipment Fueling

- Label drains within the facility boundary, by paint/stencil (or equivalent), to indicate whether they flow to an oil/water separator, directly to the sewer, or to a storm drain. Labels are not necessary for plumbing fixtures directly connected to the sanitary sewer but may be useful to help eliminate confusion about where the drain leads.
- Post signs to remind employees not to top off the fuel tanks when filling and signs that ban employees from changing engine oil or other fluids at this location.
- Report leaking vehicles to fleet maintenance.
- Install inlet catch basin equipped with a small sedimentation basin or grit chamber to remove large particles from stormwater in highly impervious areas. Proper maintenance of these devices is necessary.
- Accumulated non-contaminated stormwater (e.g., in a secondary containment) should be released prior to next storm.
- Ensure the following safeguards are in place:
 - Overflow protection devices on tank systems to warn the operator to automatically shutdown transfer pumps when the tank reaches full capacity.
 - Protective guards around tanks and piping to prevent vehicle or forklift damage.
 - Clearly tagging or labeling all valves to reduce human error.
 - Automatic shut off for severed fuel hoses.

Fuel Dispensing Areas

- Maintain clean fuel-dispensing areas using dry cleanup methods such as sweeping for removal of litter and debris, or use of rags and absorbents for leaks and spills. Do not wash down areas with water.
- 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" of vehicle fuel tanks.
- Design fueling area to prevent stormwater runoff and spills.
- Cover fueling area with an overhanging roof structure or canopy so that precipitation cannot come in contact with the fueling area and if possible use a perimeter drain or slope pavement inward with drainage to a blind sump (must be properly maintained and water properly disposed of); pave area with concrete rather than asphalt.

Vehicle and Equipment Fueling SC-20

- Apply a suitable sealant that protects the asphalt from spilled fuels in areas where covering is infeasible and the fuel island is surrounded by pavement.
- 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.

Outdoor Waste Receptacle Area

- Spot clean leaks and drips routinely to prevent runoff of spillage.
- Minimize the possibility of stormwater pollution from outside waste receptacles by using an effective combination of the following:
 - use only watertight waste receptacle(s) and keep the lid(s) closed, or
 - grade and pave the waste receptacle area to prevent runoff of stormwater, or
 - install a roof over the waste receptacle area, or
 - install a low containment berm around the waste receptacle area, or
 - use and maintain drip pans under waste receptacles. Containment areas and drip pans must be properly maintained and collected water disposed of properly (e.g., to sanitary sewer). Several drip pans should be stored in a covered location near outdoor waste receptacle area so that they are always available, yet protected from precipitation when not in use.
- Post "no littering" signs.

Air/Water Supply Area

- Minimize the possibility of stormwater pollution from air/water supply areas by implementing an effective combination of the following:
 - spot clean leaks and drips routinely to prevent runoff of spillage, or
 - grade and pave the air/water supply area to prevent runoff of stormwater, or
 - install a roof over the air/water supply area, or
 - install a low containment berm around the air/water supply area. Maintain containment areas and dispose of contaminated water properly (e.g., to sanitary sewer).

Inspection

- Aboveground Tank Leak and Spill Control:
 - Check for external corrosion and structural failure.

SC-20 Vehicle and Equipment Fueling

- Check for spills and overfills due to operator error.
 - Check for failure of piping system.
 - Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
 - Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
 - Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
 - Periodically, integrity testing should be conducted by a qualified professional.
- Inspect and clean, if necessary, storm drain inlets and catch basins within the facility boundary before October 1 each year.

Training

- Train all 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 best management practices.
- Train employees on proper fueling and cleanup procedures.
- Use a training log or similar method to document training.
- Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place stockpiles of spill cleanup materials where they are readily accessible.
- Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly and dispose properly.
- Store portable absorbent booms (long flexible shafts or barriers made of absorbent material) in unbermed fueling areas.
- Report spills promptly.
- Install an oil/water separator and connect to the sanitary sewer (if allowed), if a dead-end sump is not used to collect spills.

Other Considerations

- Carry out all federal and state requirements regarding underground storage tanks, or install above ground tanks.

Vehicle and Equipment Fueling

SC-20

Requirements

Costs

- 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.

Maintenance

- Clean oil/water separators at appropriate intervals.
- Keep ample supplies of spill cleanup materials onsite.
- Inspect fueling areas, storage tanks, catch basin inserts, containment areas, and drip pans on a regular schedule.

Supplemental Information

Design Considerations

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% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents runoff of stormwater to the 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. The paving around the fuel dispensing area may exceed the minimum dimensions of the "fuel dispensing area" stated above.
- 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 runoff of stormwater to the extent practicable.

Air/Water Supply Area

- Grade and pave the air/water supply area to prevent runoff of stormwater to the extent practicable.

SC-20 Vehicle and Equipment Fueling

Designated Fueling Area

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

Examples

The Spill Prevention Control and Countermeasure (SPCC) Plan, which is required by law for some facilities, is an effective program to reduce the number of accidental spills 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

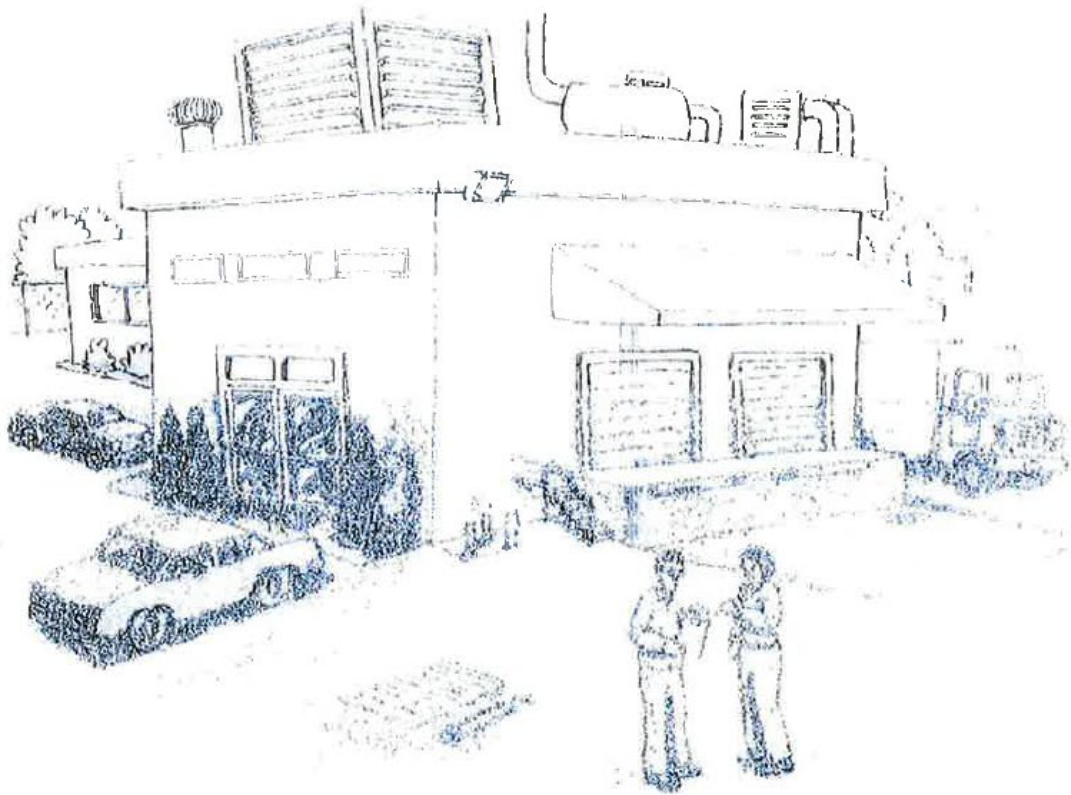
Best Management Practice Guide for Retail Gasoline Outlets, California Stormwater Quality Task Force. 1997.

King County Stormwater Pollution Control Manual –
<http://www.dnr.metrokc.gov/wlr/dss/spem.htm>

Orange County Stormwater Program
http://www.ccwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)

Best Management Practices For Industrial Storm Water Pollution Control



Sacramento
Stormwater
Management
Program

CONTENTS

Introduction

Part I: Recommended BMPs

Section Industrial Activity

1. Training and Education for Employees and Customers
2. Eliminating Improper Discharges to Storm Drains
3. Spill Prevention, Control, and Cleanup
4. Outdoor Process Equipment Operations and Maintenance
5. Outdoor Materials Storage and Handling
6. Waste Handling and Disposal
7. Vehicle and Equipment Washing and Steam Cleaning
8. Trucking and Shipping/Receiving
9. Fleet Vehicle Maintenance
10. Fueling Fleet Vehicles and Equipment
11. Building and Grounds Maintenance
12. Building Repair, Remodeling, and Construction

Part 2: Advanced BMPs and Structural Controls

Section Advanced or Structural Control

13. Loading Dock Design Features
14. Equipment Yard Design Features
15. Fleet or Equipment Fueling Area Design Features
16. Access Roads and Rail Corridors
17. Onsite Storm Water Management
18. Redirect Discharge from Storm Drain to Sanitary Sewer
19. Storm Water Management: Hydraulic Controls
20. Storm Water Management: Water Quality Controls
21. Storm Water Management: Removing Oily Contaminants

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Introduction: Storm Water Pollution Control for Industrial Facilities

Contaminated stormwater is a source of pollutants in the Sacramento creeks and rivers. Storm drains carry runoff from streets, urban centers, industrial sites, and open spaces into streams, creeks, and rivers. Industrial operations are only one contributor to this problem, but they are known to be a source of heavy metals, oily wastes, and other substances. Manufacturing, shipping, and storage operations that are exposed to storm water can be sources of pollutants in storm water.

Federal and state storm water regulations now require many kinds of industrial facilities to take steps to prevent storm water pollution. Based upon SIC codes and stormwater exposure, your facility may need to be covered under the **General Industrial Stormwater Permit**. If so, you need to prepare a *Storm Water Pollution Prevention Plan*, or SWPPP, that is in part a collection of **Best Management Practices** (BMPs are pollution control measures) like the ones described in this manual. If your facility is *not* covered under the General Permit, you will still need to implement BMPs to comply with local stormwater ordinances.

Storm water pollution, unlike some pollution problems, cannot be covered by one set of rules that applies to all industrial facilities. Regulated industrial facilities in Sacramento County range from manufacturing facilities covering several square miles to storefront distributors. Different plants can have very different storm water quantities, flow patterns, and potential pollutants. Even different facilities of the same general industry may need different approaches to preventing storm water pollution.

The BMPs in this manual are recommended by the Sacramento County Stormwater Program to help you prevent storm water pollution at your commercial or industrial facility; protect water quality in local creeks and streams, the groundwater basin, and rivers; and comply with storm water regulations. This manual is intended to help you identify and implement effective and economical measures for your facility.

BMPs include both operating practices and structural controls that can reduce the amounts of pollutants in storm water. You need to determine which of these may apply to your facility, and implement them as necessary. Specific regulations may vary from one municipality to another, so you should become familiar with local storm water ordinances in your community. Most cities within Sacramento County have their own Stormwater Ordinances.

This manual consists of two parts. The recommended BMPs in Part 1 are basic, everyday operational practices and relatively small structural or equipment requirements that can be effective in *preventing* pollution, reducing potential pollutants *at the source*.

In many industrial facilities, storm water pollution can be prevented with common-sense precautions and modest changes in routine operations or maintenance practices. The numbered sections are keyed to some industrial operations that are common to many kinds of facilities. The sections describe BMPs that typically can be applied to the operations. These practices alone might be sufficient to control storm water pollution for some industrial facilities.

In other cases, to prevent storm water pollution it will be necessary to establish new practices or build physical controls. Part 2 of this manual consists of "advanced management practices." The advanced BMPs require more costly or more intensive efforts to address pollutants that are not adequately controlled by the simpler operational BMPs. The advanced BMPs describe possible approaches if you need to go beyond the Part 1 BMPs.

Businesses operating in Sacramento County should be aware that in addition to the State's General Industrial Stormwater Permit which applies to certain industries such as manufacturing, mining, recycling, auto dismantlers, cement plants and hazardous waste treatment, storage and disposal facilities, all businesses must also comply with County and city stormwater Ordinances. For a copy of the County's Stormwater Ordinance Fact Sheet call Sacramento County's Department of Water Resources at (916) 874-6851.

Businesses should also be aware that the County has been required to by the State of California to begin conducting stormwater pollution compliance inspections at area businesses. Affected businesses include restaurants, gas stations, auto body and repair facilities, nurseries, equipment rental yards, auto dealers and General Industrial Stormwater Permit facilities. Inspections begin July, 2004.

Recommended BMPs for Storm Water Pollution Prevention

Part 1 of this manual contains BMPs that are recommended to control storm water pollution from particular industrial activities. Part 1 is divided into numbered sections. Each section describes industrial activities common to many kinds of industrial facilities, and contains a collection of BMPs tailored to that kind of industrial activity or operation.

As a rule the recommended BMPs in this part of the manual are intended to describe "state of the practice." These are the preferred operational techniques that pertain to each of the industrial activities, recommended to control potential storm water pollution that could result from that activity. Many of these practices are straightforward housekeeping activities, and many may already be in place at your facility. In general, the recommended BMPs are *pollution prevention* measures: they are geared toward reducing pollutants at the source in order to prevent the release of potential pollutants to storm water.

The recommended BMPs are to be implemented on an ongoing basis for the indefinite future. Operators of industrial and commercial facilities should expect to implement these BMPs or similar controls, wherever they would be effective at preventing pollutants from flowing with storm water from the site.

Review your current operating practices and, where they differ from the Part 1 preferred BMPs, modify your practices and train your employees in the new procedures. You need to evaluate your own facility and decide what works best, because storm water pollution control practices take a number of forms, and may include a wide range of solutions that are not included in this manual. Storm water pollution control may be guided by three general principles:

1) Prevent water from contacting working areas.

Shipping areas, outdoor equipment, material storage areas, vehicle maintenance spaces, and working areas of all sorts are subject to contamination with raw materials, process liquids, grease, oily wastes, Vehicle fluids, heavy metals, and miscellaneous potential pollutants. If you prevent storm water, wash water, or water from other sources from contacting areas

exposed to pollutants, you will be less likely to discharge pollutants into your storm drains.

- Keep rainfall from directly contacting working areas, by installing roofs, placing structures, or moving industrial operations indoors.
- Prevent *run-on* storm water from contacting industrial areas, indoors or out by using properly designed berms or grading. Run-on is water that flows across the industrial area. It picks up pollutants as it flows.
- Avoid practices where you use water that later enters the storm drains. - for instance, washing in outdoor areas. Most of these practices, including many that were acceptable in the past, are now considered to be "illegal dumping" of non-storm water to the storm drain.

2) Keep pollutants off surfaces that come into contact with water.

Evaluate your site carefully to identify all areas that are contacted by storm water, wash water, cooling water that is otherwise unpolluted, or other water that is allowed to be discharged to the storm drain. Then take special care to keep pollutants off these surfaces. That means controlling minor leaks and spills that you might otherwise overlook, and taking a close look at your operating routines and equipment to determine whether any substances are exposed to storm water that do not need to be.

3) Manage storm water before it is discharged to the storm drain.

If you can't avoid adding pollutants to storm water, you may need to remove pollutants to meet water quality requirements before discharge. Storm water control regulations, and this manual, consider treatment as a last resort and emphasize source control options because they are usually less costly and more effective in the long run. In this manual, treatment measures appear only under Advanced Management Practices.

If your facility is involved with manufacturing, fabrication, transportation, mining, recycling, salvage, cement production or hazardous waste treatment, storage or disposal it most likely should be covered under the State's General Industrial Stormwater Permit. Please call The Regional Water Quality Control Board at (916) 255-3000 for more details.

1. Training and Education for Employees and Customers

Successful storm water pollution control relies in large part on proper training and education of employees. **Periodic stormwater compliance training is a requirement of the State's General Industrial Stormwater Permit**

Train employees in these BMPs because a single employee's mistake or misunderstanding at the wrong time, in the wrong place, can lead to a costly pollution incident. When you have selected the BMPs that apply to your facility, add training in these BMPs to your regular employee training procedures.

Train employees to routinely inspect industrial activities and equipment that may be exposed to storm water. A once-a-week walk-through can help identify potential difficulties before they become major problems. Inspect structural BMPs to be sure that they continue to function properly.

Continue your training procedures in the future. Assign experienced workers to train new employees. Review procedures as a group at least once a year. You can coordinate this with worker safety training programs or "worker right-to-know" training for hazardous materials. It is always best to document any training that your employees receive.

Periodically check employees' work practices to be sure the BMPs are implemented properly. Post informational and reminder signs, such as: proper equipment wash procedures at designated washing areas; "Close the cover" signs at dumpsters and other storage areas. Stencil "No dumping!—flows to creeks" messages at storm drains. (Stencils are available from the Stormwater Management Program.)

Provide general information as well, because employees often respond best if they understand *why* they are being asked to conduct a new procedure. Employees' suggestions in return can help identify cost-effective storm water controls for your facility. Provide positive feedback so employees understand the difference they each make in protecting the creeks and rivers.

Emphasize the importance of keeping pollutants out of the storm drain, because the drains flow directly to streams and the rivers without benefit of the wastewater treatment that the sanitary sewers receive. Educate plant personnel about the harmful

environmental effects of improper disposal of materials into the storm drain, so they understand the importance of preventing storm water pollution. stormwater information pamphlets are available from the Sacramento Stormwater Management Program — see the back cover.

If you subcontract for small construction jobs, pressure washing services, or other work on your premises, be aware that you could be held responsible for violations caused by your contractor. Write contracts with your BMPs as conditions. Provide contractors with proper disposal options for wastes. Monitor contractors to be sure they comply with your BMPs.

To keep abreast of new developments, participate in workshops, trade association meetings, and seminars. Trade association publications can be valuable sources of information. Modify your practices whenever you find a new idea that serves your shop better.

If you serve customers at your facility, be aware of customer activities onsite. If they dispose of materials improperly, *you* will be responsible for the violation. Ask your customers not to discard liquids into your trash cans or storm drains. If you have persistent problems, you may need to monitor your customers more carefully at trash cans, storm drains, and other potential disposal areas on your property.

Let your customers know how you are minimizing wastes and recycling fluids to show that you are a "good neighbor," and encourage your customers to be the same. Showing clients what you are doing to protect the rivers is good public relations. Some businesses make the customer aware of their environmental requirements by including a modest environmental compliance fee itemized on customers' billing statements, to cover handling and disposal costs for hazardous materials.



Label storm drain inlets so employees do not dispose waste there.

2. Eliminating Improper Discharges to Storm Drains

The Industrial Storm Water General Permit and local ordinances, generally prohibit discharges of anything but storm water and clean, potable water to the storm drains. There are many ways in which non-storm water from industrial plants can enter the storm drainage system. In most cases, the discharges result from practices that are now illegal, even though they may be inadvertent or may have been permissible in the past. Industrial process water, building wastewater, and water from other sources such as commercial vehicle and equipment washing are prohibited, with a few exceptions described in Table 1. Inspect your facility and yard to be sure no unauthorized discharges enter your storm drains.

Unauthorized discharges take two forms. **Illicit connections** are improper permanent connections that allow wastewaters to enter storm drains, including some that may have been allowed in the past. Connections that allow sanitary or process wastewater to enter the storm drain are prohibited, including all storm drain connections from indoor drains or sinks.

Illegal dumping is water that has been exposed to industrial activities, as well as other discharges, that are released to the storm drainage system or to local waters. Pollutants may be introduced to storm drains inadvertently, by routine practices that discharge water outdoors; or by routinely discharging wastes, wash water, and other materials to storm drains, catch basins, and other conveyance facilities either on your property or in the street. A large part of this improper discharge results from employees' lack of understanding, coupled with a lack of readily-available proper routes for the discharge.

You need to make a long-term ongoing effort to assure that no illegal discharges will occur. This requires continuing observation to identify potential sources of intentional or inadvertent improper discharges. Discontinue or re-route the water from those activities. Continuing employee training will be needed. Measures to help prevent illegal discharges include:

- Provide well-marked proper disposal or collection methods for waste water wherever you frequently use wash water, discharge cooling water, or produce a liquid waste that might otherwise reach the storm drain.

- Employee training should especially emphasize proper disposal of non-storm water (see Section 1). Educate employees to understand that storm drains connect directly to streams and the rivers without treatment.
- Label all storm drain inlets and catch basins "No dumping-flows to rivers" so employees will know which inlets are part of the storm drain system.
- Periodically inspect and maintain storm drain inlets. Clean out catch basins so that accumulated pollutants do not wash down the storm drains.
- Consider protecting on-site drains with insert filters designed to capture pollutants common to your operations.

Table 1 is a summary of a 3-page table included in the **General Industrial Stormwater Permit**. The table identifies some common sources of water in industrial plants that can enter storm drains. For each source, the table lists the preferred disposal option for facilities in the Sacramento County. For water that is allowable for discharge to the storm drain, Table 1 lists conditions or restrictions on discharge.

A few discharge categories of special interest are:

- **Cooling tower condensate** for industrial process water must be discharged to the sanitary sewer, with the appropriate permits.
- **Internal coolant** for refrigeration or building air conditioning is prohibited from the storm drains.
- **Building air conditioner condensate** may be discharged to the storm drain *only* if it is not treated with algae inhibitors, corrosion control chemicals, or other additives. Do not allow it to run across parking lots or other paved surfaces that may be contact pollutants on its way to the storm drain; use a pipe or trough to direct the flow.

Storm drain Filters: Installing filters in your on-site storm drains provides extra protection. A wide variety of filters are available. Some simply filter sediments while others are designed to filter pollutants such as oil and grease. Some filters will readily fit inside standard drain openings, while others must be ordered to fit. It is very important that filters be maintained and replaced as necessary. Blocked filters can cause flooding or result in pollutant slugs to the storm drainage system.

Table I. Preferred disposal options for water discharges

Water Source	Preferred disposal option	Restrictions or permit needed	Possible options for reuse or recycle
Industrial process wastewater	Sanitary sewer	POTW permit	Reuse in-plant whenever possible.
Non-contact cooling water	Onsite reuse		Reuse in closed-loop cooling system (cooling tower).
• Uncontaminated	Storm drain if reuse is impossible	Storm water NPDES permit	
• Contaminated	Sanitary sewer	POTW permit	Treat and reuse
Industrial cooling equipment condensation		Storm water NPDES permit	Hold and apply to landscape
• Uncontaminated	Storm drain	Must be tested and shown to be uncontaminated	
• Contaminated	Sanitary sewer	POTW permit	
Building air conditioner condensation	Storm drain (if city allows)	Some localities require discharge to POTW with permit	
Building air conditioner coolant			Reuse in-plant whenever possible.
• Uncontaminated	Storm drain	Storm water NPDES permit	
• Contaminated	Sanitary sewer	POTW permit	
Storm water in outdoor secondary containment			
• Uncontaminated	Storm drain	Test to determine contamination	Pump and apply to landscaping (See Section 5)
• Contaminated	Sanitary sewer	POTW permit	
Storm water from outdoor material storage			
• Covered	No discharge	Zero contact with storm water	
• Open	Storm drain	Water quality inlet or similar treatment. (See Section 20) Storm water NPDES permit	
Roof drain water	Storm drain if no pollutants	Roof vents may be source of pollutants. See BAA/CMD air emissions regulation and Section 4	
Industrial equipment wash water	Sanitary sewer	POTW permit	Reuse in-plants whenever possible.
Vehicle maintenance wash water	Sanitary sewer	POTW permit	Capture and reuse for washing
Wash water from paved walkways in commercial and business districts	Sanitary sewer	POTW Permit	
Commercial exterior building wash water	Sanitary sewer	POTW Permit	
Landscape irrigation	Storm drain		Minimize water so none runs off.
Portable water and portable line flushing	Storm drain	Must be dechlorinated	
Fire fighting flows	Storm drain	Block downstream channels to detain for testing as hazardous waste.	

Source, Storm Water Industrial General Permit for the Sacramento County, Stormwater Management Program, January 1992. POTW permit. Permit to retreat and discharge is required from your wastewater authority (Publicly Owned Treatment Works)

BMQMD: Sacramento County, Department of Air Quality

*Biocides, corrosion inhibitors, or other additives are contaminants from a storm water point of view.

**Must comply with local water use restrictions during drought conditions.

***Potable water, swimming pool water and other chlorinated sources must be dechlorinated by aeration, retention, or chemical additives to a measurable chlorine standard before reaching receiving water. If the water is not dechlorinated it must be discharged to the sanitary sewer under a POTW permit

3. Spill Prevention, Control, and Cleanup

Small spills can have cumulative effects that add up to a significant source of potential pollutants in your storm water discharge. The best approach by far is to prevent spills and leaks: maintain a regular inspection and repair schedule, and correct potential spill situations before a spill can occur. Some prevention techniques are described in Sections 4, 5, and 6.

When a spill does occur, quick and effective response is the best way to prevent pollutants from reaching storm water. Prepare a set of well-defined procedures for responding to a spill of any liquids in an area that might be exposed to storm water. The procedures can be specific for your facility, and should consider all circumstances from small, minor releases that can be easily handled to a large emergency spill including who to call to respond to the situation before it gets out of hand. Train employees in the procedures (Section 1).

The basic procedures should emphasize that spills be cleaned up promptly, not allowed to evaporate. Otherwise, pollutants remain on the pavement and may be washed to the storm drains with the next rain, or will remain in the soil to become a possible groundwater pollutant. If the spill is on an unpaved surface, determine whether you need to remove the contaminated soil to prevent it from being a source of future storm water pollutants.

Also, the standard procedures should specify cleaning up leaks, drips, and other spills without water whenever possible. Do not use a hose to clean up a spill area. Hosing may remove the spill from the immediate area, but does not keep the pollutant out of the environment. On the contrary, it adds to the volume of the spill and spreads the spilled material around a larger area.

If you handle hazardous materials, spill prevention and response procedures are described in your hazardous materials management plan, filed with your fire department or other hazardous materials ("HazMat") authority (see Section 6). If a spill occurs, notify the authorities as required in your emergency response plan. Contain and collect the spilled substance, then dispose of the substances and any contaminated soil in compliance with hazardous materials regulations.

Small spills are those which can be wiped up with a shop rag. Don't put wet rags in the dumpster with the shop trash: store them in a covered rag bin, of the kind used at auto service stations. Avoid paper towels. You can avoid making this a waste stream by sending used rags to a professional cleaning service. (You need to inform your cleaning service of what the shop rags have been used for.) Do not saturate rags with gasoline, solvents, or other volatile liquids.

Medium-sized spills are too large to wipe up with a rag and require more attention. Contain and soak up the liquid using dry absorbent material such as vermiculite, specially-prepared sawdust, or "cat litter." Absorbent "snakes" may be used as temporary booms to contain and soak up the liquid. Sweep up the used absorbent and snakes and dispose of them appropriately: with the shop trash if non-hazardous, with the hazardous wastes if necessary. Another convenient option is to use a wet/dry shop vacuum cleaner to collect spills, and dispose of the liquid with your liquid or hazardous wastes. *Do not* use vacuums for gasoline, solvents or other volatile fluids, because the enclosed vacuum may become an explosion hazard.

Larger spills must be contained and then cleaned up. For spills of food waste or other non-hazardous liquids, take steps to contain and clean up the liquid, and minimize the wash water used in cleanup. Shut off or plug storm drain inlets or sewer inlets where the spill may enter. If necessary, keep temporary plugs or special covers on hand to block your inlets, and train employees on when and how to use them. For hazardous materials spills, implement your emergency procedures and alert your HazMat authority.



Wipe up small spills immediately with shop rags.

4. Outdoor Process Equipment Operations and Maintenance

Storm water from your site can accumulate pollutants by exposure to numerous small leaks, spills, and other discharges of outdoor equipment. Large equipment may require specially-designed structural or advanced BMPs to reduce the potential for storm water to contact pollutants. Ordinary precautions, such as those below, may suffice for smaller equipment

As a first step, identify all equipment at your site that may be exposed to storm water, or may discharge potential pollutants that may be exposed to storm water. Identify the kinds of pollutants each piece of equipment may generate -lubricants, coolants, and other possible sources of leaks or discharges.

Be creative and thorough in developing your list The inventory should include rooftop cooling towers or air conditioners; rooftop air vents for industrial equipment; outdoor air compressors and other service equipment; indoor wet processes where leaks or discharges may discharge to outdoor areas; and material transfer areas, such as loading areas where forklifts or trucks may carry pollutants outdoors on their tires.

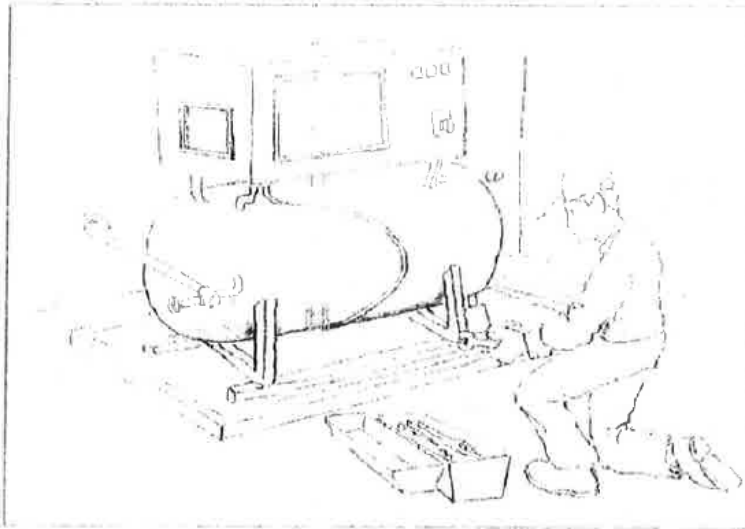
Using the equipment inventory, assign an employee to inspect each piece of equipment on a regular basis to see that it is functioning properly. This could be the employee responsible for operating the equipment if it is used regularly, or may be a maintenance staff member for equipment on the roof or in seldom-seen places. Inspect for leaks, malfunctions, and staining on and around the equipment, and other evidence of leaks and discharges. Assign the inspecting person to be responsible for reporting a spill. Develop a routine for taking actions on the report: cleaning up the spill, and repairing the leak to prevent future spills.

Where possible, take the next step toward full pollution prevention and make

modifications to prevent storm water from contacting the equipment or its discharges. Place equipment on an impermeable surface, or install a drip pan beneath potential leak points. To minimize the amount of rainwater that contacts the equipment, you may construct a simple roof and install a berm to prevent run-on and runoff. If the equipment requires a "wet" process - that is: operations that inevitably release wash water or process liquids - place it on a paved surface and install a connection to the sanitary sewer. Check with The County's Industrial Waste Section at (916) 375-6470 to identify appropriate permits.

Air compressors and other equipment sometimes produce small quantities of automatic blowdown water, which commonly contains lubricating oil or other potential pollutants. This may not be discharged to the storm drain. Connect the blowdown to the sanitary sewer. Or, if the compressor has a frequent small bleed, place a drip pan or catchments to collect the water -do not let it soak into unpaved surfaces or run off paved surfaces.

Condensate on exterior surfaces of compressors, building cooling equipment, and other machinery need not be collected for discharge to the sanitary sewer, but may be directed to the storm drain. Prevent buildup of puddles or pools of condensate under the equipment; route it to a storm drain so it does not pick up pollutants while it flows across your site.



Keep drip pans under outdoor equipment to contain drips and leaks, especially during maintenance. Consider placing a simple shed roof over this sort of equipment.

5. Outdoor Materials Storage and Handling

If you handle **bulk solid materials** outdoors, keep them covered, in appropriate containments, and protected from storm water. Apply this policy for raw materials, products, by-products, and construction materials or supplies. Materials of concern include gravel, sand, lumber, topsoil, compost, concrete, packing materials, metal products, and others.

Store the material in one of these ways:

- The preferred method is storage on a paved surface with a roof or covering so that no direct rainfall contacts them, and with appropriate berms or mounding to prevent run-on of storm water. Roofs are required by most municipalities for new facilities.
- Where a roof is not feasible, store on a specially constructed paved area with a drainage system. Pave the area with a slope of about 1.5% to minimize water pooling. Prevent runoff and run-on with berms or curbing along the perimeter. For many materials, the preferred alternative will be the installation of *no drain* and the testing and pumping of ponded water to the sanitary sewer, a treatment system, or offsite disposal, as appropriate. Discharge to the storm drain is not allowed for most materials.
- Where a drain is allowed, install longitudinal drains that lead to treatment facilities or water quality catch basins along the lower edge of the pad. You may need a permit from your wastewater authority to discharge to the sanitary sewer, or may need the Regional Board to allow special provisions in your storm water NPDES permit (the General Permit).
- As a temporary arrangement, place the material on a paved surface and cover it with tarps or plastic sheeting, secured with weights or ropes. If possible, choose a mounded or bermed area that will prevent run-on of storm water through the material. Move the materials to a permanent storage place as soon as possible.

Parking lots or other surfaces near bulk materials storage facilities should be swept periodically to remove fines that may wash out of the materials and wash away with storm water. Larger bulk material storage facilities will need more extensive structural

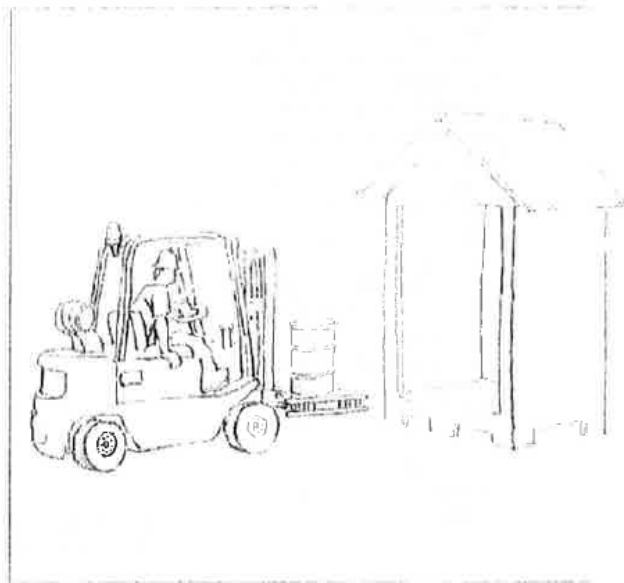
controls designed for the specific facility and material. **Avoid tracking materials off-site.**

Hazardous materials need to be stored in accordance with federal, state, and local HazMat requirements. The requirements are generally more than adequate to prevent storm water pollution -for instance, HazMat secondary containment may have *no drain*.

If you store **liquid containers**, implement a plan and a design to control unexpected leaks and spills so the liquid does not reach storm drains or surfaces that will be exposed to storm water. If you store hazardous materials, the spill prevention plans required by your HazMat authority are adequate to ensure storm water protection. Non-hazardous materials storage should also incorporate spill control designs and procedures.

Select a storage method appropriate for the type of material. Keep liquid tanks in a designated area on a paved impermeable surface and within a berm or other secondary containment. Keep outdoor storage containers especially, in good condition. Inspect containers regularly for damage or leaks, as described in Section 4. Clean up any leaks or spills immediately (using dry methods, described in Section 3), and repair the leaks promptly.

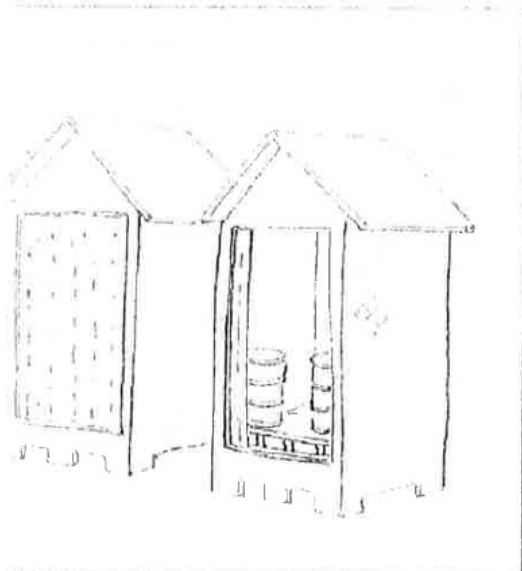
"Doghouse" sheds are one way to keep storm water away from barrels and materials kept outdoors, and provide spill control at the same time.



If the materials frequently leak during transfer, or the materials generally cause a wet environment when using or storing them, the area may need to be connected to the sanitary sewer (permitted by your wastewater authority), and should be covered and bermed to minimize contact with storm water.

Some localities *require* that secondary containments be connected to sanitary sewers, and prohibit any hard-plumbed storm drain connections within the secondary containment. On the other hand, large storage facilities and tank farms that have high-capacity bermed areas may receive rainfall over a wide area, and much of it may not contact the tanks or equipment; these might be better-served by a storm drain. As a rule, large facilities like this need site-specific storm water pollution prevention designs.

For smaller storage tanks, storage in roofed areas can prevent all contact with storm water (in combination with well-designed spill control procedures). Store liquids in a shed where one is available. New sheds, even if temporary, can be costly because of building permits and fire-code requirements. A possible option is the "doghouse" design used by some firms (illustrated). The roof and flooring prevent contact with direct rain or run-on storm water. Since it has only two walls, most fire departments do not require sprinklers. The flooring is wire mesh above secondary containment, so most HazMat authorities accept the structure for storing hazardous materials. (A permit may be required by local building or planning



departments.)

Storm water in secondary containment areas often accumulates from direct rainfall into open containments. Water that has contacted storage vessels or the pumping and transfer equipment associated with storage and handling, is considered to have contacted industrial activities and may not be discharged to the storm drains.

You may wish to roof the containment to avoid this problem. If that is not possible, or you wish to avoid the cost, you need to identify an acceptable disposal for water from the containment. One common solution is a portable pumping system that can be moved to accommodate separate containment structures on your site. The equipment can pump water into a truck or portable temporary holding tank. The water then can be tested and disposed according to whether any pollutants are present. Some disposal options are:

- If it meets criteria to be defined as hazardous waste, employ a certified hazardous waste hauler for disposal at a permitted hazardous waste facility.
- If it contains constituents similar to process wastewater for which your onsite wastewater pretreatment facilities are designed, pre-treat the water and discharge to the sanitary sewer.
- If it meets standards for your industrial discharge permit, discharge it to the sanitary sewer without pretreatment (if your wastewater authority permits).
- Reuse it on your site in an appropriate manner: industrial process water, equipment wash water, steam cleaning makeup, or another use where the water will eventually be discharged as industrial or sanitary wastewater. You may need to invest in a truck or plumbing to convey the water to its reuse location.
- If it is free of hazardous constituents, use it on your facility grounds for landscape watering. Don't apply the water to landscaping if hazardous pollutants are present -even if not concentrated enough to be hazardous waste -because the pollutants may accumulate in the soil or vegetation, and create a health hazard over the long term.

6. Waste Handling and Disposal

Table 2 summarizes the preferred storage and disposal practices for some common industrial facility wastes. For many wastes, reusing or recycling is the most cost effective means to prevent potential pollution. Fluids that you hold for recycling are special categories of hazardous waste. You may store them on your site only for short periods, in accordance with hazardous waste requirements, but they can be transported under somewhat less stringent requirements than other hazardous wastes. Many recycling services have special variances or permits that reduce your paperwork requirements and allow shipping at reduced cost.

Keep general shop trash in a dumpster with the lid closed. Put the dumpster in a paved area, not on unpaved soil or your lawn. Keep the area clean by picking up dropped trash and sweeping the area regularly, but don't use a hose to clean up - keep water off the area. Nearly all dumpsters and trash compactors leak; keep liquid wastes out of them, and keep them closed to keep storm water out.

If you can't prevent leakage from trash containers, install a roof or lean-to that keeps direct rainfall off, and place asphalt curbing or berms around the dumpster to contain the leaks. (Check with your local agencies and comply with fire codes and building permits.)

If you store scrap metal or other materials outdoors, keep them under a roof, cover, or tarpaulin. Keep scrap parts or other used metals indoors when possible. Oils and other potential pollutants can wash off long after you think the parts have been washed clean. Collect waste metal, such as used parts and metal lathe filings, for delivery to a scrap metal dealer.

If you store empty drums outdoors, do not hold them longer than necessary. Ship them to a drum reconditioner or another facility.

- Drain them completely to avoid spills.
- Seal them properly watertight, to keep storm water from entering; otherwise, the water would become a process wastewater, and can't be dumped to the storm drain.

Store and handle hazardous wastes properly. Hazardous materials or wastes are not a storm water problem if they are handled in accordance with state and federal regulations, and the requirements of your local HazMat control authority.

Keep hazardous waste and materials indoors or under cover in a locked area, to keep nighttime trespassers away. Store them before disposal in special hazardous waste containers, or closed drums within a secondary containment that is approved by your HazMat authority.

Table 2. Preferred waste handling & disposal methods

		Recommended Storage	Preferred disposal	Hazardous Waste
General plant wastes	Used parts: clean metal scrap	Bin (covered or indoors)	Scrap collector	No
	Used oily parts, contaminated	Drum	Hazardous waste hauler	Yes
	Metal shavings	Bin (covered or indoors)	Scrap collector	No
	Used rags	Rags bin with lid	Rag laundry	Possibly
	Soiled cleanup absorbent	Drum	Hazardous waste hauler	Yes
	Coolant from air conditioner or refrigeration equipment	Recycling machine	Reuse in-house (HVAC service company)	No
Liquid waste	Paints*	Original container, with lid	Hazardous waste hauler	Possibly
	Waste lubricating oil	Drum (segregate)	Oil recycler	Special**
	Solvents, thinners, and miscellaneous fluids	Tank ("hot" waste) (segregate different fluids to make recycling possible)	Solvent recycler (where possible) or waste hauler	Possibly
Liquid containers	Empty drums	Indoors or under cover	Drum reconditioner	Possibly
	Empty cans, bottles, aerosol cans, etc	Drum	Municipal trash or hazardous waste hauler	
Vehicle waste	Waste motor oil,	Drum (segregate)	Oil recycler Hazardous waste hauler	Special**
	Brake fluid, gear oil, hydraulic fluids, etc	Bottle or tank ("hot" waste)		Yes
	Antifreeze	Tank (segregate)	Recycler Battery supplier	Special**
	Batteries	Open rack: Covered or indoors	Tire hauler	Special**
	Tires Oil filters	Drum (drain first)	Oil recycler	No Special*

*Unused pure product may sometimes be returned to the vendor rather than disposed as waste. **Apply under special hazardous materials restrictions

For information about handling solid wastes that might be controlled under hazardous waste regulations, contact the County's Hazardous Materials Division at (916) 875-8550, or Cal-EPA's Toxic Substances Control Division. (See the rear cover for a list of regulatory agencies).

Empty containers such as storage barrels, oil cans, paint buckets, aerosol cans, and similar containers are hazardous wastes if they once held hazardous materials. You may not discard these with the regular trash. They must be stored properly so they do not leak outdoors. Some drum suppliers accept empty drums for reuse, under less-stringent hazardous material recycling regulations.

Vehicle maintenance waste materials often deserve special attention. Waste oil, antifreeze, spent solvents, and some other liquids can be recycled. Spent batteries may not be discarded with trash, but must either be disposed as hazardous waste, or returned to the dealer from whom you purchased them, for reclamation and reuse.

7. Equipment Washing and Steam Cleaning

Wash water for industrial equipment in most cases must be discharged as process wastewater to the sanitary sewer, and is not allowed in storm drains. To clean dirty, greasy field equipment or trucks you must install equipment to capture, pre-treat, and discharge the wash water to the sanitary sewer as industrial process waste. It may be less costly in the long run to locate a commercial car wash which has all the appropriate equipment and municipal permits, and to contract with them for washing services offsite.

If you wash vehicles or equipment on your site, you may do so only in a designated area, designed and equipped as follows:

Establish a designated wash area. It should be a covered, properly graded pad that drains to the sanitary sewer, or to a sump or tank that is serviced by a licensed waste hauler.

The wash pad should be graded to flow to the drain and surrounding areas should be graded to flow away from the pad.

Proper grading and covering the pad with a roof will help prevent stormwater from running in and creating additional costs.

Contact the Sacramento Regional County Sanitation District at (916) 875-6470 for information regarding discharging to the sanitary sewer.

Steam cleaning should be done on your site *only* if you are equipped to capture all the water and other wastes. All the washing requirements above apply to steam cleaning as well. Steam cleaning wash water may not be discharged into the storm drains. Discharging it into the sanitary sewer may require a permit from your wastewater authority and there may be pre-treatment requirements, such as an oil/water separator. You will also have to determine whether it is a hazardous waste. If you steam clean, do it indoors or in a specially prepared outdoor working area where you collect the wash water and treat it for discharge.

8. Trucking and Shipping/Receiving

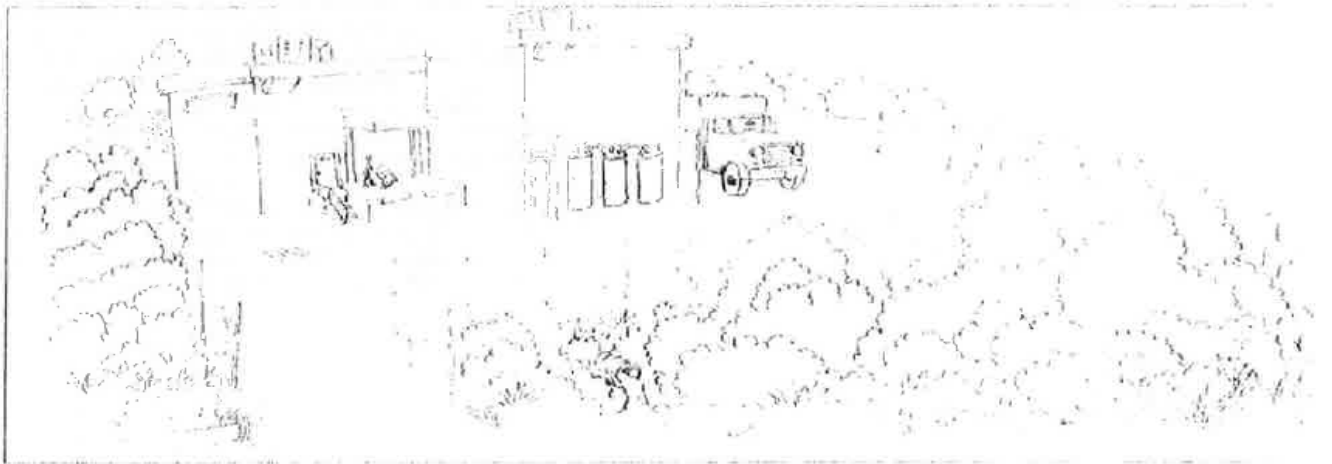
Truck loading and unloading are potential sources of pollutants when rainfall and run-on comes in contact with spilled raw materials, sediment, and motor fluids that accumulate in this heavy-traffic area.

Load and unload raw materials, products, and other materials only at designated loading areas. In that way, you can isolate the potential source to areas that you can control, rather than unspecified areas throughout your site. The best areas from a storm water point of view are indoor bays. For facilities that must use an outdoor loading dock, some operational BMPs and simple design features can control storm water pollution.

- Cover the loading dock area with a roof overhang, or use a door skirt that fits snugly to both the building door and the truck door.
- Install curbs or berms around the loading area to prevent storm water from running on and any spilled material from running off. Accumulated liquids should be pumped out with a portable pump to the sanitary sewer unless concentrations exceed allowable limits. In those cases the material must be treated or shipped offsite.
- Designate the person who accepts the shipment, the truck driver, or someone else to check under the truck for leaked motor fluids, spilled materials, debris, and other foreign materials.
- If you own and operate the truck, make the driver responsible for identifying and reporting the spill — large or small.
- If you receive shipments from trucks operated by others (a trucking company or suppliers' trucks), i.e. the drivers are not your employees, have the person who signs for delivery responsible for inspecting for spills, leaks, and debris before the trucks leave.
- Detail a procedure so that a maintenance crew cleans up spilled materials promptly.
- If you have a small company that cannot spare a crew, make the driver responsible for cleaning up after unloading or before departing with a full load.
- If you identify the loading dock as a significant source of potential pollutants in your SWPP Plan, implement further control measures such as those described in Section 13.

If you load or unload liquids, you need further operational precautions and the loading dock needs further design features. If you handle hazardous materials, all the features you need are probably in place as part of a spill control and response plan. If they are not, you should select structural BMPs such as those described in Section 13.

Parking lots and access roads are sources of potential pollutants from the trucks themselves and from possible spills or leaks of the materials being trans-



Stormwater runoff from industrial roofs, trucks, parking lots, and yards flows into storm drains and directly into creeks and rivers. It never receives treatment that would remove pollutants.

ported. If you are re-grading roads and parking lots, or if you transport materials that you expect to be significant sources of potential storm water pollutants, follow the structural BMPs recommended in Section 16. For existing facilities, especially smaller parking lots and short driveways where no hazardous materials are transported, you can effectively prevent storm water pollution by implementing routine maintenance activities, such as:

- Visually inspect your access roads and parking lots regularly to identify and clean up spills.
- Remove solid debris as soon as operations permit
- Clean up liquid spills promptly, as if they were on your shop floor.

Conduct street sweeping-style cleanups periodically to remove loose debris, small amounts of spilled raw materials, road dust, and other potential pollutants.

- Smaller spaces can easily be swept by hand.
- Do not hose off paved surfaces.
- For larger spaces, use a vacuum truck or mechanical sweeper (that collects solids, not just brushes them aside). Whenever possible, do not use a wet-washing street sweeper unless you can collect the polluted wash water.
- Private corporations or your municipality might perform the work on a contract basis so you need not purchase the truck.



During the dry weather season, the appropriate frequency of sweeping for your facility depends on how heavily the road is used and the kinds of materials you transport. Some signs that you need to sweep more frequently:

- If your trucks commonly spill or drip bulk, or if you notice debris or other materials accumulating on the access roads. The correct frequency is the one that prevents unwanted materials from accumulating.

During the wet weather season, emphasize sweeping at times that will best prevent storm water from contacting potential pollutants:

- Clean the area once thoroughly in the fall, before the wet weather season begins.
- After that, you may stay close to your dry-season needs for debris removal, but add an additional thorough cleaning before a major rainfall.

Dispose of the cleaned-up material with your regular facility trash if there are no hazardous materials. If you suspect it may be hazardous -if you handle hazardous materials, or if you know of a significant motor oil leak, for example -you should test the material or dispose of it with your facility's hazardous waste. You could face substantial penalties if you improperly dispose of hazardous waste.

If you park trucks or heavy equipment on site: inspect the parking area for leaks of oil and motor fluids and design a procedure to report them, clean them up, and repair the leaking vehicle. Some practical techniques include:

- Designate consistent parking spots for each vehicle so that if a leak is indicated on the ground, the truck can be identified and repaired.
- Designate a responsible person to check under a vehicle for leaks or spills. If you employ drivers, the driver could be responsible as part of a vehicle check before driving.
- Clean up spills promptly, using dry cleanup procedures described in Section 3. Conduct the preferred cleanup procedures for unpaved as well as paved areas.
- Develop a reasonable procedure for identifying, reporting, repairing, and cleaning up leaking motor fluids and spilled materials and make sure employees are fully trained in the procedures

9. Fleet Vehicle Maintenance

Sections 9 and 10 of this manual summarize some of the appropriate BMPs for fleet maintenance at an industrial facility.

Whenever possible, perform vehicle maintenance in an indoor garage, not in outdoor parking areas. If you change oil and do other routine engine work outdoors, you need to create a designated area for vehicle maintenance. Keep the area clean as if it were part of your shop floor and use dry cleanup practices. The area should incorporate some specific design features, as described in Sections 14 and 15. Some operational methods also can be successful at preventing storm water pollution at vehicle maintenance areas. A few suggestions:

- Keep equipment clean; don't allow buildup of grease and oil, which will wash away when the equipment is exposed to rain.
- If you work on vehicles outdoors, keep drip pans or containers under the vehicles at all times while you work on them -leaks and spills occur unexpectedly. Place drip pans under vehicles as soon as you detect a leak.
- Drain fluids from any retired vehicles kept onsite for scrap or parts. Out-of-service vehicles you intend to restore and vehicles being held for resale should be checked periodically for leakage.
- Don't change motor oil or perform vehicle or equipment maintenance in the parking lot or storage yard; use the vehicle maintenance area. Don't allow customers or employees to change their personal vehicles' oil in your vehicle service areas.
- Vehicle parking or storage yards need to be operated with some similar precautions:
- Inspect equipment in the yard for fluid leaks regularly - perhaps with a walk-by inspection for ground staining every day, and a closer visual inspection once a week.
- Keep the equipment yard clean and clear of debris, using dry sweeping methods as in Section 8. **Do not hose off the area or wash with water, because any runoff becomes an illegal discharge to the storm drain.**

- Maintain the yard's storm drain inlet(s) with special care. Clean them on a regular schedule and also after large storms. Pay attention to the kinds of potential pollutants that accumulate, so you can identify the sources and take measures to control the sources.
- Consider fitting your storm drains with filter inserts, for added protection.

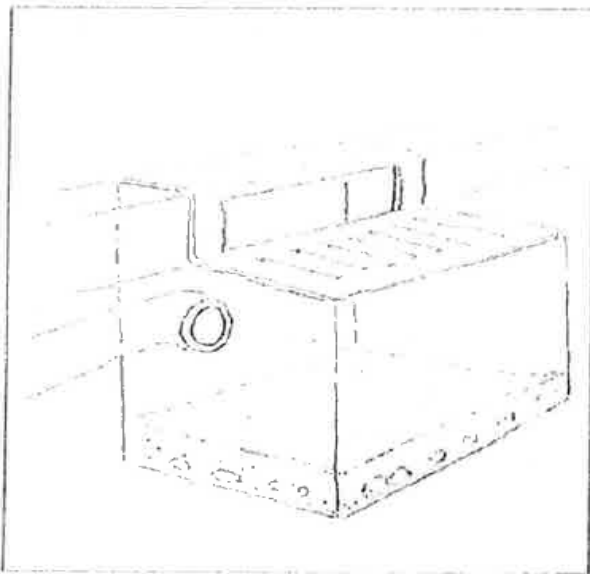
10. Fleet Vehicle and Equipment Fueling

If you have a vehicle fueling area it should be designed and operated to minimize spilled fuel and leaked fluids coming into contact with rain water. This section describes general principles, but simple operational controls may not be adequate for an industrial fueling facility. You may need to re-design your fueling area or install structural controls. Section 14 describes some general design approaches that may be useful. Some immediate, short-term steps you can take for proper operation of a fueling area include:

- Use a paved area or provide a concrete slab for the fueling area - never place it on open ground. Concrete is preferred because fuel and oils cause asphalt to deteriorate.
- Clean up gasoline overflows and spills using dry methods as in Section 3. Do not allow spills to run off or evaporate, and **do not flush the spill away with a hose**. Spread absorbent material; sweep it up with a broom, and dispose of it as a hazardous waste.
- Post signs that instruct pump operators not to top off or overfill gas tanks. **Keep dry cleanup materials in the fueling area** and instruct employees in the dry clean up methods described in Section 3. Assign someone responsibility to check the area every day for gasoline, motor oil, or other fluids that may have leaked.
- When you do routine cleaning, use a damp cloth on the pumps and a damp mop on the pavement rather than spraying with a hose, in order to minimize water going into the sump.

The main concept is to respond properly to fluid leaks in this spill-prone area. Even very small spills, when they happen every day, add up to a lot of fuel in the drainage system. This is an improper discharge that is illegal under the General Permit and is also a violation of the County's Stormwater Ordinance. Small spills do not present a problem if the fueling area is designed to handle spills - that is, if no storm water contacts it, and if it drains to a sump. But if the area drains to a valved-off storm drain or sewer connection, it must be pumped out before the valve may be opened during a rain fall.

Fuel tanks, including temporary tanks, need to be permitted by your HazMat authority. They will specify design features such as size of containments. Keep temporary fuel tanks in a bermed area that has an impervious lining, such as concrete or a heavy-gauge plastic liner.



A catch basin helps keep debris and sediments out of the storm drain, but needs to be cleaned out periodically.

11. Building Maintenance and Grounds Upkeep

Building maintenance and general outdoor cleanup should use the same principles as parking lot cleanup and spill prevention: clean up without water whenever possible, by sweeping or wiping; wash with as little water as possible; prevent and clean up spills; and clean up debris so it does not reach the storm drains.

If you **pressure wash** outdoor surfaces, the resulting discharges may not go into the storm drain. Drains should be temporarily blocked and the resulting discharges should be recovered for discharge to the sanitary sewer. In some cases, it may be legal to discharge to a landscaped area providing the discharge is not hazardous, does not overflow the area, and does not result in nuisance conditions. Contact **BERC** at (916) 364-4110, for a copy of Sacramento Stormwater Program's pressure washing BMP guidelines.

Arrange **rooftop drains** or downspouts so they don't drain directly onto paved surfaces. Connect them directly to a storm drain instead. Alternately, allow water to flow onto a grassy surface, if the grassy area is large enough that it can accept the roof's entire runoff from a medium-sized storm -that is, no water runs across the grassy area into a paved area except in the largest of storms.

Clean your on-site storm drain inlets to remove sediment and debris at least twice a year - late in the dry weather season before the first storm, and after the first major storm of the wet weather season. After each large storm, inspect the inlet; remove debris; and determine whether you need to remove sediments or do other maintenance.

The storm drain inlet may have a **catch basin**: a below-grade chamber where the storm drain pipe connects. Catch basins are intended to collect debris and sediments to prevent clogging the lines. Therefore, the catch basins themselves must be cleaned out periodically to prevent flooding. If you clean catch basins annually, shortly before the wet weather season, you can keep them flowing freely and remove leaves, sediments, and other materials that would otherwise be washed down the storm drain. Don't flush the catch basin with water: use a shovel or vacuum device to remove the materials. Other useful design features, such as vegetated ditches and water quality improvement inlets, are described in Sections 19, 20, and 21 as advanced BMPs.

Part 2: Advanced BMPs and Structural Controls

Some industrial operations and plant situations require more extensive measures to control storm water pollution. All but the smallest and least complex industrial facilities are likely to require some structural modifications. Depending on your facility, and your success at eliminating potential sources of storm water pollution, your long-term implementation plan may need to include more or fewer of these advanced BMPs.

The BMPs in this section are more extensive and, in general, more costly than the recommended BMPs in Part 1. These BMPs include structural controls storm water management measures that require constructing new facilities or installing new equipment. Not all of the advanced practices are necessary for every facility, and some will not be of use in some facilities.

You will need to evaluate your own plant to determine which BMPs are applicable to your operations, and which combination will best succeed at controlling the storm water pollutants that may run off from your site. It may prove helpful to hire a consultant, or contact **Sacramento's Business Environmental Resource Center (BERC)** for free and confidential compliance assistance. You may find you have more of a choice in selecting structural BMPs, unlike in implementing basic recommended practices. Evaluate and select controls that are adequate and most cost-effective for your site.

The BMP descriptions in Part 2 are not complete design standards, but describe the central principles you need to consider in identifying and controlling storm water pollution from various sources in your plant. The Sacramento Stormwater Management Program has developed a guidance manual for on-site stormwater quality control measures that may be helpful in determining what source control measures are appropriate for your facility. Contact the City of Sacramento at (916) 433-6369, for more information.

Advanced pollution control practices take a number of forms, and may include a wide range of solutions that are not listed here. You may develop other approaches that are more effective for your facility.

Or, you may need to develop and implement further BMPs than the ones described in this manual. If you conduct more complex activities, especially activities that are unavoidably exposed to storm water, you will need to develop more intensive source control and storm water management BMPs.

If you are renovating your shop or building a new facility, you should evaluate installing some of these structural controls even if the shop does not currently have a pollution problem with that specific area. Some of the structural measures in this section are much less costly to install during new construction than to retrofit afterwards.

For example, if you re-grade an equipment parking area, you should consider storm water design criteria even if the yard has not been in violation of standards in the past. If you put off implementing the measures, future more-stringent requirements may require these same measures to be retrofitted, which can be much more costly than if you do it while constructing a new facility or renovating for other reasons.

If your principal sources of pollutants do not originate with industrial activities, you may need to control sources that are not specifically named in the General Permit, such as: pesticides and fertilizers from landscape maintenance; oil and antifreeze from autos in large employee parking lots; and cooling water or equipment lubricants from large building ventilation and cooling equipment. Sacramento County shares a municipal stormwater permit with the cities in the County, that requires the reduction of pollutants in storm water from *all* sources, including businesses, and they may request your cooperation in developing controls for your pollutant sources that go beyond the BMPs in this manual.

Sand blasting can be controlled to keep particles off of paved surfaces and out of storm drains.

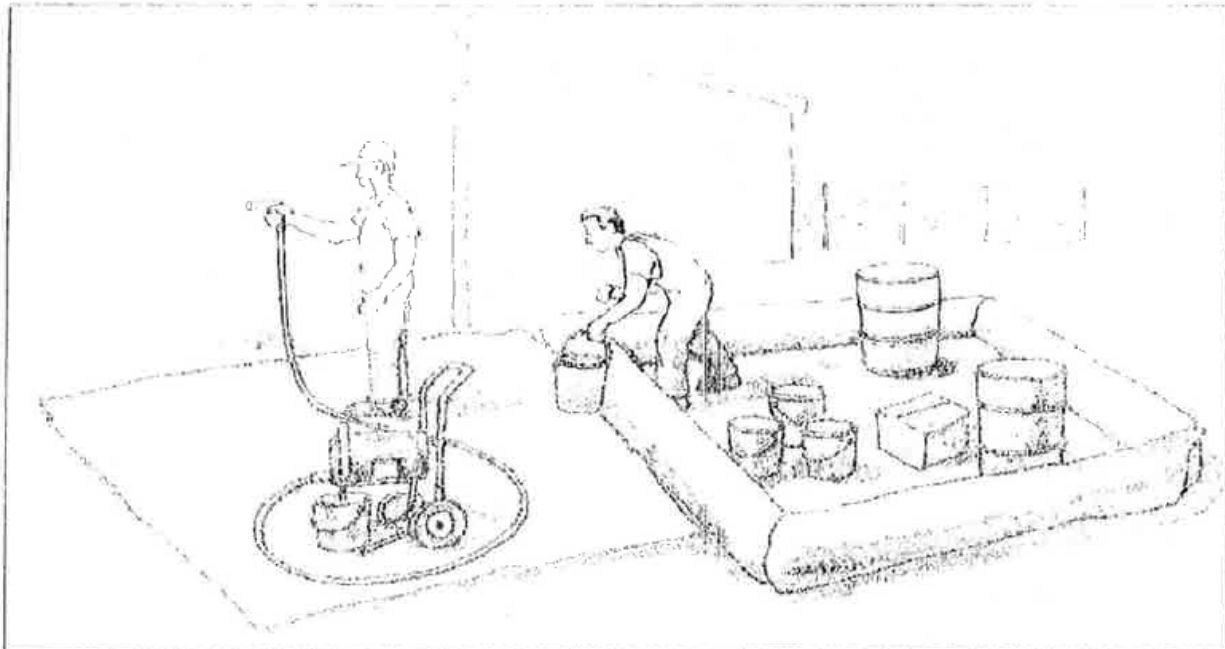
Place tarps beneath your work to capture the blasting medium and particles from the surface being cleaned.

- Hang tarps or drop cloths to enclose the area, using temporary scaffolding if necessary. Arrange the drop cloths to protect the work area from wind, and to capture airborne particles.
- Curtail operations on a windy day.
- Clean up frequently: collect dust and particles from the drop cloths before you produce too large a pile to handle easily.

Wood preservatives, pavement seal coating, and other outdoor surface treatments commonly contain metals, pesticides, solvents, or polymers that are hazardous materials. Handle and dispose of them properly, as follows:

Apply only as much of the chemical as the surface can absorb or as needed to cover the paved area.

- Soak up excess chemicals with absorbent material or rags rather than allowing them to flow to the storm drains or soak into the soil.
- If the chemicals spill, clean up promptly using dry techniques; see Section 3.
- When sealing pavement, prevent the sealant from reaching the gutters or drains. Use absorbent booms, or stuff rags into storm drain openings.
- When treating a roof with wood preservative or sealant, line the gutters with rags. Dispose of the rags properly: with your hazardous waste if the substances you are using are hazardous.
- If you clean a roof or sidewalk before applying preservative, sweep thoroughly to remove loose particles first and then wash with water if necessary.
- Collect wash water from downspouts or drains where possible and remove particles.
- Avoid applying surface treatment chemicals during the wet weather season.



Outdoor painting requires practices to prevent paint and dust from becoming storm water pollutants.

12. Building Repair, Remodeling, and Construction

This section describes some relatively simple BMPs that apply to minor building repairs, remodeling, and minor construction projects at an industrial facility that involve industrial activity exposed to storm water.

Larger-scale projects, such as construction of new facilities, are covered under a separate General Permit for construction which requires more extensive storm water pollution prevention measures than described here. For information regarding construction site stormwater requirements call the County Stormwater Management Program (See rear cover).

Before you begin a construction or repair project, familiarize yourself with typical Construction BMPs to identify and implement the appropriate practices. If those BMPs do not apply, or are unduly elaborate for a simple construction activity that will be completed in a short time, consider the following BMPs described in this section:

Store building materials under cover or in contained areas, using BMPs discussed in Section 5. For outdoor storage at a construction site, select a pollution prevention method such as:

- Put weighted tarps over piles of wood, gravel, or other materials. Don't wait for forecasts of rain - do this every day, to avoid being caught unaware. Also, it will keep materials from blowing off the pile and contributing pollutants to runoff later.
- Keep the working area clean every day for the same reason. Sweep up wood splinters, paint chips, and other residues every day, as well as a thorough cleanup at the end of the project.
- Protect nearby storm drains with filters and gravel filled check bags if the project is outdoors.

Painting requires some basic procedures.

- Before painting, while you scrape to remove old paint, spread a tarp to collect dust and paint chips. If the paint contains lead or tributyl tin, dispose of the paint chips as hazardous waste.
- Mix paints indoors before starting work.
- Use tarps while you paint and place in-use paint buckets in a pan or on plastic sheeting.

- At the end of the work day, store paint buckets and barrels of materials away from contact with storm water.
- Treat a paint spill as a chemical spill: capture it before it flows to the storm drain, and clean it up promptly using dry methods.

During painting cleanup, proper procedures are:

- If you use water-based paint, clean brushes and equipment in a sink connected to the sanitary sewer. **Never discharge paint or rinse water to the storm drain.**
- Clean up oil-based paint where you can collect the waste paint and solvents to be handled as small quantity hazardous waste -do not pour it to the sink or to a storm drain.
- Keep leftover paint, solvents, and other supplies for a later use, or deliver them to a solvent recycler with other plant wastes when you ship a batch.
- Handle empty paint cans and other containers as described in Section 6. Containers may be small-quantity hazardous waste. Latex paint cans are not hazardous waste if the paint is dry.

Do not fall back on old cleanup practices from days when storm water pollution was not known as a problem. Do not pour leftover paint down the storm drain or onto the ground. Do not clean brushes into the storm drain or pour buckets of cleanup water to the drain, or wash spilled paint down the storm drain with a hose. These practices are now categorized as "illegal dumping" and may result in fines.

Spray painting requires a few extra precautions.

- Use temporary scaffolding to hang drop cloths or draperies to shield you from the wind and to collect overspray.
- Arrange the draperies to minimize the spreading of windblown materials.
- Be aware of air quality restrictions on spray paints that use volatile chemicals. Consider a water-based spray paint for better air quality compliance.

13. Loading Dock Design Features

Loading docks may require more intensive pollution controls than the operational BMPs described in Section 8. This is especially true of areas where you load or unload liquids in containers. Bulk liquid transfers are a more intensive industrial operation that requires specific control designs, and are not addressed in this manual.

Additional features of a properly-designed loading dock include:

- Grade the loading area to be sloped or recessed to direct flow toward an inlet with a shutoff valve, or toward a dead-end sump.
- Make sure the inlet includes a sump with enough capacity to hold a spill while the valve is closed.
- Keep the valve closed at all times except when you need to release clean storm water.
- Preferably, this inlet should connect to a sanitary sewer rather than a storm drain. Check with your wastewater treatment authority for permitting requirements.

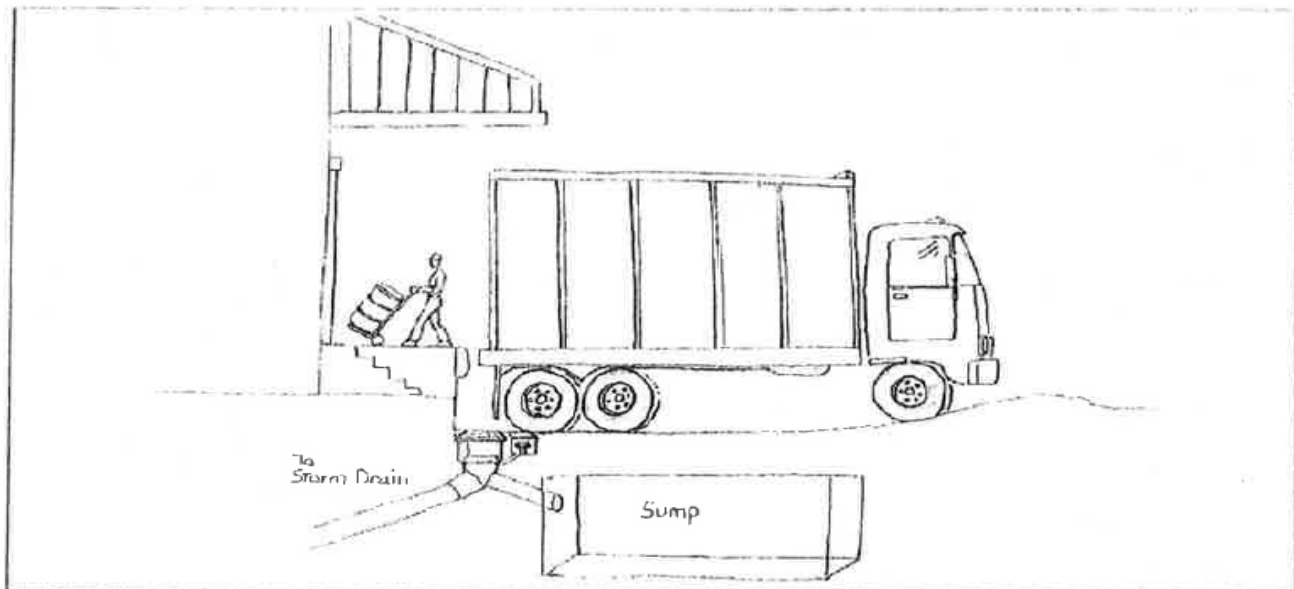
Consider completely preventing contact of storm water with the loading dock area, using a roof and berms, as described in Section 8. This will both avoid washing potential pollutants into the drain and avoid discharging clean storm water to the sanitary sewer which can result in additional sewer fees.

If the inlet connects to a storm drain:

- Accumulated liquid must be tested and found to contain *no pollutants* before opening the valve for discharge.
- If the liquid does contain pollutants, you need to pump it from the sump and discharge to your sanitary sewer if the wastewater treatment authority agrees to accept it. (See the recommendation below.)

If the inlet connects to a sanitary sewer..

- Accumulated liquid must be tested and found to be within the parameters specified in your wastewater discharge permit before opening the valve for discharge.
- If you cannot discharge to the sanitary sewer, you need to convey the liquid to a hazardous waste disposal facility.



A dead-end sump provides secure spill control, but any accumulated liquid need to be pumped out, tested, and properly disposed. Use berms or slopes to prevent run-on so storm water is not added to waste in the sump.

14. Equipment Yard Design Features

Parking and storage yards for large vehicles and heavy equipment generally require site-specific structural and operational controls. Follow the operational BMPs for vehicles recommended in Sections 7, 8, 9, and 10. Also assess your equipment yard to determine possible sources of pollutants, and install appropriate controls to keep potential pollutants out of the storm water. Design approaches may include:

- Grade the area to slope to a longitudinal drain, or install curbs to direct all storm water to a storm drain in the yard. If your yard is not too large and is properly designed, it should drain to a single storm drain. Even a small yard should include a storm drain on your property, and not rely on a city-operated drain in the street.
- If you determine that the equipment yard is a large source of oily materials in your storm water, consider fitting the inlet(s) with a sand filter (see Section 20) or removing oily pollutants (see Section 21).

Segregate the area where you service vehicles, and install special structural controls:

- If possible, perform all work indoors, or construct a roof over the specified area. This will require a building permit and compliance with appropriate fire codes.
- Pave the service area surface with concrete, not asphalt. Vehicle fluids may dissolve asphalt, or may be absorbed into the blacktop and released later.
- Drain the surface to a single drain, preferably connected to a sanitary sewer. The drain may require an oil/water separator or oil/grease trap, and must be approved by your wastewater treatment authority.
- Grade the working area to be higher than the parking lot, or surround it with a berm, to prevent storm water run-on.
- Construct a special area in which to segregate your "dirtiest" equipment (roof tar equipment, asphalt paving equipment, etc.) Handle its discharges, leaks, and runoff separately. This approach could save you from the need to treat *all* the runoff from the equipment yard.

15. Fleet or Equipment Fueling Area Design Features

If your facility's vehicle fueling area is a significant source of pollutants, you may need more intensive BMPs than the operational efforts described in Section 10. Some design features to consider are:

- Cover the fueling area to prevent rain from falling directly on the area. Install a roof over the fueling island, the area where vehicles park while fueling, and as much of the approach area as practical. Leaked engine fluids and spilled fuel inevitably accumulate on the pavement in these heavily trafficked areas.
- Storm drain and sewer inlets that drain the fueling area must be equipped with a shutoff valve to keep fuel out of the drain in the event of a spill from the pumps. The valve should be kept closed at all times except during a rainfall.
- Curtail fueling activities when the valve must be open, or use extra precautions to capture any spilled fuel, such as a large drip pan under the vehicle.

A number of different approaches may serve as effective drainage design. The fueling area needs to be separated from the rest of the yard, both to contain any fuel spill and to prevent storm water from running on. Select or adapt a scheme such as one of these:

- Grade the fueling area to be "mounded" or elevated.
- Install berms around the area that are high enough to redirect water from a large storm.
- Grade the entire fueling area to drain to a single inlet. You can accomplish this with longitudinal drains at the perimeter along the "downhill" side of the fueling area, or with a depression in the middle of the fueling area. Either way, be sure to design the grading to avoid run-on.
- At the inlet, either install a sump, from which you will pump any accumulated liquids; or connect to a sanitary sewer, after checking to get all the permits the wastewater authority may require. The sump or connection should be operated as suggested for a loading dock area in Section 13.

16. Access Roads and Rail Corridors

Access roads and rail corridors can be significant sources of pollutants for some industrial facilities. In the General Permit, access roads and rail corridors are defined as "industrial activities exposed to storm water" that you must include in identifying potential sources and selecting BMPs for your SWPPP.

Maintenance and operational BMPs for access roads are the same as those described for vehicle access and parking areas under Section 9. Some structural BMPs are described below.

Proper drainage design is a good place to start. Generally, this means the roads should be crowned and sloped outward; and that storm water should not be allowed to drain across the road, but be carried in ditches or culverts alongside the road. Grass-lining the roadside ditches can be an effective way to remove storm water pollutants -see Section 20. Maintain the ditch to be sure it does not clog or fill with sediments, allowing storm water to overflow. Planting vegetation by the roadside can help to control erosion and to promote rainwater infiltration.

If your site includes railroad access, an important source of pollutants is the **preservatives on wooden railroad ties**. Use a less-toxic preservative; avoid organic toxics such as creosote and pentachlorophenol. Or use concrete ties or other non-wooden ties.

Control spills and dust from railroad unloading. If your rail line delivers or picks up liquids, in bulk or in containers, you may need to add spill-control loading docks with shutoff valves. (See Section 3 for spill controls, and Section 13 for loading dock design features). If parked railroad cars drip, install a drip pan at the loading dock between the rails.

17. Onsite Storm Water Management

Some industrial facilities may still find potential pollutants exposed to storm water even after implementing source control measures like the operational BMPs in the first part of the manual and the structural source controls above. Further structural controls can be used to manage the storm water itself, either to control the flow of the runoff (described in Section 19), to remove some of the pollutants in passive devices (Section 20), or to remove pollutants using specially designed equipment (Section 21).

The best way to avoid the need for storm water management or treatment is to use source controls, most likely in combination. The right combination for your facility will probably include conscientious implementation of BMPs such as those recommended in Sections 1 through 12 of this manual, attention to the sources of waste at your facility, and careful reduction of process wastes.

If you need to manage storm water onsite, the most important consideration is to minimize the quantity of storm water that contacts potential pollutants. For example, keep the area of industrial activities as small as possible; separate the area from parking lots, to prevent run-on; and roof or enclose the area if possible.

Design your storm water conveyance system to *isolate* the areas where storm water contacts potential pollutants, and convey water from those areas separately from water that runs off of "clean" and non-industrial parts of the site. This will allow you to control storm water with smaller and less-costly hydraulic or water quality controls. Or, if you plan to discharge to your wastewater treatment authority (Section 18), reducing the volume will reduce the discharge cost and increase the willingness of your wastewater authority to accept the discharge.

18. Redirect Storm Water Discharge from Storm Drain to Sanitary Sewer

If source control BMPs are not adequate to prevent discharging pollutants in storm water from your facility, you may need to cease discharging storm water that contacts those pollutants. One way to avoid discharging potential pollutants with storm water is to isolate runoff from that part of your facility where the pollutants are contacted and discharge the storm water to the sanitary sewer rather than a storm drain.

Installing new connections and new piping can be quite costly, and the required permits may be a barrier, so this could be a costly BMP. Also, it will require a permit from your local wastewater authority. The permit will specify the volume of water you may discharge, the kind of pretreatment equipment you may need to install and operate, and requirements for monitoring your discharge.

Your wastewater treatment authority, as a rule, would prefer to minimize the volume of storm water that passes through the treatment system. You should reduce the quantity of storm water you redirect, using techniques like those described in Section 17.

The wastewater authority may require temporary storage of your storm water onsite, to avoid overloading their facilities during a storm. Your authority is more likely to accept discharge of storm water that has contacted pollutants if you can store it temporarily and deliver it *after* the high flows from a storm event.

Contact the Sacramento Regional County Sanitation District (SCRSD) at (916) 875-6470 for more information regarding their requirements.

Storm Water Management: Hydraulic Controls

Hydraulic controls are intended to control *quantity* of storm water discharge, but can be useful for water *quality* as well by removing potential pollutants from storm water. BMPs of this type are widely used to control erosion of hillsides and to remove sediments from storm water runoff. Also, hydraulic-control BMPs can help to remove oils and heavy metals that adsorb to sediment particles in storm water.

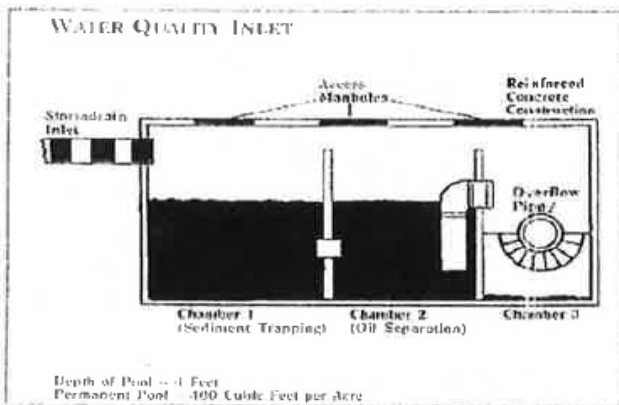
Hydraulic controls are designed for one of two purposes. One category serves to control the rate of **peak flow**, slowing the flow of water at the height of the storm to reduce its potential to carry away soils and other contaminants. The other type reduces volume of runoff, generally by causing some storm water to *infiltrate* (or soak into the soil) rather than running off into storm drains, streets, or streams. Some approaches control both peak rate and volume.

Hydraulic controls for a site are most effective if the overall site design is considered. The first step generally is to modify the site layout to increase the water-permeable surface, to increase infiltration and reduce runoff volume. If greater flow control is needed, the second step may be to strategically place *infiltration trenches* to intercept runoff and promote infiltration. (Infiltration may not be permitted in some areas -see Section 20.) For large quantities of flow, onsite ponds can be designed either to slow the peak flow of storm water or to hold water onsite until it infiltrates or evaporates. These are known as **detention ponds** or **retention ponds**. A variation is the **storm water wetland**, which similarly controls flow while wetland vegetation helps remove pollutants.

19. Storm Water Management: Water Quality Controls

A number of specific storm water management controls are better suited to water quality control than hydraulic control. These features may be added to various parts of the storm water conveyance system on an industrial site to help control potential pollutants in the storm water before it leaves the site. They are for the most part passive design features rather than treatment devices in the usual sense. Information in existing references gives design parameters for these water quality controls, so this section merely summarizes a few types of controls.

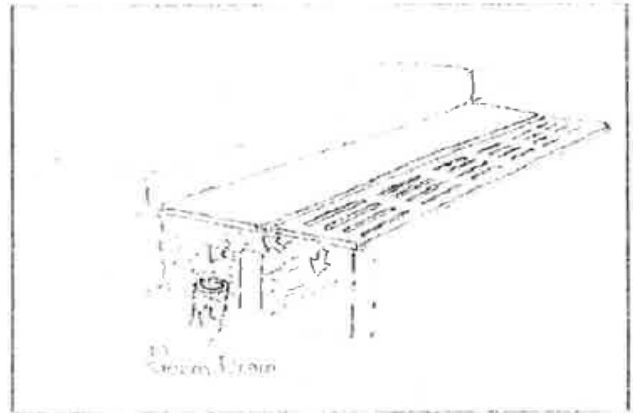
A simple technique is a **vegetated swale or channel**, a ditch that carries storm water in which grasses or plants are permitted to grow. The plants provide some peak flow control by slowing the water. They also remove some pollutants by encouraging the deposition of sediments and minor oily wastes. This control can be retrofitted to some existing storm water conveyance ditches simply by allowing grasses to grow, if it does not interfere with storm water drainage and cause water to back up onto the site.



An API separator is only partly effective at removing oily wastes, but is more effective at removing sediments than an ordinary catch basin.

A water quality inlet is a simple multi-purpose device, shown in the diagram above. A storm drain inlet is fitted with an enlarged catch basin or grit chamber where solids and sediments settle out of the water. A baffle restricts the flow of surface-floating oil, which can be removed by hand later. Floatable debris also collects at the baffle. This type of inlet has in the past been used to help remove oily wastes, but is of limited

effectiveness. Section 21 describes the inlet further, including its maintenance requirements.



A sand filter inlet can remove some pollutants before they enter the storm drain.

A **sand filter inlet** is a storm drain inlet that contains sand or another filter medium. The sand removes particulates and oily wastes from storm water as it enters the storm drain. An extension of the same concept is a **sand filter**, where storm water quality can be improved before discharge. Sand filters appear to be particularly effective if used in combination with detention or retention ponds, by diverting the first-flush of runoff (often carrying the most pollutants) to the filter and routing the remainder of the water to the pond.

Many of these water quality controls can be designed either of two ways: to control potential pollutants before discharging water to a storm drain; or to remove unwanted constituents and then direct the storm water into the ground as an *infiltration* device. Any of these controls that use infiltration techniques, or others designed specifically to promote infiltration, (porous pavement, infiltration trenches, and others), may be restricted or prohibited in some municipalities as potential sources of ground water contamination. Dry wells for disposal of storm water are illegal under State and Federal Law.

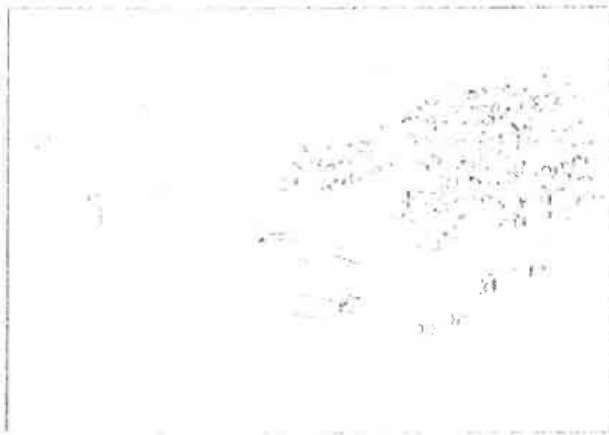
20. Storm Water Management: Removing Oily Pollutants

A simple technique to remove oils and grease from storm water uses **oil-absorbent materials** (or *oleophilic* materials), such as the booms used to contain oil spills. The absorbent material preferentially absorbs oil, and does not fill with water, so it can be used on storm water with small concentrations of oily materials.

Some facilities that have storm water conveyance ditches in which water flows all season long, have found it convenient to install a permanent floating boom to control an occasional light surface sheen. When the boom is spent, it is full of oil and is visibly heavier, floating lower in the water. The booms are inexpensive enough that they may easily be replaced whenever the absorbent is saturated. Disposal is more costly, since they may be considered a hazardous waste, unless an oil recycler can accept the material.

Oil/water separators are a broad category of devices that are intended to remove oily constituents. There are many varieties of oil/water separators, and the term is not used in the same way by all equipment vendors or design specifications.

For most applications, oil/water separators are *not recommended* as a storm water management strategy. Source control BMPs are strongly preferred. Oil/water separators are fairly costly, and most designs do not operate best at the low concentrations commonly



Oil-absorbent booms can remove oily sheen from storm water. Vegetation in an open ditch can slow the flow, helping sediments settle.

present in storm water. A sand filter inlet is typically more effective, and less costly, for the small quantities and low concentrations of oils in routine storm water runoff -that is, runoff that has not directly contacted oily industrial activities.

Separators may be useful in limited applications. They are sometimes useful as a retrofit measure to temporarily help a facility comply while it installs more effective source control BMPs. Another use is in spill control sumps, upstream of a treatment process. The advanced designs are sometimes used as a treatment device (that will discharge to a sanitary sewer) for storm water that contacts industrial activities in isolated areas where contact cannot be avoided.

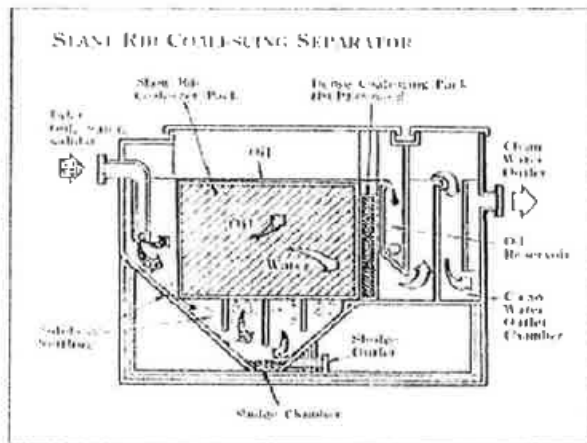
The API oil/water separator is a simple design, named for the American Petroleum Institute. The API separator is sometimes called an "oil and grease trap," to distinguish it from a true oil/water separator used for industrial wastewater. An API separator (see page 24) usually is a long basin with multiple chambers or vaults, typically installed below grade. It can be fitted to storm drains or storm water inlets in a variety of configurations. The water quality inlet described in Section 20 is one form. The intent is to slow water and stratify the flow so that oil rises. The floating oil is then retained by one or more baffles in the chambers.

An API separator removes the bulk of floating oily wastes, especially if the oil is not well-mixed but floats on top of the water. However, it is not highly efficient, so storm water can still be unacceptably polluted even after it flows through the inlet. The separator works by concentrating oily wastes within the chamber, so inevitably some of the collected wastes are carried away during heavier storms. It can be made somewhat more effective at oil removal if it includes pads or pillows of oleophilic material at the water surface level.

If you install an API separator, it *must be maintained* regularly. It requires a standing pool of water which should be pumped out periodically and replaced with clean water. The contaminated water that comes out is accepted by some commercial oil recyclers for recycling; otherwise, it must be handled as hazardous waste. If you install oil-absorbent pillows, the pillows must be closely monitored and replaced when they are saturated. They also are disposed either as hazardous waste or sent to a recycler. If the inlet includes a sediment trap, as in the water quality inlet shown in Section 20, remove solids with a shovel between storms and dispose of properly.

Develop a regular cleaning schedule appropriate for your facility. For inlets that don't carry much flow, three cleanings per year are sufficient: once before the rainy season (mid-September) to remove materials that have accumulated; once after the first major storm; and once at the end of the rainy season to prevent slow loss or evaporation of the collected oily wastes. If storm water flow is greater, the API separator may need to be cleaned monthly, or periodically between storms. As another guideline, clean the separator before three inches of oil accumulate in the entry chamber.

The CPI, or coalescing plate interceptor oil/water separator, is a more advanced design. These are common for treatment of oil-bearing industrial wastewater, but are less often cost-effective for storm water. The CPI separator generally achieves greater removal efficiency than an API type, but is more costly to purchase and operate. A CPI separator can attain a high removal efficiency, and accommodate a fairly high flow rate, but at ever-increasing capital costs for the equipment (by adding more separator plates). The best economics generally apply for relatively high concentrations of oil at low and constant flow rates.



Courtesy of Green Lakes Environmental, Inc.

A CPI separator can be very effective at removing oil but requires upstream sediment control and can be costly to maintain.

A few design features can improve the effectiveness of an oil-water separator. Pollution removal effectiveness is highest if the concentration is high when the storm water enters the unit. Avoid diluting the water to be treated with water from other parts of the site, where it does not contact the potential pollutants, both to save on the capital investment and

to increase treatment effectiveness. For industrial process applications, an evaporator can be used reduce the volume of water treated.

An oil-water separator works best if sediment is not present in the water -limit your water to be treated to isolated areas, free of mud and soils if possible. Efficiency is highest with a fairly steady flow, so you may require upstream detention. Also, don't site the separator downstream of a pump, because the pump mixes the oil and water and partially emulsifies the oil; so separators are less effective.

Storm water treatment generally is *not recommended* as a BMP. Some of the devices described in Section 21 may be considered to be treatment by the state or by your local wastewater treatment authority, which can open the door to some burdensome regulatory restrictions and permitting requirements.

For most industrial facilities, the best advice about onsite storm water treatment is to avoid it, for a number of reasons. Most of the available treatment equipment is costly to purchase and to receive permitting approval for. Operational costs can also be significant - you must monitor the equipment to assure continued effectiveness, and may need to prepare and submit chemical analyses to demonstrate continued compliance.

Further, in most places in Sacramento County treatment of storm water means you must discharge it to the sanitary sewer rather than into the storm drain (as described in Section 17). In effect, water on which you perform treatment is no longer considered to be storm water, but industrial wastewater instead. You may need to obtain or modify a discharge permit from your local wastewater authority or your municipality.

The most troublesome permitting procedures are for hazardous materials. Before installing any treatment equipment, determine whether your waste water is a hazardous waste. Cal-EPA/Toxics or the County Environmental Management Department can describe the necessary testing and approval procedures. If the wastewater that would enter the pretreatment equipment is considered to be hazardous you must obtain a permit from Cal-EPA/Toxics to operate a hazardous waste treatment facility. At present this may be true even for a simple water quality inlet. If you determine that the waste stream is not hazardous, and do not apply for a hazardous waste treatment permit, keep your testing documentation on hand to show regulators.