AI: 87366

MSR002543

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MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

INDUSTRIAL STORMWATER NOTICE OF INTENT (ISNOI)

FOR COVERAGE UNDER THE INDUSTRIAL STORMWATER GENERAL NPDES PERMIT MSR00 2543

(NUMBER TO BE ASSIGNED BY STATE)

INSTRUCTIONS

Applicant must be the owner or operator (i.e., legal entity that controls the facility's operation, or the plant/site manager, not the environmental consultant). The owner or operator that receives coverage is responsible for permit compliance. File at least 60 days prior to the commencement of the regulated industrial activity.

Submittals with this ISNOI must include a Storm Water Pollution Prevention Plan (SWPPP) with the minimum components found in ACTs 5-8 of the Industrial Stormwater General Permit. In addition, a United States Geological Survey (USGS) quadrangle map (or a copy) showing site location and extending at least 1/2 mile beyond the site's property boundary is required. If a copy is submitted, provide the name of the quadrangle map that is found in the upper right hand corner. Maps can be obtained from the MDEQ, Office of Geology at 601-961-5523.

ALL FORM BLANKS MUST BE COMPLETED (enter "NA" if not applicable)

THE APPLICANT IS: ■ **OWNER** ■ **OPERATOR (PLEASE CHECK ONE OR BOTH)**

OWNER INFORMATION

Owner Contact Name: Scott Cooper **Position:** Quitman Facilities Manager

Owner Company Name: Howard Industries

Owner Street (P.O. Box): P.O. Box 1588

Owner City: Laurel **State:** MS **Zip:** 39441

Owner Phone Number: (601)-425-3151 **Owner Email:** scooper@howard-ind.com

OPERATOR INFORMATION (if different than owner)

Operator Contact Name: _____ **Position:** _____

Operator Company Name: _____

Operator Street (P.O. Box): _____

Operator City: _____ **State:** _____ **Zip:** _____

Operator Phone Number: (___)_____ **Operator Email:** _____

O.C

FACILITY INFORMATION

Facility Name: Howard Industries - Quitman Facility

Nature of Business (Include 4-digit Standard Industrial Classification Code (SIC) and description):

SIC Code: 335311 Power, Distribution, and Specialty Transformer Manufacturing

Receiving Stream: Archusa Creek

Is receiving stream on MDEQ's 303(d) List? ☒ Yes ☐ No

Has a TMDL been established for the receiving stream segment? ☐ Yes ☒ No

Physical Site Address:

Street: 101 Box Lane **City:** Quitman

County: Clarke **Zip:** 39355

Latitude: 32 degrees 02 minutes 01 seconds **Longitude:** 88 degrees 43 minutes 48 seconds

Method Used to Determine Lat & Long (GPS of plant entrance) or Map Interpolation): Map Interpolation

Attach a copy of any existing laboratory data for each storm water outfall. If multiple sampling has been performed, provide a summary for each parameter, including sampling dates and the minimum, average and maximum values.

Is this a SARA Title III, Section 313 facility utilizing water priority chemicals at threshold amounts? ☐ Yes ☒ No
If yes, please attach a list of water priority chemicals present at the facility.

DOCUMENTATION OF COMPLIANCE WITH OTHER REGULATIONS/REQUIREMENTS

Is this notice for a facility that will require other permits? ☐ **Yes** ☒ **No**

If yes, check which one(s): ☐ **Air,** ☐ **Hazardous Waste,** ☐ **Pretreatment,** ☐ **Water State Operating,** ☐ **Individual NPDES, or list Other(s):**

How will sanitary sewage be collected and treated? Sanitary wastewater is discharged and treated at local POTW

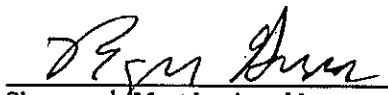
Indicate any local storm water ordinance with which the facility must comply and submit any documentation of approval.

Is treatment of storm water provided at any outfall? ☐ **Yes** ☒ **No**

If yes, please describe: _____

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Signature[1] (Must be signed by operator when different than owner)

August 14, 2024

Date Signed

Roger Gunn

Printed Name[1]

Vice President

Title

[1]This application shall be signed according to the General Permit, ACT 16, T-9, as follows:

- **For a corporation, by a responsible corporate officer.**
- **For a partnership, by a general partner.**
- **For a sole proprietorship, by the proprietor.**
- **For a municipal, state or other public facility, by principal executive officer, the mayor, or ranking elected official.**

After signing please mail to: **Chief, Environmental Permits Division**
MS Department of Environmental Quality, Office of Pollution Control
P.O. Box 2261
Jackson, MS 39225

STORM WATER POLLUTION PREVENTION PLAN

HOWARD INDUSTRIES — QUITMAN
MULTIPURPOSE MANUFACTURING
500 ARCHUSA AVENUE
QUITMAN, MISSISSIPPI 39355

EnSafe Project Number:
0888806911

Prepared for:

Howard Industries — Quitman
Multipurpose Manufacturing
500 Archusa Avenue
Quitman, Mississippi 39355

August 2024

711 Avignon Drive
Ridgeland, Mississippi 39157
601-981-4880 | 601-981-4773
www.ensafe.com

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August 2024

Prepared by:

Emily Bess
Environmental Compliance Specialist

Reviewed by:

Brian Derry, PE
Project Manager

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STORM WATER POLLUTION PREVENTION PLAN CERTIFICATION

This Storm Water Pollution Prevention Plan (SWPPP) was prepared for Howard Industries, Quitman, Mississippi in accordance with best management practices and in accordance with the factors outlined in 40 Code of Federal Regulations 122.26 as appropriate. It has the full approval of management at a level of authority to commit the necessary resources to ensure full SWPPP implementation. This SWPPP will be implemented as described herein and will be reviewed and evaluated annually.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the site, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Roger Gunn, P.E. — Signature

8/20/24 — Date

ROGER GUNN, P.E. — Name

VICE-PRESIDENT DIVISION 3 — Title

NON-STORM WATER CERTIFICATION

I certify under penalty of law that the facility has been evaluated for the presence of non-storm water discharges. This evaluation was performed through repeated observations of the facility's outdoor storage and work areas during periods of dry weather. I certify that, to the best of my knowledge, no non-storm water discharges exist at the facility as of the date. A Non-Storm Water Evaluation and Certification Form is included in this Storm Water Pollution Prevention Plan and evaluation must be performed when non-storm water is observed during **monthly** facility inspections.

Roger Gunn, P.E.
Signature of Responsible Facility Official

8/20/2024
Date

ROGER GUNN, P.E.
Name of Responsible Facility Official

RECORD OF STORM WATER POLLUTION PREVENTION PLAN REVIEW AMENDMENTS Howard Industries – Quitman Facility				
Date	**Reviewer**	**Section**	**Amendments**	**Responsible Party Initials**
August 2024	EnSafe Inc.	All	Initial Plan Creation	EB

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TABLES

APPENDICES

1.0 INTRODUCTION

Howard Industries – Quitman, Mississippi (HI Quitman) facility's Storm Water Pollution Prevention Plan (SWPPP) has been prepared with the goal of improving water quality by reducing pollutants contained in storm water discharges.

The pollution prevention approach in this SWPPP focuses on three major objectives:

- Identifying sources of pollution associated with industrial activities that are potentially affecting the quality of storm water discharges from the facility.
- Describing and ensuring implementation of practices to minimize and control pollutants associated with industrial activities that are entering storm water discharges from the facility.
- Ensuring compliance with the terms and conditions of the facility's National Pollutant Discharge Elimination System (NPDES) permit.

This SWPPP describes the implementation of best management practices (BMPs) at the facility to eliminate or reduce the number of pollutants in storm water run-off from industrial activity areas to the maximum extent practicable (MEP). BMPs include both structural and nonstructural (operational) practices. Structural practices include secondary containment basins, storm water diversionary curbing, drain plugs, and similar items constructed or installed to eliminate or reduce the amounts of pollutants in storm water run-off. Nonstructural (operational) practices are also referred to as source controls and include standard operating procedures, schedules of activities, prohibitions on practices, and other management actions that are intended to eliminate or reduce the number of pollutants in storm water run-off.

1.1 Regulatory Drivers

HI Quitman discharges storm water that is associated with industrial activity as defined in the United States Environmental Protection Agency (U.S. EPA) NPDES program established pursuant to the Federal Water Pollution Control Act, as amended by the Clean Water Act (33 United States Code 1251 et seq.) and codified in 40 Code of Federal Regulations 122. The operations conducted at the HI Quitman facility are classified under Standard Industrial Classification Code 335311, "Power, Distribution, and Specialty Transformer Manufacturing," which is defined as establishments primarily engaged in manufacturing power, distribution, instrument, and specialty transformers.

Mississippi is a delegated state with NPDES permitting authority. The state's NPDES program is administered by the Mississippi Department of Environmental Quality (MDEQ). Mississippi storm water regulations for storm water discharges associated with industrial activity are codified in the Mississippi Code of 1972, and set forth in the *Mississippi Water Pollution Control Law*, 49-47-1 et seq., as amended, and the Mississippi Commission on Environmental Quality Regulation WPC-1, *Wastewater Regulations for National Pollutant Discharge Elimination System Permits, Underground Injection Control Permits, State Permits, Water Quality Based Effluent Limitations and Water Quality Certification*

The MDEQ can be reached at:

Mississippi Department of Environmental Quality
General Permits Branch
Environmental Permits Division
515 East Amite Street
Jackson, Mississippi 39201

1.2 Storm Water Pollution Prevention Plan Requirements

Act 5 of the Industrial Storm Water General Permit regulations specifically requires the facility to develop and implement a SWPPP.

In general, this SWPPP follows the regulatory requirements for SWPPPs outlined in Act 5 of the storm water general permit. The SWPPP discusses the facility's conformance to applicable regulatory requirements.

1.3 Pollution Prevention Team

The Storm Water Pollution Prevention (SWPP) Team identifies potential pollutants and spill sources and develops environmental incident reporting procedures. The SWPP Team develops and coordinates spill prevention and response procedures and provides prompt notices to appropriate agencies and environmental contractors. The SWPP Team develops storm water pollution prevention, inspection, and recordkeeping procedures; reviews environmental occurrences to evaluate the need for modifications to the SWPPP; and implements subsequent amendments to the SWPPP.

The responsibility for storm water pollution prevention for the Site lies with HI Quitman's Environmental Health and Safety (EHS) Manager. The EHS Manager or the Emergency Duty Officer will direct the efforts of the SWPP Team to ensure the actions required by the SWPPP are implemented. Table 1 lists the lead members of the SWPP Team; their responsibilities are presented in subsequent sections.

Table 1
Storm Water Pollution Prevention Team

Prioritized Contact List	Role	Contact Timeline	Day Phone	24-Hour Phone
Scott Cooper Facility Manager	General Foreman	Immediately	601-433-2070	601-433-2070
Everett Lawrence General Services Director	Emergency Duty Officer	Immediately	601-470-3114	601-470-3114
Caleb Brown Environmental Engineer	Alternate	Immediately	601-470-9841	601-580-0703
John Risher Environmental Health and Safety Manager	2nd Alternate	Immediately	601-422-1919	601-433-1683

1.3.1 General Foreman

The General Foreman has the responsibility and authority to accomplish the following action:

- Assisting the SWPP Team with spill clean-up.

1.3.2 Environmental Health and Safety Manager

The EHS Manager has the responsibility and authority to accomplish the following actions:

- Ensuring inspections and maintaining inspection logs to determine the need for changes to the SWPPP are conducted by EHS staff.
- Conducting annual SWPP Team meetings to review the SWPPP, determining the need for modifications to the SWPPP, and evaluating the overall effectiveness of the SWPPP.
- Coordinating the SWPP Team and developing BMPs, inspection procedures, staff training, and facility maintenance programs to ensure compliance with the SWPPP.
- Ensuring the SWPPP and other required reports are maintained, updated as necessary, and available for regulatory review.

- Reviewing monitoring results and ensuring the initiation of corrective action following adverse monitoring reports to ensure compliance with the SWPPP and appropriate regulatory requirements and coordinating activities.

- Identifying resources required, providing training, and maintaining training records.

1.3.3 Emergency Duty Officer

The Emergency Duty Officer has the responsibility and authority to accomplish the following actions:

- Assisting with spill clean-up if necessary
- Acquiring outside resources for spill clean-up if necessary

1.3.4 Storm Water Pollution Prevention Team

The SWPP Team is responsible for the following items:

- Assisting with the implementing the SWPPP
- Compiling data and preparing reports
- Assisting with inspections and maintaining inspection logs
- Reporting identified deficiencies

2.0 SITE INFORMATION

General information for the HI Quitman facility is as follows:

Name of Facility:	Howard Industries — Quitman
Facility (Site) Address:	500 Archusa Avenue Quitman, Mississippi 39355
Facility (Mailing) Address:	P.O. Box 1588 Laurel, Mississippi 39441
County:	Clarke
Facility Status:	Private
Facility Phone Number:	601-433-2070
Primary Contact:	Mr. John Risher, EHS Manager
Phone Number:	601-422-1919
NPDES Permit No:	N/A
Secondary Contact:	Mr. Caleb Brown, Environmental Engineer
Phone Number:	601-470-9841
Facility Owner:	Howard Industries
Facility Operator:	Howard Industries
Principal Products:	Transformers
Receiving Stream:	Unnamed Tributary of Archusa Creek
2024 303(d) Listing Status:	Listed (no Total Maximum Daily Loads have been completed)

2.1 Facility Location and Process Description

HI Quitman is located in the City of Quitman in Clarke County, Mississippi.

The HI Quitman facility produces cores for transformers. Processes include coil winding, curing, and painting. The facility uses electric and natural gas ovens in its process, and the building is also used for storage purposes.

2.2 Site Maps

Appendix A contains three figures which provide detailed Site information. Figure 1 is a 7.5-minute quadrangle map showing the Site's location and extending 1 mile beyond the facility property boundary. Figure 2 is a Site drainage map that identifies the approximate drainage basins for the storm water outfalls at the Site. Figure 3 identifies storage tanks onsite. The general Site layout drawing includes the following information:

- Approximate locations of storm water outfalls.
- Site features, including paved areas and facility buildings.
- Locations of storm water structural control measures.
- Locations where major significant materials, operations, and access roadways are exposed to storm water.
- Locations of the general operation areas exposed to storm water.

2.3 Site Drainage

The facility has one drainage basin that is depicted on Figure 2 in Appendix A. The receiving water for each drainage basin is an unnamed tributary of Archusa Creek.

Drainage Basin 1

The outfall for Drainage Basin 1 is near the southwest corner of the facility. Potential regulated discharges from this outfall include surface drainage from scrap material stored outside. The storm water generally drains via sheet flow towards a low point along the facility boundary and exits the property through Outfall #1 toward the southeastern corner of the facility, which empties into an unnamed tributary of Archusa Creek, which ultimately discharges offsite to the Chickasawhay River.

2.4 Emergency Planning Right-To-Know Act Section 313 Reporting Requirements

SWPPPs prepared for facilities subject to reporting requirements under Superfund Amendments and Reauthorization Act Title III, Section 313 under the Emergency Planning Right-to-Know Act for chemicals classified as Section 313 water priority chemicals must describe and ensure the implementation of several additional BMPs to minimize or prevent the release of these materials to the environment.

HI Quitman does not use any Section 313 Water Priority Chemicals; therefore, this section does not apply to them.

2.5 History of Spills and Leaks

There is no information on reportable spills or leaks of toxic or hazardous pollutants that involved storm water contamination or that otherwise were documented to have occurred at the facility in the past 3 years. Details associated with any releases that occur at the facility will be documented in accordance with the facility's Spill Prevention, Control, and Countermeasure Plan. As outlined in Act 5 of the storm water general permit, significant spills or leaks that contaminate storm water will be documented monthly and included in the annual compliance evaluation as detailed in Section 5.

3.0 INVENTORY OF POTENTIAL POLLUTANT SOURCES AND CORRESPONDING BEST MANAGEMENT PRACTICES

3.1 Best Management Practices

U.S. EPA emphasizes implementing pollution prevention measures and BMPs that reduce possible pollutant discharges at the source. Source reduction measures include, among others, preventive maintenance (PM), chemical substitution, spill prevention, good housekeeping, training, and proper materials management. Where such practices are not appropriate to a particular source or do not effectively reduce pollutants in storm water discharges, U.S. EPA supports using source control measures and BMPs such as material segregation or covering, water diversion, and dust control. Like source reduction measures, source control measures and BMPs are intended to keep pollutants out of storm water. The remaining classes of BMPs, which involve recycling or storm water treatment, allow reusing storm water or attempting to lower pollutant concentrations before discharge.

BMPs are to be implemented to the MEP. Due to changing technology, MEP is an ever-changing goal. The SWPP Team will continue to review activities at HI Quitman location to determine what additional BMPs should be implemented at the facility. Additional BMP needs could result from changes in activities performed in the building or outside areas. Personnel changes may result in some of the items on the existing BMP lists moving to the implementation BMP lists, if training is not performed regularly. Some of the recommended BMPs are structural (requiring construction), while others are nonstructural (source control). The SWPP Team will review the recommended structural BMPs and provide an implementation time frame. Nonstructural BMPs can be implemented more easily, while structural BMPs require funding and a construction timetable.

The following is a list of general BMPs that will be implemented throughout the facility:

- Improving operation and maintenance of machinery and processes.
- Maintaining current chemical and waste material inventory.
- Labeling all containers indicating name, type of substance, and handling hazards associated with that material.
- Maintaining well-organized work areas.
- Inspecting storage areas and properly removing and disposing of potential pollutants.

- Adhering to maintenance and inspection programs required at Site (i.e., Spill Prevention, Control, and Countermeasure Plan).
- Training employees about good housekeeping practices and storm water pollution prevention.
- Maintaining records and properly reporting incidents.
- Reporting all spills to a single contact, the EHS Manager.
- Good housekeeping procedures applied throughout the facility.
- Minimizing exposure of pollutant sources to rainfall and/or run-off
  - Using grading, berming, or curbing to prevent run-off of contaminated flows and diverting run-on away from these areas.
  - Locating materials, equipment, and activities so that leaks are contained in existing containment and diversion systems (confining storage of leaky or leak-prone vehicles and equipment awaiting maintenance to protected areas).
  - Cleaning up spills and leaks promptly using dry methods (e.g., absorbents) to prevent pollutant discharges.
  - Using drip pans and absorbents under or around leaky vehicles and equipment or storing indoors where feasible.
  - Using spill/overflow protection equipment.
  - Draining fluids from equipment and vehicles before onsite storage or disposal.
  - Performing all cleaning operations indoors, under cover, or in bermed areas to prevent run-off and run-on and capture any overspray.
  - Ensuring that all wash water drains to a proper collection system (i.e., not the storm water drainage system).
- Proper security measures throughout the facility.

- Good housekeeping (required by MSR00) will be practiced by keeping areas that may contribute pollutants to storm water discharges clean and orderly. Particular attention will be paid to areas where materials are stockpiled or handled, storage areas, liquid storage tanks, and loading/unloading areas.

- Spill kits will be readily available for all liquid storage areas.

- Floatable debris is intercepted before storm water is discharged. Small windblown metal pieces are kept inside to prevent them from leaving in the storm water as floatable debris.

3.2 Non-Storm Water Discharge Management

The SWPPP includes a certification (page ii) that storm water discharges have been tested or evaluated for the presence of non-storm water discharges. No discharges from the Site are permitted, except the allowable non-storm water discharges listed above.

3.3 Preventive Maintenance Program

An effective PM Program is an important aspect of any BMP system. Well-maintained and inspected equipment and structural controls are less likely to cause problems.

The SWPPP specifically provides timely inspections of storm water management controls and maintenance of these controls when necessary. The HI Quitman PM Program includes, but is not limited to, the following elements:

- Identifying equipment, systems, and site areas that should be inspected and conducting appropriate inspections or tests.

- Routinely inspecting and maintaining the storm water ditch for solids accumulation, floatables accumulation, and other maintenance items. Lack of maintenance due to accumulation of solids is a main cause of poor treatment performance.

- Maintaining complete inspection and repair records.

4.0 ANALYSIS OF HISTORICAL AND POTENTIAL POLLUTANTS

4.1 Sampling Data

No historical storm water sampling has been conducted at the facility as MSR00 does not require analytical monitoring of collected samples.

4.2 Discharges to Water Quality Impaired/Water Quality Limited Waters

Archusa Lake, the receiving water body for the facility's discharges, is on the "303(d) list,", which details the water quality impaired/water quality limited water bodies in Mississippi. Archusa Lake is listed for Biological Impairments.

Periodically, the facility personnel should go to the following website to ensure that these water bodies are not added to the list that would require compliance with this section: https://www.mdeq.ms.gov/permits/environmental-permits-division/generalpermits/industrial-stormwater/

5.0 STORM WATER INSPECTION AND EVALUATION PROGRAM

MSR00 requires developing and implementing a storm water inspection and evaluation program. The program must include facility inspections, as often as needed but no less than monthly, of all areas associated with industrial activity that contribute to storm water discharges. The HI Quitman PM Program will include monthly facility inspections and an annual comprehensive site compliance evaluation.

The objectives of this program are as follows:

- Demonstrate compliance with the permit
- Demonstrate compliance with implementing the SWPPP
- Measure the effectiveness of BMPs in eliminating pollutants in industrial storm water discharges

Appendix B contains the Monthly Storm Water Inspection Summary Form, MDEQ Monthly Spill and Leak Log Sheet, MDEQ Industrial Storm Water General Permit Monthly Inspection Report, MDEQ Monthly Visual Jar Test Inspection Form, MDEQ Employee Training Log, and the MDEQ Annual Inspection Report and Certification Form for SWPPP Evaluation. Inspections of areas and equipment will be documented, and inspection records will be maintained in Appendix C.

5.1 Monthly Facility Inspections

MSR00 requires facility equipment and material-handling and storage area inspections for evidence of pollutants entering the drainage system. Storm water must be free from (1) debris, oil, scum, and other floating materials, other than in trace amounts; (2) eroded soils and other materials that will settle to form objectionable deposits in receiving waters; (3) suspended solids, turbidity, and color at levels inconsistent with the receiving waters; and (4) substances in concentrations that would cause violation of state water quality criteria in the receiving waters.

According to the general storm water permit (MSR00), qualified facility personnel (as designated in Table 1) must perform monthly inspections of areas where industrial material, equipment, or activities are exposed to storm water. Records of inspections shall be maintained (using forms provided in Appendix B), and follow-up procedures shall be implemented to ensure appropriate actions are taken in response to the inspections.

Facility Inspection

Inspections of areas and equipment are documented, and inspection records will be maintained in Appendix C. MDEQ inspections forms are provided in Appendix B. These inspection reports include date, time, name of inspector, weather conditions, and follow-up action needed. Before each inspection, the SWPPP and previous inspection reports will be reviewed to ensure that adequate response and corrective actions have been taken in previous inspections.

Ongoing inspections of material-handling areas and equipment that could contribute pollutants to the drainage system are recommended. Qualified personnel will inspect material-handling areas and equipment each workday for evidence of, or the potential for, pollutants entering the drainage system. Necessary adjustments, replacements, maintenance, and repairs will be made as soon as feasible, with precautionary measures taken promptly to avoid or halt pollutants entering into the drainage system.

All areas exposed to precipitation at HI Quitman are visually inspected for evidence of pollutants entering, or the potential for pollutants to enter, the drainage system. Measures to reduce pollutant loadings are evaluated to determine whether they are adequate and properly implemented or whether additional control measures are needed. Structural storm water management measures required under this section are observed to ensure that they are operating correctly. Visual inspections will also be performed to determine equipment needed to implement the plan, such as spill response equipment.

Visual Outfall Examination

Outfalls should be visually examined at least quarterly during rainfall events. Although it is not a permit requirement, the examination is to assess the facility's BMPs effectiveness. Color, clarity, floating solids, settled solids, suspended solids; foam, oil sheen, and other indicators of storm water pollution observation results should be recorded using the MDEQ Visual Examination Form in Appendix B.

5.2 Non-Storm Water Discharge Assessments and Certification

The Non-Storm Water Discharge Assessment and Certification form in Appendix B must be completed if any non-storm water discharges are found; otherwise, the original SWPPP Non-Storm Water Certification on page ii will be in force.

5.3 Storm Water Monitoring

MSR00 does not require analytical monitoring of storm water for this facility unless a spill has occurred. Since the facility does not discharge to a 303(d)-listed impaired water body, does not release Superfund Amendments and Reauthorization Act Title III, Section 313 water priority chemicals, and does not have a coal pile, no special monitoring requirements are necessary.

5.4 Annual Comprehensive Site Inspection and Storm Water Pollution Prevention Plan Evaluation Report

The annual comprehensive Site inspection will be conducted in order to achieve a "big picture" look at the facility's permit compliance. The annual Site comprehensive compliance evaluation will be conducted by reviewing all forms for the year: the monthly facility inspections, spill reports, non-storm water evaluation reports, sampling results, etc. The results of this evaluation will be used to update the SWPPP, if necessary.

This audit will also evaluate all current practices for reducing pollutants in storm water to determine whether these practices are effective, or if further controls are necessary. Structural control measures will also be inspected and all necessary repairs or problems with these systems will be documented. Inspection areas shall include, at minimum, all storm water outfalls; exterior equipment; spill prevention and containment equipment; and all loading/unloading, storage, parking, and waste management areas.

Inspections must evaluate all areas contributing to storm water discharges associated with industrial activity to determine whether the SWPPP adequately minimizes pollutant loadings. Inspections will also ensure that the SWPPP is properly implemented in accordance with the terms of MSR00 or if additional control measures are needed.

The evaluation must be reported on copies of the MDEQ Industrial Storm Water General Permit Annual SWPPP Evaluation Form (Appendix B). The form, along with a copy of the annual monitoring sampling data must be submitted annually to the MDEQ, postmarked no later than January 28 for the preceding calendar year. If the results of this evaluation cause the SWPPP to be updated, the form must be accompanied by the required SWPPP amendments. Reports shall be submitted to MDEQ at the following address:

Mississippi Department of Environmental Quality
Chief, Environmental Compliance and Enforcement Division
Office of Pollution Control
P. O. Box 2261
Jackson, Mississippi 39225

The signed report shall be retained as part of the SWPPP in Appendix C.

5.5 Recordkeeping and Updating Requirements

All records and information from the activities described in this SWPPP, including review documentation, inspection reports, training/briefing records, and monitoring reports, should be kept in Appendix C of this SWPPP and retained by the facility for at least 3 years from the date of sampling, measurement, evaluation, inspection, or reporting.

The SWPPP must be signed and retained for at least 3 years after the last plan modification or amendment and after coverage under this permit is terminated.

HI Quitman must give MDEQ at least a 10-day notice, if possible, before implementing any planned noncompliance with permit requirements. The MDEQ must be orally notified within 24 hours of any unanticipated noncompliance, and a written notice of noncompliance shall be provided within 5 working days of the time of HI Quitman's knowledge of the circumstances. The written report shall describe the cause, exact dates and times, and steps taken or planned to reduce, eliminate, or prevent reoccurrence of the noncompliance.

Based upon the results of the annual SWPPP evaluation, the description of potential pollutant sources and BMPs identified in the SWPPP should be revised and provided for implementing any changes in a timely manner. HI Quitman must amend the SWPPP whenever there is a change in design, construction, operation, or maintenance that may increase the discharge of pollutants into state waters or the SWPPP proves to be ineffective in controlling storm water pollutants. The SWPPP shall be submitted to the MDEQ along with the annual report and SWPPP evaluation form.

6.0 EMPLOYEE TRAINING

A personnel training program is essential to effectively implementing the SWPPP. Personnel at all levels of responsibility will be trained in the components and goals of the NPDES program and the SWPPP. Training addresses each component of the SWPPP; including how and why tasks are to be implemented.

At a minimum, the following will be part of the training program:

1. Storm water control training appropriate to personnel job function shall be provided for supervisors and other operating personnel. A training and educational program for employees shall be developed for implementing appropriate activities identified in the SWPPP.

2. Personnel will be trained to **identify and manage potential spills** that can occur from equipment and containers (i.e., hydraulic fluids, paints, etc.). Employees must report incidents of leaking fluids to management.

3. All employees will be trained in **inspection and good housekeeping practices,** which include the following:

    - Proper scrap inspection, handling, and storage procedures
    - Regular vacuuming and/or sweeping
    - Cleaning up spilled materials
    - Identifying where brooms, vacuums, sorbents, foams, neutralizing agents, and other good housekeeping and spill response equipment are located
    - Instruction on securing drums and containers
    - Frequently checking for leaks and spills of various materials

4. All personnel will be trained to **recognize toxic and hazardous substances** at the facility. Personnel training will include the following:

   - Proper materials organization and storage
   - Appropriate identification of toxic and hazardous substances stored, handled, and produced onsite

Personnel refresher training is held annually. All personnel training will be documented on the Training Sign-In Sheet found in and maintained as part of an electronic database. The SWPP Team leader will coordinate training for all SWPP Team members in the elements of the SWPPP. The SWPP Team members will coordinate training on the proper implementation of BMPs for all personnel within their jurisdiction. Training records will be kept in an electronic database.

7.0 SPILL PREVENTION AND RESPONSE

The HI Quitman BMPs and good housekeeping procedures will aid in minimizing contamination of storm water run-off from the facility.

In the event of a release of oil, paint, hazardous material, waste and/or other potential pollutant that could affect storm water quality, the following procedures shall be used:

- The person discovering the release shall immediately notify the General Foreman.
- If a contaminated discharge occurs at any time other than the day shift, Site personnel shall contact the EHS Manager identified in this SWPPP.

Other methods that will be used at HI Quitman to prevent any storm water contamination are as follows:

- Periodic (monthly and quarterly) inspections will be conducted
- Used filters will be stored in covered bins

Spill kits will be maintained at appropriate locations at the facility. Used absorbent material will be disposed of properly and not exposed to storm water.

8.0 MANAGEMENT OF RUN-OFF

The HI Quitman BMP Manual is in Appendix D. These BMPs may be used to troubleshoot new BMPs needed at the facility.

All BMPs that are in place will be maintained to ensure that they function as designed. BMPs should be designed to minimize pollution.

The term "minimize" means reduce and/or eliminate to the extent achievable using control measures (including BMPs) that are technologically available and economically practicable and achievable in light of best industry practice. HI Quitman should consider the following when selecting and designing control measures:

- Preventing storm water from coming into contact with polluting materials is generally more effective, and less costly, than trying to remove pollutants from storm water.
- Using control measures in combination is more effective than using control measures in isolation for minimizing pollutants in your storm water discharge.
- Assessing the type and quantity of pollutants, including their potential to impact receiving water quality, is critical to designing effective control measures.
- Minimizing impervious areas at your facility and infiltrating run-off onsite (including bioretention cells, green roofs, and pervious pavement, among other approaches) can reduce run-off and improve groundwater recharge and stream base flows in local streams, although care must be taken to avoid groundwater contamination.
- Attenuating flow using open vegetated swales and natural depressions can reduce in-stream impacts of erosive flows.

Sediment and Erosion Control

Concrete, asphalt, and gravel cover most of the facility; however, there are some pervious grass-covered land areas around the facility. The storm water run-off from these areas consists of sheet flow in various directions ultimately flowing into ditches or culverts surrounding the facility.

Generally, HI Quitman must provide appropriate source control, stabilization measures, nonstructural and structural controls, or an equivalent for erosion and sediment control. HI Quitman should consider, either individually or in combination, the following erosion and sediment control measures. Site inspections will address any erosion problems and corrective actions that are pursued.

Use the BMP Manual in Appendix D as a resource when determining new BMPs to be used at the facility.

9.0 PERMIT AND STORM WATER POLLUTION PREVENTION PLAN ADMINISTRATION

9.1 Storm Water Pollution Prevention Plan Availability

The SWPPP is available for review at the facility and is available digitally at the EHS Manager's Office. A complete Industrial Storm Water Notice of Intent form can be found in Appendix E.

9.2 Required Storm Water Pollution Prevention Plan Modifications

HI Quitman will update the SWPPP when there is a change at the facility that has a significant effect on the discharge or potential of pollutants from the facility.

9.3 Signature Requirements

Certifications and reports may be signed by the Vice President of Manufacturing. The MSR00 rules state that the Executive Vice President must be made the "duly authorized individual" in writing in order to have the authority to sign and certify storm water documents. A letter has been submitted to MDEQ stating that the Executive Vice President is the "duly authorized individual."

Appendix A
Figures

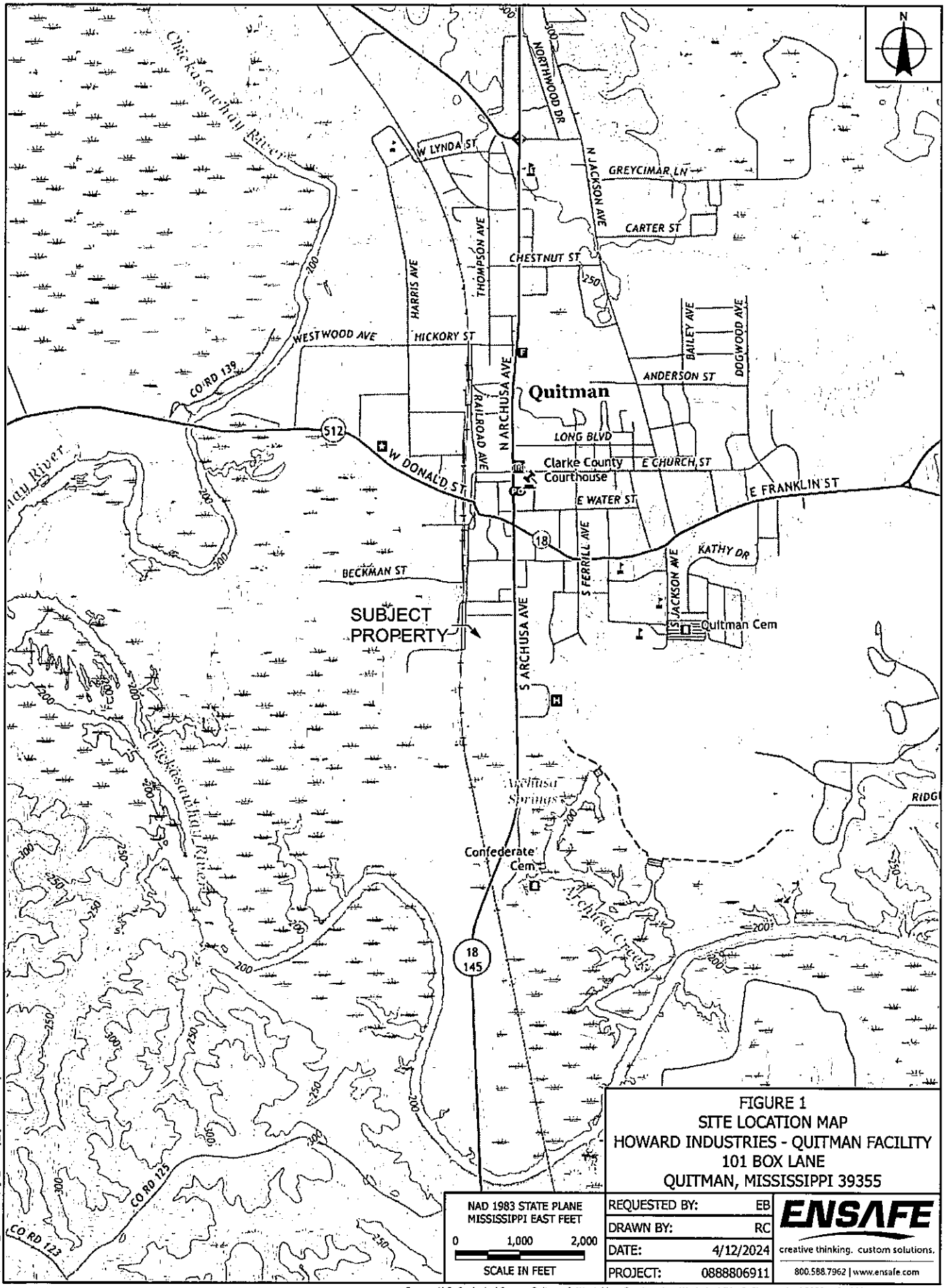

FIGURE 1
SITE LOCATION MAP
HOWARD INDUSTRIES - QUITMAN FACILITY
101 BOX LANE
QUITMAN, MISSISSIPPI 39355

REQUESTED BY:	EB
DRAWN BY:	RC
DATE:	4/12/2024
PROJECT:	0888806911

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Source: U.S. Geological Survey. Quitman & Wautubbee Quadrangles, Mississippi [Map]. Photorevised 2020. 1:24,000. 7.5 Minute Series.

NAD 1983 STATE PLANE
MISSISSIPPI EAST FEET

0 80 160
SCALE IN FEET

LEGEND

- SIGN
- TELEPHONE POLE
- METER POLE
- POWER POLE
- LAMP POLE
- GUY WIRE
- WATER METER
- GAS METER
- DRAIN GRATE
- DRAIN INLET
- CURB INLET
- CLEAN OUT
- WATER VALVE
- TELEPHONE BOX
- FIBER OPTIC MARKER
- BOLLARD
- FIRE HYDRANT
- SEWER MANHOLE
- MILLED ASPHALT
- CHAIN LINK FENCE
- POWER POLE
- SEWER LINE
- WATER LINE
- GAS LINE
- RAILROAD TRACKS

NOTES

TOB = TOP OF BANK
TOE = TOE OF DITCH
EOC = EDGE OF CONCRETE
EOP = EDGE OF PAVEMENT
EOG = EDGE OF GRAVEL
EOR = EDGE OF ROCK
BOC = BACK OF CURB
CSF = COTTON SPINDLE FD
CSF = COTTON SPINDLE FD
RBF = 1/2" REBAR FD
RBS = 1/2" REBAR SET
MNF = MAGNETIC NAIL FD
MNS = MAGNETIC NAIL SET
MFP = METAL FENCE POST
FEB = FIRE EQUIPMENT BOX
TRL = TREE LINE
APR = AS PER RECORD (CCBS-104-22)
APS = AS PER SURVEY

FIGURE 2
FACILITY DRAINAGE MAP
HOWARD INDUSTRIES - QUITMAN FACILITY
101 BOX LANE
QUITMAN, MISSISSIPPI 39355

REQUESTED BY:	EB
DRAWN BY:	KMB
DATE:	4/19/2024
PROJECT:	0888806911

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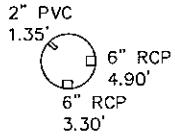
Source: Saul Surveying and Mapping, LLC.

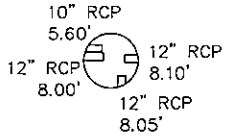
I:\CAD PROJECTS\Howard\6911 Quitman_MS\Plans\6911_B001_SITE MAP_QUITMAN_MS.dwg

EXHIBIT "A"
PT# 2798



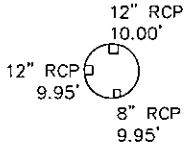
SMH

EXHIBIT "B"
PT# 133



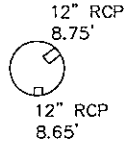
SMH

EXHIBIT "C"
PT# 175



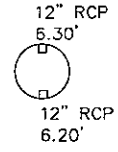
SMH

EXHIBIT "D"
PT# 1420



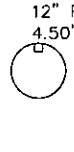
SMH

EXHIBIT "E"
PT# 1448



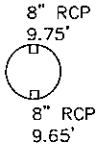
SMH

EXHIBIT "F"
PT# 1501



SMH

EXHIBIT "G"
PT# 708



SMH

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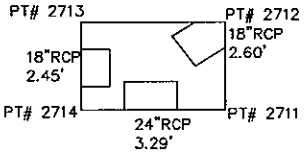
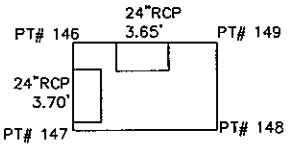


CURB INLET

EXHIBIT "I"



CURB INLET

DWG. NO.: 072423A1 (SHEET 2)

EXHIBITS "A-I" NOT TO SCALE

Appendix B
Mississippi Department of Environmental Quality
Inspection Forms

Facility Name _____

Monthly Spill & Leak Log Sheet

Month/Year _____

Physical Address _____

Permit Number _____

Instructions: A list of spills and leaks of toxic or hazardous pollutants that have occurred at the facility shall be documented on the Monthly Spill and Leak Log Sheet that is provided in the Individual NPDES Permit SWPPP Forms Package. A separate form shall be completed for each month that the facility is covered under this permit. If no spills have occurred, the form shall be completed by checking the available box and signing it as indicated. Permit recipients may use an alternate form to record this information, so long as it includes all of the information on the above referenced form and it is updated monthly. The completed forms shall be filed on-site with the SWPPP and made available to MDEQ personnel for inspection upon request.

Date of Spill	Material Spilled	Quantity Spilled (specify units)	Area that Spill Occurred	Did the Spill Result in a Discharge?	Injury / Property Damage?	Person(s) Involved In Clean-up	Date Reported to MDEQ (If significant)
Corrective Action(s) Taken							
Date of Spill	Material Spilled	Quantity Spilled (specify units)	Area that Spill Occurred	Did the Spill Result in a Discharge?	Injury / Property Damage?	Person(s) Involved In Clean-up	Date Reported to MDEQ (If significant)
Corrective Action(s) Taken							
Date of Spill	Material Spilled	Quantity Spilled (specify units)	Area that Spill Occurred	Did the Spill Result in a Discharge?	Injury / Property Damage?	Person(s) Involved In Clean-up	Date Reported to MDEQ (If significant)
Corrective Action(s) Taken							
☐ No spills have occurred this month.	*"I certify under penalty of law that this report is true, accurate, and complete, to the best of my knowledge and belief."*						
	Inspector's Name - Printed			Inspector's Signature			Date

INDIVIDUAL NPDES STORM WATER PERMIT
PERMIT NUMBER (MS_ _ _ _ _ _ _)
MONTHLY INSPECTION / VISUAL EVALUATION REPORT
(FOR INDUSTRIAL STORM WATER ACTIVITY)

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

As required by this permit, this inspection / visual evaluation form must be completed on a monthly basis. Completion of this form must be performed by an individual with the knowledge, skills, and training to assess conditions and activities that could impact storm water quality and to evaluate the effectives of best management practices required by this permit. A copy of the completed and signed form shall be maintained on-site with the SWPPP and be available for review by MDEQ personnel upon request.

FACILITY NAME:	DATE:
PHYSICAL ADDRESS:	

WEATHER INFORMATION:

- Description of Weather Conditions (e.g., sunny, cloudy, raining, snowing, etc.):

  _____

  _____

- Was the inspection conducted during or immediately after a rain event? ☐ **Yes** ☐ **No** ☐ If yes, conduct a Jar Test at each storm water outfall and attach the results to this form.

I. POTENTIAL POLLUTANT SOURCE, AREA INSPECTION AND BEST MANAGEMENT PRACTICES EVALUATION

SWPPP AND SITE MAP:	Yes	No	N/A	Findings & Remedial Action Documentation
• Is the Site Map current and accurate?	○	○	○	
• Is the SWPPP inventory of industrial activities, materials and products current?	○	○	○	
VEHICLE/EQUIPMENT AREAS:				
Equipment cleaning:				
• Is equipment washed and / or cleaned using a detergent(s)?	○	○	○	
• If so, is all wash water captured and properly disposed of?	○	○	○	
Equipment fueling:				
• Are all fueling areas free of contaminant buildup and evidence of chronic leaks/spills?	○	○	○	
• Are all chemical liquids, fluids, and petroleum products, stored on an impervious surface that is surrounded with a containment berm or dike that is capable of containing 10% of the total enclosed tank volume or 110% of the volume contained in the largest tank, whichever is greater?	○	○	○	
• Are structures in place to prevent precipitation from accumulating in containment areas?	○	○	○	
• If not, is there any water or other fluids accumulated within the containment area?	○	○	○	

	Yes	No	N/A	Findings & Remedial Action Documentation
Equipment maintenance:				
• Are maintenance tools, equipment and materials stored under shelter, elevated and covered?	○	○	○	
• Are all drums and containers of fluids stored with proper cover and containment?	○	○	○	
• Are exteriors of containers kept outside free of deposits?	○	○	○	
• Are any vehicles and/or equipment leaking fluids? Identify leaking equipment.	○	○	○	
• Is there evidence of leaks or spills since last inspection? Identify and address.	○	○	○	
• Are materials, equipment, and activities located so that leaks are contained in existing containment and diversion systems (confine the storage of leaky or leak-prone vehicles and equipment awaiting maintenance to protected areas)?	○	○	○	
Add any additional site-specific BMPs:	○	○	○	
_____				
_____				
_____				
_____				
_____				
GOOD HOUSEKEEPING BMPS:				
1. Are paved surfaces free of accumulated dust/sediment and debris?	○	○	○	
• Date of last vacuum/sweep _____				
• Are there areas of erosion or sediment/dust sources that discharge to storm drains?	○	○	○	
2. Are there any waste receptacles located outdoors? If yes:	○	○	○	
• In good condition?	○	○	○	
• Not leaking contaminants?	○	○	○	
• Closed when not being accessed?	○	○	○	
• External surfaces and area free of excessive contaminant buildup?	○	○	○	
3. Are the following areas free of accumulated dust/sediment, debris, contaminants, and/or spills/leaks of fluids?				
• External dock areas	○	○	○	
• Pallet, bin, and drum storage areas	○	○	○	
• Maintenance shop(s)	○	○	○	
• Equipment staging areas (loaders, tractors, trailers, forklifts, etc)	○	○	○	
• Around bag-house(s)	○	○	○	
• Around bone yards	○	○	○	
• Other areas of industrial activity:	○	○	○	
_____				
_____				
_____				
_____				
_____				

SPILL RESPONSE AND EQUIPMENT:	Yes	No	N/A	Findings & Remedial Action Documentation
1. Are spill kits available, in the following locations?				
• Fueling stations	○	○	○	
• Transfer and mobile fueling units	○	○	○	
• Vehicle and equipment maintenance areas	○	○	○	
• Process / product formulation areas	○	○	○	
2. Do the spill kits contain all the appropriate necessary items such as:				
• Oil absorbents?	○	○	○	
• A storm drain plug or cover kit?	○	○	○	
• A non-water containment boom?	○	○	○	
• A non-metallic shovel?	○	○	○	
• Other additional items: _____ _____ _____	○	○	○	
3. Are contaminated absorbent materials properly disposed?	○	○	○	
GENERAL MATERIAL STORAGE AREAS:				
• Are damaged materials stored inside a building or another type of storm-resistant shelter?	○	○	○	
• Are all uncontained material piles stored in a manner that minimizes the discharge of impacted storm water?	○	○	○	
• Are scrap metal bins covered?	○	○	○	
• Are outdoor containers covered?	○	○	○	
STORM WATER BMPS AND TREATMENT STRUCTURES: (Visually inspect all storm water BMPs, treatment structures / devices, discharge areas, infiltration, and outfalls shown on the Site Map).				
• Are BMPs and treatment structures in good repair and operational?	○	○	○	
• Are BMPs and treatment structures free from debris buildup that may impair function?	○	○	○	
• Are berms, curbing or other methods used to divert and direct discharges adequate and in good condition?	○	○	○	
OBSERVATION OF STORM WATER DISCHARGES:				
• Is the discharge free of floating materials, visible oil sheen, discoloration, turbidity, odor, foam or any other signs of contamination?	○	○	○	
• Water from washing vehicles or equipment (with detergent), steam cleaning and/or pressure washing is considered process wastewater and is not allowed to comingle with storm water or enter storm drains. Is process water comingling with storm water or entering storm drains?	○	○	○	
• Illicit discharges include domestic wastewater, noncontact cooling water, or process wastewater (including leachate). Were any illicit discharges observed during the inspection?	○	○	○	

MISCELLANEOUS AREAS / ITEMS OF CONCERN: (Evaluations of any matters that are not contained within another section but are covered in the SWPPP [i.e. industrial areas; housekeeping measures; unique BMPs; observations, etc.] should be denoted here.)	Yes	No	N/A	Findings & Remedial Action Documentation

II. CORRECTIVE ACTION AND SWPPP MODIFICATION DESCRIPTIONS: Additional space to describe inspection findings and corrective actions if needed. Provide brief explanation of the general location and the rationale for the additional or different BMPs. Should the SWPPP need to be amended, a copy of the amended SWPPP must be submitted to MDEQ.

III. CERTIFICATION STATEMENTS AND SIGNATURES:

Inspector - Certification: This section must be completed by the person who conducted the site inspection prior to submitting this form to the person with signature authority or a duly authorized representative of that person.

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief."

Inspector's Name – Printed	**Inspector's Signature**	**Inspector's Title**	**Date**

Monthly Visual Jar Test Inspection Form

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Instructions: As part of inspections conducted during or after storm events, a representative sample of storm water should be collected at each outfall in a clean, clear jar and examined in a well-lit area. Should any of the objectionable characteristics described in the form below be observed, permit recipient shall investigate upstream from the sample location to identify the potential sources of pollution, implement corrective action, and describe the corrective action in the space provided below.

Facility Name:	Physical Address:
Date:	Permit Number:
Time collected:	Person collecting/examining sample (Print):
Outfall Number/Location sample was collected:	
Was the sample collected during or immediately after a rain event? **Yes or No**	

Parameter	Parameter Description	Description of Sample
Color	Is the water sample colored? **Yes or No**	If yes, describe the color:
Clarity	Is the water sample clear and transparent? **Yes or No**	If no, describe the clarity:
Floating Solids	Are there solids floating at the top of the sample? **Yes or No**	If yes, describe the floating solids:
Settled Solids	Are there solids settled out in the bottom of the sample? **Yes or No**	If yes, describe the settled solids:
Suspended Solids	Are there solids suspended in the water column of the sample? **Yes or No**	If yes, describe the suspended solids:
Foam	Is there foam forming at the top of the sample? **Yes or No**	If yes, describe the foam:
Odor	Does the sample have an odor? **Yes or No**	If yes, describe the odor:
Oil Sheens	Does the sample have an oil sheen? **Yes or No**	If yes, describe the oil sheen:

Detail any concerns noted in the visual jar sample and describe the corrective actions taken:

"I certify under penalty of law that this report is true, accurate, and complete, to the best of my knowledge and belief."

Inspector's Name - Printed	Inspector's Signature	Date

INDIVIDUAL NPDES STORM WATER PERMIT
PERMIT NUMBER (MS_ _ _ _ _ _ _)
ANNUAL SWPPP EVALUATION FORM
(FOR INDUSTRIAL STORM WATER ACTIVITY)

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Permit recipients shall conduct a comprehensive evaluation of the facility's SWPPP by December 31st in the year following issuance and annually thereafter. The evaluation shall assess the effectiveness and accuracy of the SWPPP and ensure that the SWPPP is current, up to date, and meets all requirements set forth in the permit. Should the SWPPP need to be amended based on the findings of any evaluation, a copy of the amended SWPPP must be submitted to MDEQ.

FACILITY NAME:	EVALUATION DATE:
PHYSICAL ADDRESS:	

I. DESCRIPTION OF POTENTIAL POLLUTANT SOURCES

INDUSTRIAL ACTIVITIES	Yes	No	Findings & Remedial Action Documentation
• Does the SWPPP have a list of Industrial Activities exposed to storm water?	○	○	
• Has the facility added any Industrial Activities that are exposed to storm water since the previous Annual SWPPP Evaluation?	○	○	
MATERIALS AND POLLUTANTS			
• Does the SWPPP have a list of materials and pollutants exposed to storm water?	○	○	
• Does the SWPPP have a narrative description of the materials and pollultants?	○	○	
• If so, does the narrative contain the following information?			
o Method of storage and disposal.	○	○	
o Management practices employed to minimize contact with storm water.	○	○	
o Structural and non-structural control measures to reduce pollutants in storm runoff.	○	○	
o Any treatment the storm water receives.	○	○	
SPILLS AND LEAKS			
• Does the SWPPP contain a monthly updated list of spills and leaks?	○	○	
• Does the SWPPP contain an updated summary of all storm water samplaing data including a description of associated pollutants?	○	○	

I. DESCRIPTION OF POTENTIAL POLLUTANT SOURCES (CONTINUED)

SITE MAP	Yes	No	Findings & Remedial Action Documentation
• Does the SWPPP have a site map showing the property layout with site boundaries?	○	○	
• If so, does the site map indicate the following features?			
o Surface water bodies.	○	○	
o Drainage area of each storm outfall by number.	○	○	
o Direction of flow for each drainage area.	○	○	
o Location and description of existing structural and non-structural control measures to reduce the pollutants in storm runoff.	○	○	
o Location of any storm water treatment activities.	○	○	
o Location of any storm drain inlets.	○	○	
o Location of industrial activities, such as:	○	○	
a) Fuel storage and dispensing locations. b) Vehicle/equipment repair, maintenance, and cleaning areas. c) Materials storage and handling areas. d) Loading/unloading areas. e) Process or manufacturing areas.			
o Location of housekeeping practices.	○	○	
o Storm water conveyances (ditches, pipes, & swales).	○	○	

II. DESCRIPTION OF STORM WATER MANAGEMENT CONTROLS

POLLUTION PREVENTION MANAGER/COMMITTEE			
• Does the SWPPP specify individual(s) responsible for developing the SWPPP and assisting the facility manager in its implementation, maintenance, and revision?	○	○	
• If so, have there been any changes in the personnel listed since the previous Annual SWPPP Evaluation?	○	○	

RISK IDENTIFICATION AND MATERIAL INVENTORY			
• Does the SWPPP assess the pollution potential of various sources at the facility including loading and unloading operations; outdoor storage, manufacturing or processing activities; significant dust or particulate generating processes and on-site disposal practices?	○	○	
• If so, have there been any changes in operations or sources of potential pollutants since the previous Annual SWPPP Evaluation?	○	○	

II. DESCRIPTION OF STORM WATER MANAGEMENT CONTROLS (CONTINUED)

	Yes	No	Findings & Remedial Action Documentation
SEDIMENT AND EROSION PREVENTION			
• Does the SWPPP identify areas with a high potential for soil erosion, and specify prevention measures to limit erosion?	○	○	
• If so, have there been any changes to the facility which would increase the potential for soil erosion since the previous Annual SWPPP Evaluation?	○	○	
PREVENTIVE MAINTENANCE			
• Does the SWPPP contain a preventive maintenance program to insure the inspection and maintenance of storm water management devices?	○	○	
• If so, does the program specify protocol for inspecting and testing of equipment to preclude breakdowns or failures that may cause pollution?	○	○	
GOOD HOUSEKEEPING			
• Does the SWPPP describe and list practices appropriate to prevent pollutants from entering storm water from industrial activities due to poor housekeeping?	○	○	
• If so, do the practices describe or list the following:			
o Designated areas for equipment maintenance and repair.	○	○	
o Provisions for waste receptacles at convenient locations.	○	○	
o Provisions for regular collection of waste.	○	○	
o Adequately maintained sanitary facilities.	○	○	
o Secondary containment around any on-site fuel or chemical container with a capacity greater than 660 gallons or any combination of containers which have an aboveground storage capacity of more than 1,320 gallons.	○	○	
o Secondary containment for raw material stockpiles.	○	○	
SPILL PREVENTION AND RESPONSE PROCEDURES			
• Does the SWPPP identify potential spill areas and their drainage points?	○	○	
• Does the SWPPP specify material handling procedures and storage requirements?	○	○	
• Does the SWPPP have procedures for cleaning up spills?	○	○	
• Have there been any changes at the facility in potential spill areas and/or their drainage points since the previous Annual SWPPP Evaluation?	○	○	
EMPLOYEE TRAINING			
• Does the SWPPP specify periodic training for personnel that are responsible for implementing and/or complying with the requirements of the SWPPP?	○	○	

II. DESCRIPTION OF STORM WATER MANAGEMENT CONTROLS (CONTINUED)			
ILLICIT CONNECTIONS EVALUATION AND CERTIFICATION	Yes	No	Findings & Remedial Action Documentation
• Does the SWPPP contain an illicit connection certification?	○	○	
• If so, was the certification evaluation and certification completed within the last 5 years?	○	○	
• Does the certification include the following?: o Method of evaluation, date(s), observation point(s), and result(s).	○	○	
ROUTINE VISUAL SITE INSPECTIONS			
• Does the SWPPP describe the policy and procedures for routine visual inspections, including frequencies and areas to be inspected?	○	○	
• Does the SWPPP inspection policy describe procedures for collecting storm water if the inspection is conducted during or after a storm event?	○	○	
• If so, does the SWPPP inspection policy outline procedures to investigate, correct, and document instances in which visible pollutants are observed?	○	○	
STORM WATER MANAGEMENT			
• Does the SWPPP provide for the management of storm water volume through its diversion, infiltration, storage or re-use?	○	○	
III. NON-STORM WATER DISCHARGE MANAGEMENT			
NON-STORM WATER MANAGEMENT			
• Does the SWPPP identify any allowable non-storm water discharges?	○	○	
• Does the SWPPP identify and ensure the implementation of appropriate Best Management Practices (BMPs) for the non-storm water component of any discharge?	○	○	
• Have there been any changes or additions to the allowable non-storm water discharges since the previous Annual SWPPP Evaluation?	○	○	
IV. FACILITY CHANGES			
SWPPP AMENDMENT			
• Has there been a change in design, construction, operation, or maintenance, which may increase the discharge of pollutants to waters of the State or has the SWPPP been ineffective in controlling storm water pollutants? **If so, amend the SWPPP and submit it to the MDEQ within 30 days of amendment.**	○	○	

V. MONTHLY INSPECTION SUMMARY (Previous 12 months)

DATE (mm/dd/yy)	TIME	ANY DEFICIENCIES? YES	ANY DEFICIENCIES? NO	IF YES, WERE CORRECTIVE ACTIONS TAKEN? YES	IF YES, WERE CORRECTIVE ACTIONS TAKEN? NO	INSPECTOR(S)

SWPPP EVALUATION CERTIFICATION STATEMENT AND SIGNATURE:

SWPPP Evaluation and Certification: This section must be completed by the person who conducted the SWPPP evaluation prior to submitting this form to the person with signature authority or a duly authorized representative.

"I certify that this report is true, accurate, and complete to the best of my knowledge and belief."

Name-Printed	Signature	Title	Date

RO/DAR CERTIFICATION AND SIGNATURE

Permittee-Certification:

☐ The SWPPP is in compliance with the terms and conditions of the Individual NPDES Storm Water Permit.

☐ The SWPPP is out of compliance with the terms and conditions of the Individual NPDES Storm Water Permit. The SWPPP will be amended and submitted to MDEQ within 30 days of amendment.

"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Printed Name of person with Signature Authority or a Duly Authorized Representative[1]	**Signature of person with Signature Authority or a Duly Authorized Representative**[1]	**Date**

[1]A person is a Duly Authorized Representative only if 1) the authorization is made in writing and submitted to the permit board ["*Signatory Requirements*"], and 2) the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated activity, such as: manager, operator of a well or well field, superintendent, person of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company.

Employee Training Log

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Instructions: Newly hired employees responsible for implementing and/or complying with the requirements of the permit shall receive initial training prior to performing such responsibilities. Employees responsible for implementing and/or complying with the requirements of the permit shall receive refresher training by December 31st of each calendar year. Proper documentation of employee training must be maintained. Include copies of the training agenda and certificates of training when applicable. All training records shall be maintained for at least three years from the date of training.

Facility Name:	Physical Address:
Permit Number:	Training Date:
Training Topic:	
Training Description:	

Employee Name (printed)	Employee Signature	Worker ID Number	Initial/Refresher

"I certify under penalty of law that this report is true, accurate, and complete, to the best of my knowledge and belief."

Trainer Name (printed)	Trainer Signature	Date

MISSISSIPPI DEPARTMENT OF
ENVIRONMENTAL QUALITY

Storm Water Pollution Prevention Plan (SWPPP) Certification Form for Individual NPDES Permit Reissuance

INSTRUCTIONS

This form shall be attached to the NPDES Form 2F (or other required form) for reissuance of the individual NPDES Permit.

The current individual NPDES Permit requires a SWPPP to be maintained and implemented at the site. If the SWPPP is no longer current or does not effectively control storm water pollutants at the facility, a revised SWPPP shall be submitted to MDEQ as an attachment to the NPDES Form 2F (or other required form) submitted for reissuance of the individual permit.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

1.	**IS A COPY OF THE SWPPP AT THE PERMITTED SITE?**	☐ YES	☐ NO
2.	**IS THE SWPPP UP-TO-DATE AND EFFECTIVE IN CONTROLLING STORM WATER POLLUTANTS? IF NO, PLEASE ATTACH REQUIRED SWPPP AMENDMENTS**	☐ YES	☐ NO

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature[1] _____ **Date** _____

Printed Name[1] _____ **Title** _____

[1] **This form shall be signed according to 11 Miss. Admin. Code Pt. 6, Ch. 1, as follows:**
- **For a corporation, by a responsible corporate officer.**
- **For a partnership, by a general partner.**
- **For a sole proprietorship, by the proprietor.**
- **For a municipal, state or other public facility, by principal executive officer, mayor, or ranking elected official.**

Appendix C
Inspection Records

Appendix D
Best Management Practice Manual

HOWARD INDUSTRIES
STORM WATER POLLUTION PREVENTION PLAN
BEST MANAGEMENT PRACTICES MANUAL

Best Management Practices (BMPs) are measures used to prevent or reduce pollution from any type of activity. BMPs may include processes, procedures, schedules of activities, prohibitions on practices, and other additional management practices to prevent or reduce water pollution. They are anything which may be identified as a method; inexpensive or costly, short of actual treatment, to curb water pollution. BMPs can be almost anything that prevents toxic or hazardous substances from entering the environment.

The purpose of this appendix of the Storm Water Pollution Prevention Plan (SWPPP) is to be a reference when selecting BMPs at the site and to describe some basic BMPs required for inclusion in the SWPPP.

Implementing these or other BMPs should be documented and maintained as part of the overall SWPPP. The effectiveness of the BMPs selected should be evaluated annually or when conditions warrant additional evaluations.

This BMP Manual is comprised of fact sheets that are organized by activity. The following checklists may be used to select BMPs when new projects are planned or when problems are encountered during storm water inspections.

BMP CHECKLIST

ADMINISTRATIVE SOURCE CONTROL BMPs			
☐	ASC-1 GOOD HOUSEKEEPING	☐	ASC-7 RECORD KEEPING
☐	ASC-2 PREVENTATIVE MAINTENANCE	☐	ASC-8 PREVENTATIVE MONITORING PRACTICES
☐	ASC-3 VISUAL INSPECTIONS	☐	ASC-9 SECURITY
☐	ASC-4 SPILL PREVENTION AND RESPONSE	☐	ASC-10 AREA CONTROL PROCEDURES
☐	ASC-5 MANAGEMENT OF RUNOFF	☐	ASC-11 SIGNS AND LABELS
☐	ASC-6 PERSONNEL TRAINING		
VEHICLE AND EQUIPMENT MANAGEMENT BMPs			
☐	VEM-1 FUELING STATIONS	☐	VEM-5 DRIP PANS
☐	VEM-2 VEHICLE AND EQUIPMENT MAINTENANCE	☐	VEM-6 VEHICLE POSITIONING
☐	VEM-3 PAINTING OPERATIONS	☐	VEM-7 LOADING AND UNLOADING BY AIR PRESSURE OR VACUUM
☐	VEM-4 VEHICLE AND EQUIPMENT WASHING	☐	VEM-8 VEHICLE WASHING
MATERIAL AND WASTE MANAGEMENT BMPs			
☐	MWM-1 LOADING AND UNLOADING	☐	MWM-7 COVERING
☐	MWM-2 LIQUID STORAGE IN ABOVEGROUND TANKS	☐	MWM-8 SWEEPING
☐	MWM-3 INDUSTRIAL WASTE MANAGEMENT AREAS AND OUTSIDE MANUFACTURING	☐	MWM-9 SHOVELING
☐	MWM-4 OUTSIDE STORAGE OF RAW MATERIALS, BY-PRODUCTS, OR FINISHED PRODUCTS	☐	MWM-10 SORBENTS
☐	MWM-5 CONTAINMENT DIKING	☐	MWM-11 GELLING AGENTS
☐	MWM-6 CURBING		
STORM WATER ENGINEERING BMPs			
☐	SE-1 STORM WATER CONVEYANCES	☐	SE-7 VACUUM AND PUMP SYSTEMS
☐	SE-2 DIVERSION DIKES	☐	SE-8 PIPE SLOPE DRAINS
☐	SE-3 GRADED AREAS FOR PAVEMENT	☐	SE-9 SUBSURFACE DRAINS
☐	SE-4 COLLECTION BASINS	☐	SE-10 LEVEL SPREADERS
☐	SE-5 SUMPS	☐	SE-11 INFILTRATION TRENCHES
☐	SE-6 EXCAVATION PRACTICES	☐	SE-12 POROUS PAVEMENTS/CONCRETE GRIDS AND MODULAR PAVEMENTS
SEDIMENT AND EROSION CONTROL PRACTICES (PERMENANT)			
☐	SECP-1 SEDIMENT AND EROSION AND PREVENTION PRACTICES	☐	SECP-6 STREAM BANK STABILIZATION
☐	SECP-2 DUST CONTROL (INDUSTRIAL)	☐	SECP-7 MULCHING, MATTING AND NETTING
☐	SECP-3 VEGETATION PRACTICES	☐	SECP-8 PERMANENT SEEDING AND PLANTING
☐	SECP-4 PRESERVATION OF NATURAL VEGETATION	☐	SECP-9 SODDING
☐	SECP-5 BUFFER ZONES	☐	SECP-10 GRASSED SWALES

SEDIMENT AND EROSION CONTROL PRACTICES (TEMPORARY)			
☐	EC-1 DUST CONTROL (LAND DISTURBANCE AND DEMOLITION AREAS)	☐	EC-9 STORM DRAIN INLET PROTECTION
☐	EC-2 TEMPORARY SEEDING	☐	EC-10 SEDIMENT TRAPS
☐	EC-3 CHEMICAL STABILIZATION	☐	EC-11 TEMPORARY SEDIMENT BASINS
☐	EC-4 INTERCEPTOR DIKES AND SWALES	☐	EC-12 OUTLET PROTECTION
☐	EC-5 FILTER FENCES	☐	EC-13 CHECK DAMS
☐	EC-6 STRAW BALE BARRIERS	☐	EC-14 SURFACE ROUGHENING
☐	EC-7 BRUSH BARRIERS	☐	EC-15 GRADIENT TERRACES
☐	EC-8 GRAVEL OR STONE FILTER BERMS	☐	EC-16 VEGETATED FILTER STRIPS

ASC-1 GOOD HOUSEKEEPING

Good housekeeping involves using common sense to identify ways to maintain a clean and orderly facility and keep contaminants out of separate storm sewers. It includes establishing procedures to reduce the possibility of mishandling chemicals or equipment and training employees in good housekeeping techniques.

Good housekeeping requires that areas, which may contribute pollutants to storm water discharges, are maintained in a clean, orderly manner.

Operation and Maintenance

These practices make sure that processes and equipment are working well. Basic operation and maintenance BMPs incorporated in the good housekeeping program are:

- Regular pick up and disposal of loose garbage and waste material on site outside of active fill areas.
- Make sure equipment is working properly (Refer to Maintenance BMPs ASC-2).
- Routinely inspect for leaks or conditions that could lead to discharges of chemicals or contact of storm water with raw materials, intermediate materials, waste materials, or products (Refer to Visual Inspection BMPs ASC-3).
- Ensure that spill cleanup procedures are understood by employees (Refer to Spill Prevention and Response BMPs ASC-4).

Material Storage Practices

Improper storage can result in the release of materials and chemicals that can cause storm water runoff pollution. Proper storage technique BMPs incorporated into the good housekeeping program are:

- Provide adequate space to facilitate material transfer and easy access for inspections.
- Store containers, drums, and bags away from direct traffic routes to prevent accidental spills.
- Stack containers according to manufacturer's instructions to avoid damaging the containers from improper weight distribution.

- Store containers on pallets or similar devices to prevent corrosion of the containers which can result when containers come in contact with moisture on the ground.

- Assign the responsibility of hazardous material inventory to a limited number of people who are trained to handle hazardous materials.

Material Inventory Procedures

Improved material tracking and inventory practices can reduce the waste that results from overstocking and the disposal of outdated materials. Careful tracking of all ordered materials may also result in efficient materials use. Material Inventory Procedures incorporated in the good housekeeping program are listed below:

- Identify all chemical substances present at the facility. Review the site and the purchase orders for the previous year. List all chemical substances used at the facility, and then obtain the Material Safety Data Sheet (MSDS) for each. Keep MSDSs available to all employees.

- Label all containers to show the name and type of substance, stock number, expiration date, health hazards, suggestions for handling, and first-aid information.

- Clearly mark on the inventory hazardous materials that require special handling, storage, use, and disposal considerations.

The emergency control system should determine the amount of hazardous materials stored at a facility. Make sure that storage areas are designed to contain spills.

Employee Participation

Employees should be trained regularly in good housekeeping practices to reduce mishandling of chemicals/equipment.

ASC-2 PREVENTATIVE MAINTENANCE

The preventive maintenance program includes:

- Timely inspection and maintenance of storm water management devices (for example, cleaning catch basins).
- Inspecting and testing facility equipment and systems to uncover conditions that could cause breakdown or failures resulting in discharges of pollutants to surface waters.
- Proper facility equipment and systems maintenance.

Preventive maintenance involves regularly inspecting and testing facility equipment and operational systems. These inspections should uncover conditions such as cracks or slow leaks which could cause breakdowns or failures that result in discharges of chemicals to storm sewers/surface waters. The program should prevent breakdowns and failures by adjustment, repair or replacement of equipment. The preventive maintenance program includes the following elements:

- Identifying equipment, systems, and facilities and surrounding areas that must be inspected.
- Schedule for periodic inspections or tests of these equipment and systems.
- Appropriate and timely adjustment, repair, or replacement of equipment and systems.
- Maintenance and updating of complete records on inspections, equipment, and systems.

Identification of Equipment to Inspect

The first step is to identify which systems or equipment may malfunction and cause spills, leaks, or other situations that could lead to storm water runoff contamination. Identifying equipment as a BMP will include inspecting the following as a minimum:

- Pipes
- Pumps
- Storage tanks and bins
- Pressure vessels
- Pressure release valves

- Process and material handling equipment
- Storm water management devices (catch basins, or other structural or treatment BMPs).

Schedule Routine Preventive Maintenance Inspections

Schedules will be set for routine inspections once equipment and areas have been identified. Examination for leaks, corrosion, support or foundation failure, or other forms of deterioration or leaks should be included. Look for spots or puddles of chemicals or fluid leaks and document any detection of smoke, fumes, or other signs of leaks. Periodic testing of facility equipment for structural soundness is a key element of preventive maintenance.

Preventive maintenance inspections must be conducted as part of regular visual inspections.

Equipment Repair or Replacement

Promptly repair or replace defective equipment found during inspections and tests.

Records on Preventive Maintenance

- Complete an equipment inspection form monthly.
- Record test results and follow up with corrective action.
- Make sure records are complete and detailed.
- These records will be kept with other visual inspection records as part of this SWPPP.

ASC-3 VISUAL INSPECTIONS

Regular visual inspections are performed to verify that all of the elements of the plan are in place and working properly. The visual inspection program must include the following:

- Identifying qualified facility personnel who will inspect equipment and areas at appropriate intervals in the plan.
- Verifying corrective action.
- Maintaining all inspection/records.

Areas to Inspect

- Areas around all equipment
- Areas where spills and leaks have occurred in the past
- Material storage areas (tank farms, drum storage)
- Outdoor material processing areas
- Material handling areas (loading, unloading, transfer)
- Waste generation, storage, treatment, and disposal areas.

These areas will be inspected and documented monthly.

Implementing a Visual Inspection Plan

If the facility has no established inspection program, then a plan must be developed. Appropriate personnel are responsible for conducting the inspections. It is important to remember that the employees carrying out the visual inspection program should be properly trained, familiar with the storm water pollution prevention program, and knowledgeable about proper record keeping and reporting procedures.

Records of Inspections

Inspection records will note:

- When inspections were done
- Who conducted the inspection
- What areas were inspected
- What problems were found
- Corrective action
- Who has been notified

These records should be kept with the SWPPP. The U.S. Environmental Protection Agency's (USEPA) General Permit requires that records be kept until at least 1 year after coverage under the permit expires.

Visual Inspection Checklist

Note the minimum inspection items below:

- Corroded drums or drums without plugs or covers
- Corroded or damaged tanks, tank supports, and tank drain valves
- Corroded or leaking pipes
- Leaking or improperly closed valves and valve fittings
- Leaking pumps and/or hose connections
- Broken or cracked dikes, walls or other physical barriers designed to prevent storm water from reaching stored materials
- Windblown dry chemicals
- Leaking or corroded components.

ASC-4 SPILL PREVENTION AND RESPONSE

Spills and leaks together are one of the largest industrial sources of storm water pollutants, and are in most cases avoidable. Establishing standard operating procedures such as safety and spill prevention procedures along with proper employee training can reduce accidental releases. Avoiding spills and leaks is preferable to cleaning them up, not only from an environmental standpoint, but because spills increase operating costs and lower productivity.

Identify Potential Spill Areas

As part of this SWPPP, a list or inventory of materials handled, used, and disposed of, and a site map indicating the drainage area of each storm water outfall is included. Refer to drainage map with the locations of areas and activities with high material spill potential to determine where spills will most likely occur. Spill potential also depends upon how materials are handled, the types and volumes of materials handled, and how materials are stored.

Material Handling Procedures and Storage Requirements

By developing various spill scenarios, ideas for eliminating or minimizing the spill or its impact will emerge. These solutions should be prioritized and adopted according to conditions of effectiveness, cost, feasibility, and ease of implementation. A list of some suggested activities that may reduce the potential of spills that will occur/impact storm water quality follows:

- Expand ways to recycle, reclaim, and/or reuse materials to reduce the volume brought into the facility.
- Install leak detection devices, overflow controls, and diversion berms.
- Use effective housekeeping practices.
- Perform regular visual inspections to identify signs of wear on tanks, drums, containers, and berms and to identify messy housekeeping or other clues that could lead to potential spills.
- Perform preventive maintenance on storage tanks, valves, pumps, pipes and other equipment that may be present.
- Use filling procedures for tanks/other equipment that minimize spills.

- Use material transfer procedures that reduce the chance of leaks/spills.
- Substitute less toxic or nontoxic materials for toxic materials.
- Provide appropriate security.

ASC-5 MANAGEMENT OF RUNOFF

Managing runoff is the consideration of appropriate traditional storm water management practices (practices other than those which control the source of pollutants) used to divert, infiltrate, reuse, or otherwise manage storm water runoff in a manner that reduces pollutants in storm water discharges from the site. Procedures determined to be reasonable and appropriate must be implemented and maintained. The potential of various sources at the facility to contribute pollutants to storm water discharges from industrial activity must be considered when determining reasonable and appropriate measures. Appropriate measures may include:

- Vegetated swales (vegetated depression used to transport, filter, and remove sediment)
- Reusing collected storm water (such as for a process or as an irrigation source)
- Inlet controls (such as oil/water separators)
- Snow management activities
- Infiltration devices
- Wet detention/retention devices

Many BMPs are measures to reduce pollutants at the source before they have an opportunity to contaminate storm water runoff. Traditional storm water management practices can be used to direct storm water away from areas of exposed materials/potential pollutants. Traditional storm water management practices can be used to direct storm water that contains pollutants to natural or other types of treatment locations. For example, using an oil/water separator on storm water that has oil and grease will remove some of the oil and grease before the storm water leaves the site. Permits will generally not require specific storm water management practices since these practices must be selected on a case-by-case basis depending upon the activities at the site.

ASC-6 PERSONNEL TRAINING

Employee training programs must inform personnel at all levels of responsibility of the components and goals of the SWPPP. Training should address each component of the SWPPP, including how and why tasks are to be implemented. Similar BMP topics include:

- Spill prevention and response
- Good housekeeping
- Material management practices

Personnel training is essential for effective implementation of the SWPPP. The purpose of a training program is to teach personnel at all levels of responsibility the components and goals of the SWPPP.

The following sections discuss how to create an effective storm water pollution prevention training program.

Spill Prevention and Response

Spills can occur from equipment and containers containing petroleum products (gas, diesel fuel, oil, lubricating grease, hydraulic fluids). ***Spills from these services must be repaired and cleaned up in accordance with accepted local, state, and federal standards.***

Good Housekeeping

All employees must be trained in proper good housekeeping practices. Training must include a thorough discussion with all employees annually. New employees must receive instruction before beginning work. Each employee must be briefed on the items below:

- Require regular vacuuming and/or sweeping of interior spaces; sweeping and/or wetting.
- Promptly cleaning up spilled materials to prevent polluted runoff.
- Identifying places where brooms, vacuums, sorbents, foams, neutralizing agents, and other good housekeeping and spill response equipment are stored.
- Displaying signs reminding employees of the importance and procedures of good housekeeping.

- Discussing updated procedures and report on the progress of practicing good housekeeping at every meeting.

- Providing instruction on securing drums and containers and frequently checking for leaks and spills.

Materials Management Practices

All personnel must be trained to recognize all toxic and hazardous substances at the facility. Personnel must be trained on:

- Proper organization and storage of materials.

- Identification of all toxic and hazardous substances stored, handled, and produced onsite.

All employee training must be documented on the appended form and maintained as a part of this SWPPP.

ASC-7 RECORD KEEPING

Incidents such as spills or other discrepancies with other information describing the quality and quantity of storm water discharges must be included in the records. Inspections and maintenance activities must be documented and recorded in the plan. ***Records must be maintained for 3 years after the permit expires.***

Record Keeping and Reporting Procedures for Spills, Leaks, and Other Discharges

Records must include the following information:

- The date and time of the incident, weather conditions, duration, cause, environmental problems, response procedures, parties notified, recommended revisions of the BMP program, operating procedures/equipment needed to prevent recurrence.
- Formal written reports. ***(Document all reports called in to the National Response Center in the event of a reportable quantity discharge).***
- A list of the procedures for notifying the appropriate personnel and the names and telephone numbers of responsible personnel.

All inspections must be kept on file as directed by the pollution prevention team. The team will be responsible for reviewing the inspection records and when necessary implement correction measures.

Records Retention

Records of spills, leaks, or other discharges, inspections, and maintenance activities must be retained for at least 3 years after coverage expires under the permit.

ASC-8 PREVENTATIVE MONITORING PRACTICES

Preventive monitoring practices include the routinely observing a process or piece of equipment to ensure its safe performance and may also include the chemical analysis of storm water before discharge to the environment. Several types of monitoring systems are described below:

Automatic Monitoring System — In areas where overflows, spills and catastrophic leaks are possible, an automatic monitoring system is recommended. Some federal, state, and local laws require such systems to be present if threats exist to the health and safety of personnel and the environment. For material management areas, monitoring may include liquid level detectors, pressure and temperature gauges, and pressure-relief devices. In material transfer, process, and material handling areas, automatic monitoring systems can include pressure drop shut-off devices, flow meters, thermal probes, valve position indicators, and operation lights. Loading and unloading operations might use these devices for measuring the volume of tanks before loading, for weighing vehicles or containers, and for determining rates of flow during loading and unloading.

Automatic Chemical Monitoring — Measures the quality of plant runoff to determine whether discharge is appropriate or whether diversion to a treatment system is warranted. Such systems might monitor pH, turbidity, or conductivity. These parameters might be monitored in diked areas, sewers, drainage ditches, or holding ponds. Systems can also be designed to signal automatic diversion of contaminated storm water runoff to a holding pond (a valve or a gate could be triggered by a certain pollutant in the storm water runoff).

Manned Operations — In material transfer areas and process areas, personnel can be stationed to watch over the operations so that any spills or mismanagement of materials can be corrected immediately. This is particularly useful at loading and unloading areas where vehicles or equipment must be maneuvered into the proper position to unload.

Nondestructive Testing — Some situations require that a storage tank or a pipeline system be tested without being physically moved or disassembled. The structural integrity of tanks, valves, pipes, joints, welds, or other equipment can be tested using nondestructive methods. Acoustic emission tests use high frequency sound waves to draw a picture of the structure to reveal cracks, malformations, or other structural damage. Another type of testing is hydrostatic pressure testing. During pressure testing, the tank or pipe is subjected to pressures several times the normal pressure. A loss in pressure during the testing may indicate a leak or

some other structural damage. Tanks and containers should be pressure tested as required by federal, state or local regulations.

Automated monitoring systems should be placed in an area where personnel can easily observe the measurements. Alarms can be used in conjunction with the measurement display to warn personnel. Manned operations should have communication systems available for getting help in case spills or leaks occur. Especially sensitive or spill prone areas may require backup instrumentation in case the primary instruments malfunction.

Mechanical and electronic equipment should be operated and maintained according to the manufacturer's recommendations. Equipment should be inspected regularly to ensure proper and accurate operation.

The pollution prevention team, in consultation with a certified safety inspector, should evaluate system monitoring requirements to decide which systems are appropriate based upon hazard potential.

Advantages of Preventive Monitoring Practices	**Disadvantages of Preventive Monitoring Practices**
• Pressure and vacuum testing can locate potential leaks or damage to vessels early. The primary benefit of such testing is in ensuring the safety of personnel, but it also has secondary benefits including prevention of storm water contamination. • Automatic system monitors allow for early warnings if a leak, overflow, or catastrophic incident is imminent. • Manning operations, especially during loading and unloading activities, is effective and generally inexpensive. • The primary benefit of nondestructive testing is in ensuring the safety of personnel, but it also has secondary benefits including early detection of the potential for contaminating storm water runoff.	• Plant personnel often do not have the expertise to maintain automatic equipment. • Automatic equipment can fail without warning. • Automated process control and monitoring equipment may be expensive to purchase and operate.

ASC-9 SECURITY

Setting up a security system will prevent an accidental or intentional release of materials to storm water runoff as a result of vandalism, theft, sabotage, or other improper uses of facility property. Security personnel should be trained about the specifics of the SWPPP. Routine patrol, lighting, and access control are discussed below as possible measures to include in the facility's security system and are measures that can be used at any facility.

Security information should be included in the existing training required to instruct personnel about where and how to patrol areas within the facility. Instruction should also include what to look for in problem areas and how to respond to problems. During routine patrol, security personnel can actively search the facility for indications of spills, leaks, or other discharges; respond to any disturbance resulting from intruders or inappropriate facility operations; and generally work as a safeguard to prevent unexpected events.

Sufficient lighting throughout the facility during daytime and night hours make it easier to get to equipment during checks and will make it easy to detect spills and leaks that might otherwise be hidden. Routine patrols are easier with proper lighting.

Controlling site access is an important part of security, activity and traffic control. Signs, fencing, guard houses, and visitor clearance requirements should be considered to control site access.

- Signs are the simplest, most inexpensive method of access control, but they are limited in their actual control since they provide no physical barriers and require that people obey them voluntarily.

- Fencing provides a physical barrier to the facility site and an added means of security.

- Guard houses used with visitor rules make sure that only authorized personnel enter the site.

- Traffic signs are also useful. Restricting vehicles to paved roads and providing direction and warning signs can help prevent accidents. Where restricting vehicles to certain pathways is not possible, it is important to ensure that all above-ground valves and pipelines are well marked.

Advantages of Security	Disadvantages of Security
• Provides a preventive safeguard to operational malfunctions or other facility disturbances (routine patrols) • Allows easier detection of vandals or thieves (lighting) • Prevents spills by providing good visibility (lighting) • Prevents unauthorized access to facility (access control)	• May not be feasible for smaller facilities • May be costly (installation of lighting systems) • May increase energy costs as a result of additional lighting • May not be feasible to have extensive access controls at smaller facilities

ASC-10 AREA CONTROL PROCEDURES

The activities conducted at an industrial site often result in the materials being deposited on clothes or footwear and then being carried throughout the facility site. As a result, these materials may find their way into the storm water runoff.

Area control procedures involves practicing good housekeeping measures such as maintaining indoor or covered material storage and industrial processing areas. If the area is kept clean, the risk of accumulating material on footwear and clothing is reduced. In turn, the chance of leftover pollutants making contact with storm water and polluting surface water is minimized.

Area control measures can be used at any facility where materials may be tracked into areas where they can come in contact with storm water runoff. Areas can include material handling/storage/process areas.

Materials storage areas and industrial processing areas should be checked regularly to ensure that good housekeeping measures are being implemented. Cover-garments, foot mats, and other devices used to collect residual material near the area should be cleaned regularly.

Other effective practices include the following:

- Brushing off clothing before leaving the area
- Stomping feet to remove material before leaving the area
- Using floor mats at area exits
- Using coveralls, smocks, and other over garments in areas where exposure to material is of greatest concern (personnel should remove the over garments before leaving the area)
- Posting signs to remind personnel about these practices.

Advantages of Area Control Procedures	Disadvantages of Area Control Procedures
• Are easy to implement • Result in a cleaner facility and improved work environment	• May be seen as tedious by employees and therefore may not be followed

ASC-11 SIGNS AND LABELS

Signs and labels identify problem areas or hazardous materials at a facility. Warning signs, often found at industrial facilities, are a good way to suggest caution in certain areas. Signs and labels can also provide instructions on the use of materials and equipment. Labeling is a good way to organize large amounts of materials, pipes, and equipment.

Labels tell material type and container contents. Accurate labeling can help quickly identify the type of material released so facility personnel can respond correctly.

Two effective labeling methods include color-coding and U.S. Department of Transportation (USDOT) labeling. Color-coding is easily recognized by facility personnel and simply involves painting/coating or applying an adhesive label to the container. Color codes must be consistent throughout the facility to be effective, and signs explaining the color codes should be posted in all areas.

The USDOT requires that labels be prominently displayed on transported hazardous and toxic materials. Labeling required by the USDOT should be expanded to piping and containers, making it easy to recognize materials that are corrosive, radioactive, reactive, flammable, explosive, or poisonous.

Areas where they are particularly useful are material transfer areas, equipment areas, loading and unloading areas, or anywhere information might prevent contaminants from being releases to storm water.

Signs and labels should be visible and easy to read. Useful signs and labels might provide the following information:

- Names of facility and regulatory personnel, including emergency phone numbers, to contact in case of an accidental discharge, spill, or other emergency.
- Proper uses of equipment that could cause release of storm water contaminants.
- Types of chemicals used in high-risk areas.
- The direction of drainage lines/ditches and their destination: color, treatment or discharge.

- Information on a specific material.

- Refer to Occupational Safety and Health Administration (OSHA) standards for sizes and numbers of signs required for hazardous material labeling.

Hazardous chemicals might be labeled as follows:

- Danger
- Combustible
- Warning
- Caution
- Flammable
- Poisonous
- Caustic
- Corrosive
- Volatile
- Explosive

Periodic checks can ensure that signs are still in place and labels are properly attached. Signs and labels should be replaced and repaired as often as necessary.

Advantages of Signs and Labels	Disadvantages of Signs and Labels
• Inexpensive and easy to use	• Must be updated and maintained so they are legible

VEM-1 FUELING STATIONS

When storm water mixes with fuel spilled or leaked onto the ground, it becomes polluted with chemicals that are harmful to humans and to fish and wildlife. The following will help identify activities that can contaminate storm water and suggest BMPs to reduce or eliminate storm water contamination from fueling stations. (Refer to the Exposure Minimization BMPs: MWM-5, MWM-6, VEM-5, SE-4, SE-5, MWM-7, VEM-6, and VEM-7).

Fuel station activities that can contaminate storm water include:

- Spills and leaks that happen during fuel or oil delivery.

  Fuel overflows during storage tank filling are a major source of spills. Overflows can be prevented. Watch the transfer constantly to prevent overfilling and spills. Overfill prevention equipment automatically shuts off flow, restricts flow, or sounds an alarm when the tank is almost full. Federal regulations require overfill prevention equipment on all underground storage tanks installed after December 1988. For underground storage tanks installed before December 1988, overfill prevention equipment is required by 1998. Consider installing overflow prevention equipment sooner than the required deadline as part of your pollution prevention plan.

  Spills should be controlled immediately. Small spills can be contained using sorbent material such as oil dry or equivalent, straw, or sawdust. Do not wash petroleum spills into the storm drain or sanitary sewer. (Refer to Containment Diking and Curbing BMP WMW-5).

- Spills caused by "topping off" fuel tanks.

  Gas pumps automatically shut off when the vehicle fuel tank is almost full to prevent spills. Trying to completely fill the tanks or topping off the tank often results in overfilling the tank and spilling fuel. Discourage topping off tanks by training employees and posting signs.

- Allowing rainfall on the fuel area or storm water to run onto the fuel area.

  Fueling areas can be designed to minimize spills, leaks, and incidental losses of fuel, such as vapor loss, from coming into contact with rain water:

- Build a roof over the fuel area.

- Pave the fuel area with concrete instead of asphalt. Asphalt soaks up fuel or can be slowly dissolved by fuel, engine fluids, and other organic liquids and the asphalt itself can become a source of storm water contamination.

- Allowing run-on to the fuel areas.

  Run-on is storm water generated from other areas that flows or "runs on" to your property or site. Run-on flowing across fueling areas can wash contaminants into storm drains. Run-on can be ***minimized*** by:

- Grading, berming, or curbing the area around the fuel site to direct run-on away from the fuel area.

- Locating roof downspouts so storm water is directed away from fueling areas.

- Using valley gutters to route storm water around fueling area.

- Hosing or washing down the fuel area.

  Cleaning the fueling area with running water should be ***avoided*** because the wash water will pick up fuel, oil, and grease and make it storm water. Consider using a damp cloth on the pumps and a damp mop on the pavement rather than a hose. ***Check with the local sewer authority about any treatment required before discharging the mop water or wash water to the sanitary sewer.***

The key to a successful storm water pollution prevention plan is getting employees interested in reducing waste generation.

Discuss pollution prevention with employees. They are most familiar with the operations that generate wastes and may have helpful waste reduction suggestions. Consider setting up an employee reward program to promote pollution prevention.

Wash water and storm water in fueling areas drain directly to the storm sewer without adequate treatment. Some types of oil/water separators installed at these locations can provide

treatment to discharges from oil contaminated pavements, but this equipment is only effective when properly maintained.

SUMMARY OF FUELING STATION BMPs

- Consider installing spill and overflow protection.
- Discourage topping off fuel tanks.
- Reduce exposure of the fuel area to storm water.
- Use dry cleanup methods for the fuel area.
- Use proper petroleum spill control.
- Encourage employee participation.

VEM-2 VEHICLE AND EQUIPMENT MAINTENANCE

Many vehicle and equipment maintenance operations use materials or create wastes that are harmful to humans and the environment. Storm water runoff from areas where these activities occur can become polluted by a variety of contaminants such as solvents and degreasing products, waste automotive fluids, oils, greases, acids, and caustic wastes. These and other harmful substances in storm water can enter water bodies through storm drains or through small streams where they can harm fish and wildlife.

The following will help find sources of storm water contamination from vehicle and equipment maintenance operations and to help personnel choose BMPs that can reduce or eliminate these sources.

Activities That Can Contaminate Storm Water

Engine repair and service:

- Parts cleaning
- Shop cleanup
- Spilled fuel, oil, or other materials
- Replacing fluids (oil, oil filters, hydraulic fluids, transmission fluid, and radiator fluids).

Outdoor vehicle and equipment storage and parking:

- Dripping engine and automotive fluids from parked vehicles and equipment.

Disposal of materials or process wastes:

- Greasy rags
- Oil filters
- Air filters
- Batteries
- Spent coolant, degreasers, etc.

Parts Cleaning

Parts are often cleaned using solvents such as trichloroethylene, 1,1,1-trichloroethane, or methylene chloride. Many of these cleaners are harmful and must be disposed of as a hazardous waste. Cleaning without using liquid cleaners whenever possible reduces waste. Scrape parts with a wire brush, or use a bake oven if available. Prevent spills and drips of solvents and cleansers to the shop floor. Perform all liquid cleaning at a centralized station so the solvents and residues stay in one area. If parts are dipped in liquid, remove them slowly to avoid spills. Locate drip pans, drain boards, and drying racks to direct drips back into a sink or fluid holding tank for reuse.

Nontoxic or Less Toxic Cleaners or Solvents

Eliminate or reduce the number or amount of hazardous materials and waste by substituting nonhazardous or less hazardous materials, if possible. For example:

- Use non-caustic (noncorrosive) detergents instead of caustic cleaning agents for parts cleaning (ask suppliers about alternative cleaning agents).
- Use detergent-based or water-based cleaning systems instead of organic solvent degreasers.
- Replace chlorinated organic solvents (1,1,1-trichloroethane, methylene chloride, etc.), with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of but are by no means harmless themselves. Check the list of active ingredients to see whether it contains chlorinated solvents.
- Choose recyclable cleaning agents.

Contact suppliers or trade journals for more product specific waste minimization suggestions.

Work Areas and Spills That Are Washed or Hosed Down with Water

Clean up leaks, drips, and other spills without using large amounts of water. Use rags for small spills, a damp mop for general cleanup, and dry absorbent material for larger spills. Consider the following BMPs:

- Avoid hosing down work areas.

- Collect leaking or dripping fluids in drip pans or containers. If different liquids are kept separate, the fluids are easier to recycle.

- Keep a drip pan under the vehicle while unclipping hoses, unscrewing filters, or removing other parts. Use a drip pan under any vehicle that might leak while it is being worked on to keep splatters or drips off the shop floor.

- Promptly transfer used fluids to the proper waste or recycling drums. Do not leave full drip pans or other open containers lying around.

- Locate waste and recycling drums in properly controlled areas of the yard, preferably areas with a concrete slab and secondary containment.

Spills or Materials that are Washed or Poured down the Drain

Do not pour liquid waste into floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections. Used or leftover cleaning solutions, solvents, and automotive fluids and oil are often toxic and should not be put into the sanitary sewer. Be sure to dispose of these materials properly or find opportunities for reuse and recycling. ***If uncertain how to dispose of chemical wastes, contact the state hazardous waste management agency or the Resource Conservation and Recovery Act hotline at (800) 424-9346.*** Post signs at sinks to remind personnel, and paint stencils at outdoor drains to notify personnel and others not to pour liquid waste down drains.

Oil Filters Should be Completely Drained before Recycling or Disposal

Oil filters disposed of in trash cans or Dumpsters can leak oil and subsequently contaminate storm water. Place the oil filter in a funnel over the waste oil recycling or disposal collection tank to drain excess oil before disposal. Oil filters can be crushed and recycled; ask oil suppliers or recyclers about recycling oil filters as an alternative to disposal.

Incoming Vehicles and Equipment Should be Checked for Leaking Oil and Fluids

Park vehicles indoors or under a roof, if possible, so storm water does not contact the area. If vehicles are parked outdoors before repair, watch them closely for leaks.

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

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

Wrecked Vehicles or Damaged Equipment Stored Onsite

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

- As the vehicles arrive, place drip pans under them immediately, even if suspected that all fluids have leaked out before the vehicles reach the shop.

- Build a shed or temporary roof over areas where parked vehicles await repairs or salvage, especially if wrecked vehicles are handled. Build a roof over vehicles kept for parts.

- Drain all fluids, including air conditioner coolant, from wrecked vehicles and "parts" vehicles. Drain engines, transmissions, and other used parts.

- ***Store cracked batteries in a non-leaking secondary container.*** Do this with all cracked batteries, event if all the acid has been suspected to have drained out. ***If a battery is dropped, treat it as if it is cracked.*** Put in into the containment area until it is verified that it is not leaking.

Recycle Any or All of the Following:

- Degreasers
- Used oil or oil filters
- Antifreeze
- Cleaning solutions
- Automotive batteries
- Hydraulic fluid

All of these materials can be either recycled onsite or sent offsite for recycling. Some recycling options, ranked by level of effort required, follow:

Least Effort:

- Arrange for collecting and transporting batteries, used oil and other fluids, cleaning solutions, and degreasers to a commercial recycling facility. This requires that wastes are separated and stored until they are picked up by the recycling company.

- "Dirty" solvent can be reused. Presoak dirty parts in used solvent before cleaning the parts in fresh solvent.

Moderate Effort:

- Used oil, antifreeze, and cleaning solutions can be recycled onsite using a filtration system that removes impurities and allows the fluid to be reused. Filtration systems are commercially available.

Most Effort:

- Install an onsite solvent recovery unit. If the facility creates large volumes of used solvents, consider purchasing or leasing an onsite still to recover the solvent for reuse. ***Contact the state hazardous waste management agency for more information about onsite recycling of used solvents.***

Reduce the Number of Different Solvents Used

Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Sometimes, one solvent can perform a job as well as two different solvents.

Separate Wastes

Separating wastes allows for easier recycling and may reduce treatment costs. Keep hazardous and nonhazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents (like 1,1,1-trichloroethane) separate from non-chlorinated solvents (kerosene and mineral spirits). Proper labeling of all wastes and materials will help accomplish this goal (Refer to Signs and Labels BMP ASC-11).

Recycled Products

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

SUMMARY OF VEHICLE MAINTENANCE AND REPAIR BMPs

- Check for leaking oil and fluids.
- Use nontoxic or low-toxicity materials.
- Drain oil filters before disposal or recycling.
- Do not pour liquid waste down drains.
- Recycle engine fluids and batteries.
- Isolate and label wastes.
- Buy recycled products.

VEM-3 PAINTING OPERATIONS

Many painting operations use materials or create wastes that are harmful to humans and the environment. Storm water runoff from areas where these activities occur can become polluted by a variety of contaminants such as solvents and dusts from sanding and grinding that contain toxic metals like cadmium and mercury. These and other potentially harmful substances in storm water can enter water bodies directly through storm drains where they can harm fish and wildlife.

The following will help identify potential sources of storm water contamination from painting operations on site and BMPs that can reduce or eliminate these sources. Implementing this section can help eliminate, reduce, or recycle pollutants that may otherwise contaminate storm water.

Painting Activities That Can Contaminate Storm Water:

- Painting and paint removal
- Sanding or paint stripping
- Spilled paint or paint thinner

Prevent Paint Wastes from Contaminating Storm Water Runoff

Use tarps and vacuums to collect solid wastes produced by sanding or painting. Tarps, drip pans, or other spill collection devices should be used to collect spills of paints, solvents, or other liquid materials. These wastes should be disposed of properly to keep them from contaminating storm water.

Contain Wastes from Sanding

Prevent paint chips from coming into contact with storm water. Paint chips may contain hazardous metallic pigments or biocides(pesticides). Reduce contamination of storm water with paint dust and chips from sanding by the following practices:

- Avoid sanding in windy weather when possible.

- Enclose outdoor sanding areas with tarps or plastic sheeting. Be sure to provide adequate ventilation and personal safety equipment. After sanding is complete, collect the waste and dispose of it properly.

- Keep workshops clean of debris and grit so that the wind will not carry any waste into areas where it can contaminate storm water.

- Move the activity indoors if it can be performed safely.

Inspect Parts before Painting

Inspect the part or vehicle to be painted to ensure that it is dry, clean, and rust free. Paint sticks to dry, clean surfaces, which in turn means a better, longer-lasting paint job.

Use Painting Equipment That Creates Little Waste

As little as 30 percent of the paint may reach the target from conventional airless spray guns; the rest is lost as overspray. Paint solids from overspray are deposited onto the ground where they can contaminate storm water. Other spray equipment that delivers more paint to the target and less overspray should be used:

- Electrostatic spray equipment
- Air-atomized spray guns
- High-volume/low-pressure spray guns
- Gravity-feed guns

Train Personnel to Use Spray Equipment Correctly

Operator training can reduce overspray and minimize the amount of paint solids that can contaminate storm water. Correct spraying techniques also reduce the amount of paint needed per job. If possible, avoid spraying on windy days. When spraying outdoors, use a drop cloth or ground cloth to collect and dispose of overspray.

Recycled Paint, Paint Thinner, and/or Solvents

These materials can either be recycled onsite or sent offsite for recycling. Some recycling options ranked by the level of effort required are listed below.

Least Effort:

- Dirty solvent can be reused for cleaning dirty spray equipment and parts before equipment is cleaned in fresh solvent.

- Give small amounts of leftover paint to the customer for touchup.

Moderate Effort:

- Arrange for collection and transportation of paints, paint thinner, or spent solvents to a commercial recycling facility.

Most Effort:

- Install an onsite solvent recovery unit. If the facility creates large volumes of used solvents, paint, or paint thinner, consider buying or leasing an onsite still to recover used solvent for reuse. Contact the state hazardous waste management agency for more information about onsite recycling of used solvents.

Separate Wastes

Separating wastes makes recycling easier and may reduce treatment costs. Keep hazardous and nonhazardous wastes separate, and keep chlorinated solvents (like 1,1,1-trichloroethane) separate from non-chlorinated solvents (like petroleum distillate and mineral spirits). Check the MSDS for ingredients, or talk with waste haulers or recycling companies to learn which waste types can be stored together and which should be separated.

Reduce the Number of Solvents Used

Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Sometimes, one solvent can do a job as well as two different solvents.

Use Recycled Products

Many products made of recycled (refined or purified) materials are available. Buying recycled paints, paint thinner, or solvent products helps build the market for recycled materials.

SUMMARY OF PAINTING OPERATION BMP

- Inspect parts before painting.
- Contain sanding wastes.
- Prevent paint waste from contacting storm water.
- Use proper procedures interim storage of waste paint, solvents, etc.
- Evaluate efficiency of equipment.
- Recycle paint, paint thinner, and solvents.
- Segregate wastes.
- Buy recycled products.

VEM-4 VEHICLE AND EQUIPMENT WASHING

Washing vehicles and equipment outdoors or in areas where wash water flows onto the ground can pollute storm water. Wash water can contain high concentrations of oil and grease, phosphates, and high suspended solid loads (these and other potentially harmful substances can pollute storm water when deposited onto the ground where they can be picked up by rainfall runoff). Vehicle wash water is considered to be a process wastewater and needs to be covered by a National Pollutant Discharge Elimination System (NPDES) permit.

The following will help find storm water contamination sources from vehicle and equipment washing and to select BMPs to reduce those sources. This section can help eliminate, reduce, or recycle pollutants that otherwise may contaminate storm water. (Refer to Vehicle Washing BMP VEM-8).

Vehicle and Equipment Washing Activities That Can Contaminate Storm Water:

- Outside equipment or vehicle cleaning (washing or steam cleaning)
- Wash water discharged directly to the ground or storm water drain

Consider Using Phosphate-Free Biodegradable Detergents

Phosphates, which are plant nutrients, can cause excessive growth of nuisance plants in water when they enter lakes or streams in wash water. Contact suppliers about phosphate-free biodegradable detergents that are available on the market.

Vehicles, Equipment, or Parts That Are Washed over the Open Ground

Used wash water contains high concentrations of solvents, oil and grease, detergents, and metals. Try not to wash parts or equipment outside. Washing over impervious surfaces like concrete, blacktop, or hardpacked dirt allows wash water to enter storm drains directly or deposits contaminants onto the ground, where they are washed into storm drains when it rains. Washing over pervious ground such as sand soils potentially can pollute groundwater. Therefore, small parts and equipment washing should be done over a parts washing container where the wash water can be collected and recycled or disposed of properly.

If washing large equipment or vehicles takes place, and it is necessary to wash outside; designate a specific area for washing. This area should be bermed to collect the wastewater and graded to direct the wash water to a treatment facility. Consider filtering and recycling vehicle wash water. If recycling is not practical, the wastewater can be discharged to the sanitary sewer.

SUMMARY OF VEHICLE AND EQUIPMENT WASHING BMPs

- Consider using phosphate-free detergents.
- Use designated cleaning areas.
- Consider recycling wash water.

Personnel Involvement is the Key

Getting personnel interested in reducing waste is the key to a successful SWPPP. Discuss pollution prevention with personnel. They are most familiar with the operations that generate wastes and may have helpful waste reduction suggestions. Consider setting up a personnel award program to promote pollution prevention.

VEM-5 DRIP PANS

Drip pans are small depressions or pans used to contain very small volumes of leaks, drips, and spills that occur at a facility. Drip pans can be depressions in concrete, asphalt, or other impenetrable materials or they can be made of metals, plastic, or any material that does not react with the dripped chemicals. Drip pans can be temporary or permanent.

Drip pans are used to catch drips from motors, valves, pipes, etc., so that the materials or chemicals can be cleaned up easily or recycled before they can contaminate storm water. Although leaks and drips should be repaired and eliminated as part of a preventive maintenance program, drip pans can provide a temporary solution where repair or replacement must be delayed. In addition, drip pans can be an added safeguard when they are positioned beneath areas where leaks and drips may occur.

Drip pans can be used at any industry where valves and piping are present and the potential for small volume leakage and dripping exists. When using drip pans, consider the location of the drip pan, weather conditions, the type of material used for the drip pan, and how it will be cleaned.

The location of the drip pan is important because they must be inspected and cleaned frequently. Drip pans must be easy to reach and remove. In addition, take special care to avoid placing drip pans in precarious positions such as next to walkways, on uneven pavement/ground, or on pipelines. Drip pans in these locations are easily overturned and may present a safety hazard, as well as an environmental hazard.

Weather conditions are also important factors. Heavy winds and rainfall move or damage drip pans because of their small size and their light weight (if not built-in). To prevent this, secure the pans by installing or anchoring them. Drip pans may be placed on platforms or behind wind blocks or tied down.

Employees must pay attention to the pans and empty them when they are nearly full for drip pans to be effective. Because of their small holding capacities, drip pans will easily overflow if not emptied. Also, recycling efforts can be affected if storm water accumulates in drip pans and dilutes the spilled material. It is important to have clearly specified and easily followed practices of reuse/recycle and/or disposal, especially the disposal of hazardous materials. Many facilities dump the drip pan contents into a nearby larger volume storage container and periodically recycle the contents of the storage container.

Frequent inspection of the drip pans is necessary due to the possibility of leaks in the pan itself or in piping or valves that may occur randomly or irregular slow drips that may increase in volume. Conduct inspections ***before*** forecasted rainfall events to remove accumulated materials and ***immediately*** after storm events to empty storm water accumulations.

Advantages of Drip Pans	Disadvantages of Drip Pans
• Inexpensive	• Contain small volumes only
• Easily installed and simple to operate	• Must be inspected and cleaned frequently
• Allow for reuse/recycling of collected material	• Must be secured during poor weather conditions
• Empty or discarded containers may be reused as drip pans	• Contents may be disposed of improperly unless facility personnel are trained in proper disposal methods

VEM-6 VEHICLE POSITIONING

Vehicle positioning is the practice of locating trucks or rail cars while transferring materials to prevent spills of materials onto the ground surface, which may then contaminate storm water runoff. Vehicle positioning is a simple and effective method of material spill prevention and yet it is commonly overlooked.

Vehicle positioning can be used at all types of industrial facilities. This practice is appropriate for any area where materials are transferred from or to vehicles, such as loading and unloading areas, storage areas, and material transfer areas. Use vehicle positioning in conjunction with other practices such as covering, sumps, drip pans, or loading and unloading by air pressure or vacuum where chemical spills are of concern.

The purpose of vehicle positioning is to locate vehicles in a stable and appropriate position to prevent problems, such as spills resulting from broken material storage containers, spills caused by vehicle movement during materials transfer activities, and spills caused by improperly located vehicles. Vehicles should also be positioned near containment or flow diversion systems to collect unexpected spills from leaks in transfer or connections. The following activities are included in this practice:

- Constructing walls that help in positioning the vehicles
- Positioning vehicle either over a drain or on a sloped surface that drains to a containment structure
- Outlining required vehicle positions on the pavement
- Using wheel guards or wheel blocks
- Posting signs requiring emergency brake usage
- Requiring vehicles to shut off engines during materials transfer activities

Advantages of Vehicle Positioning	Disadvantages of Vehicle Positioning
• Inexpensive • Easy and effective	• May require redesign of loading and unloading areas

VEM-7 LOADING AND UNLOADING BY AIR PRESSURE OR VACUUM

Air pressure and vacuum systems are commonly used for transporting and loading and unloading materials. These systems are simple to use and effective in transferring dry chemicals or solids from one area to another, but are less effective as the particles of material become denser.

In an air pressure system, a safety relief valve and a dust collector are used to separate the dry materials from the air and then release the air accumulated during transfer operations. In a vacuum system, a dust collection device and an air lock, such as a rotary gate or trap door feeder, are typically used.

Using mechanical equipment that involves enclosed lines, such as those provided by air pressure (also referred to as pneumatic) and vacuum loading systems are effective methods for minimizing releases of pollutants into the environment. Because of the enclosed nature of the system, pollutants are not exposed to wind or precipitation and therefore have less potential to contaminate storm water discharges.

Air pressure and vacuum systems can be used at all types of industrial facilities. This equipment is in material handling areas to use for storing, loading and unloading, transporting, or conveying materials.

Unlike many of the other BMPs discussed in this manual, air pressure and vacuum systems may be expensive because of the costs of purchasing the system and retrofitting the system to existing materials handling procedures. In many cases, these systems can be shipped to a facility and be installed onsite without contractor help. Manufacturer's recommendations should be followed closely to ensure proper installation. In other cases, systems may have to be designed specifically for a site. Proper design and installation are very important for air pressure and vacuum systems to be as effective as possible. The equipment may be weatherproof or, if not, consider enclosing or covering the equipment.

Conduct routine inspections of air pressure and vacuum systems. Regular maintenance is required of these systems, especially the dust collectors. Conduct maintenance activities based upon manufacturer's recommendations. ***Inspect air pressure systems more frequently due to the greater potential for leaks to the environment.***

Advantages of Loading and Unloading by Air Pressure or Vacuum	Disadvantages of Loading and Unloading by Air Pressure or Vacuum
• Quick and simple • May be economical if materials can be recovered • Minimizes exposure of pollutants to storm water	• May be costly to install and maintain • May not be appropriate for some denser materials • May require site-specific design • Dust collectors may need an installation permit under the Clean Air Act

VEM-8 VEHICLE WASHING

Materials that accumulate on vehicles and then scatter across industrial sites represent an important source of storm water contamination. Vehicle washing removes materials such as site-specific dust and spilled materials that have accumulated on the vehicle. If not removed, residual material will be spread by gravity, wind, snow, or rainfall as the vehicles move across the facility site and off the site.

This practice is appropriate for any facility where vehicles come into contact with raw materials onsite. If possible, vehicle washing areas should be located where the most vehicle activity occurs. Wastewater from vehicle washing should be directed away from process materials to prevent contact. Those areas include material transfer areas, loading and unloading areas, or areas located just before the site exit.

When considering the method of vehicle washing, consideration should be given to using a high-pressure water spray with no detergent additives. In general, water will adequately remove contaminants from the vehicle. If detergents are used, they may cause other environmental impacts. Phosphate or organic-containing compounds should be avoided.

All wash water should be directed into a sanitary sewer system when available. If the wash water is directed into the storm sewer system it will result in a non-storm-water discharge, thus requiring an application for an NPDES permit to cover the discharge.

Blowers or vacuums should be considered where the materials are dry and easily removed by air.

Advantages of Vehicle Washing	Disadvantages of Vehicle Washing
• Prevents dispersion of materials across the facility site	• May be costly to construct a truck washing facility
• Is necessary only where methods for transferring contained materials and minimizing exposure have not been successfully adopted and implemented	• May require an NPDES permit

MWM-1 LOADING AND UNLOADING MATERIALS

Loading/unloading operations usually take place outside on docks or terminals. Materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and be carried away by rainfall runoff or when the area is cleaned. Rainfall may wash off pollutants from machinery used to unload or load materials. The following will help find sources of storm water contamination from loading and unloading materials and choose BMPs to reduce or eliminate those sources. (Refer to Loading and Unloading by Air Pressure or Vacuum BMP VEM-7).

Loading and Unloading Activities That Can Contaminate Storm Water

- Pumping liquids or gases from barge, truck, or rail car to a storage facility or vice versa.
- Pneumatic transfer of dry chemicals to or from the loading and unloading vehicles.
- Transfer by mechanical conveyor systems.
- Transfer of bags, boxes, drums, or other containers by forklift, trucks, or other material handling equipment.

Tank Trucks and Material Delivery Vehicles Should Be Located Where Spills or Leaks Can Be Contained

Loading and unloading equipment and vehicles should be located so that leaks can be contained in existing containment and flow diversion systems.

Loading/Unloading Equipment Should Be Checked Regularly for Leaks

Check vehicles and equipment regularly for leaks, and fix any leaks promptly. Common areas for leaks are valves, pumps, flanges, and connections. Look for dust or fumes. These are signs that material is being lost during unloading/loading operations.

Loading/Unloading Docks or Areas Should Be Covered to Prevent Exposure to Rainfall

Covering loading and unloading areas, such as building overhangs at loading docks, can reduce exposure of materials, vehicles, and equipment to rain.

Loading/Unloading Areas Should Be Designed to Prevent Storm Water Run-On

Run-on is storm water created from other areas that flows or "runs on" to the property or site. Run-on flowing across loading/unloading areas can wash contaminants into storm drains. Run-on can be **minimized** by:

- Grading, berming, or curbing the area around the loading area to direct run-on away from the area.

- Placing roof downspouts so storm water is directed from loading sites and equipment and preferably to a grassy or vegetated area where the storm water can soak into the ground.

SUMMARY OF LOADING/UNLOADING OPERATION BMPs

- Contain leaks during transfer.
- Check equipment regularly for leaks.
- Limit exposure of material to rainfall.
- Prevent exposure of material to rainfall.
- Prevent storm water run-on.

MWM-2 LIQUID STORAGE IN ABOVEGROUND TANKS

Accidental releases of chemicals from aboveground liquid storage tanks can contaminate storm water with many different pollutants. Materials spilled, leaks, or lost from storage tanks may accumulate in soils or on other surfaces and be carried away by rainfall runoff. The following can help find sources of storm water contamination from aboveground storage tanks and select BMPs to reduce or eliminate those sources. (Refer to the Exposure Minimization and Exposure Mitigation BMPs: MWM-8, MWM-9, SE-6, SE-7, MWM-10, and MWM-11)

The most common causes of unintentional releases from tanks:

- External corrosion and structural failure
- Installation problems
- Spills and overfills due to operator error
- Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves)
- Leaks or spills while pumping liquids or gases from barges, trucks, or rail cars to a storage facility.

Storage Tanks That Contain Liquid Hazardous Materials, Hazardous Wastes, or Oil

Oil and hazardous materials storage must meet specific standards set by federal and state laws. These standards include Spill Prevention, Control, and Countermeasure plans, secondary containment, installation, integrity and leak detection monitoring, and emergency preparedness plans. Federal regulations set specific standards for preventing run-on and collecting runoff from hazardous waste storage, disposal, or treatment areas. These standards apply to container storage areas and other areas used to store, treat, or dispose of hazardous waste. If the collected storm water is a hazardous waste, it must be managed as a hazardous waste in accordance with all applicable state and Federal environmental regulations. ***To find out more about storage requirements, call the toll-free U.S. Environmental Protection Agency's (USEPA) Resource Conservation and Recovery Act hotline at (800) 424-9346 or contact the state hazardous waste management agency.***

Operators Should be Trained in Correct Operating Procedures and Safety Activities
Well-trained personnel can reduce human errors that lead to accidental releases or spills.

Safeguards Should be Implemented Against Accidental Releases
Engineered safeguards can help prevent operator errors that may cause the accidental release of pollutants. Safeguards include:

- Overflow protection devices on tank systems to warn the operator or to automatically shut down transfer pumps when the tank reaches capacity.
- Protective guards around tanks and piping to prevent vehicle or forklift damage.
- Clearly tagging or labeling of valves to reduce human error.

Tank Systems Should be Inspected and Tank Integrity Tested Regularly
Visually inspect the tank system to identify problem areas before they lead to a release. Correct any problems or potential problems as soon as possible. An audit of a newly installed tank system by a registered and specially trained professional engineer can identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets. Operators should routinely visually inspect the tank system after installation. Areas to inspect include tank foundations, connections, coatings, tank walls, and the piping system. Look for corrosion, leaks, straining of tank support structures from leaks, cracks, scratches in protective coatings, or other physical damage that may weaken the tank system. ***Integrity testing should be done periodically by a qualified professional.***

Tanks Should be Bermed or Surrounded by a Secondary Containment System
A secondary containment system around both permanent and temporary tanks allows leaks to be more easily detected and contains spills or leaks. Methods include berms, dikes, liners, vaults, and double-walled tanks.

SUMMARY OF BMPS FOR LIQUID STORAGE IN ABOVEGROUND TANKS

- Comply with applicable state and federal laws.
- Properly train personnel.
- Install safeguards against accidental releases.
- Routinely inspect tanks and equipment.
- Consider installing secondary containment.

MWM-3 INDUSTRIAL WASTE MANAGEMENT AREAS AND OUTSIDE MANUFACTURING

Storm water runoff from areas where industrial waste is stored, treated, or disposed of can be polluted. Outside manufacturing activities can also contaminate storm water runoff. Activities such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, or operations that use hazardous materials are particularly dangerous. Wastes spilled, leaked, or lost from waste management areas or outside manufacturing activities may build up in soils or on other surfaces and be carried away by rainfall runoff. There is also a potential for liquid wastes from lagoons or surface impoundments to overflow to surface waters or soak the soil where they can be picked up by storm water runoff. Possible storm water contaminants include toxic compounds, oil and grease, paints or solvents, heavy metals, and high levels of suspended solids.

The best way to reduce the potential for storm water contamination from both waste management areas and outside manufacturing activities is to reduce the amount of waste that is created and, as a result, the amount that must be stored or treated. The following will help determine BMPs that can eliminate or reduce the amount of toxicity of industrial wastes as well as minimize contamination of storm water from existing waste management areas. Waste reduction BMPs are appropriate for a wide range of industries and are designed to provide ideas on ways to reduce wastes.

Industrial waste management activities or areas that can contaminate storm water:

- Landfills
- Waste piles

- Wastewater and solid waste treatment and disposal:

  - Waste Pumping
  - Additions of treatment chemicals
  - Mixing
  - Aeration
  - Clarification
  - Solids dewatering

- Land application

Look for Ways to Reduce Waste at the Facility

The first step to reducing wastes is to assess activities at the facility. The assessment is designed to find situations at the facility where you can eliminate or reduce waste generation, emissions, and environmental damage. Starting a waste reduction program has many potential benefits. Some of these benefits are direct (cost savings from reduced raw material use), while others are indirect (avoided waste disposal fees).

Outside manufacturing activities or situations that can contaminate storm water:

- Processes or equipment that generate dusts, vapors, or emissions
- Outside storage of hazardous materials or raw materials
- Dripping or leaking fluids from equipment or processes
- Liquid wastes discharged directly onto the ground or into the storm sewer

Consider Waste Reduction BMPs

There are many different types of BMPs that can help eliminate or reduce the amount of industrial waste generated the facility. Some of these BMPs are listed below:

- Production planning and sequencing
- Process or equipment modification
- Raw material substitution or elimination
- Loss prevention and housekeeping
- Waste segregation and separation
- Closed-loop recycling
- Training and supervision
- Reuse and recycling

Industrial Waste Management and Outside Manufacturing Areas Should be Checked Often for Spills and Leaks

By checking waste management areas for leaking containers or spills, you can prevent wastes from contaminating storm water. Look for containers that are rusty, corroded, or damaged. Transfer wastes from these damaged containers into safe containers. Close the lids on Dumpsters to prevent rain from washing wastes out of holes or cracks into the bottom of the Dumpster. In outside areas, look for leaking equipment (valves, lines, seals, or pumps) and fix leaks promptly. Inspect rooftop and other outdoor equipment (HVAC devices, air pollution control devices, transformers, piping) for leaks or dust concentrations.

Industrial Waste Management Areas or Manufacturing Activities Should be Covered, Enclosed or Bermed

The best way to **avoid** contaminating storm water from existing waste management and manufacturing areas is to prevent storm water run-on or rain from entering or contracting these areas. This can be done by:

- Preventing direct contact with rain
- Moving the activity indoors after ensuring that all safety concerns such as fire hazard and ventilation are addressed
- Covering the area with a permanent roof
- Covering waste piles with a temporary covering material such as a reinforced tarpaulin, polyethylene, polyurethane, polypropylene, or Hypalon
- Minimizing storm water run-on by enclosing the area or building a berm around the area

Vehicles Used to Transport Wastes to the Land Disposal or Treatment Site Should be Equipped with Anti-Spill Equipment

Equipment transport vehicles equipped with spill prevention equipment can prevent spills of wastes during transport. Examples include:

- Vehicles equipped with baffles for liquid wastes
- Trucks with sealed gates and spill guards for solid wastes
- Trucks with tarps

Use Loading Systems That Minimize Spills and Fugitive Losses Such as Dust or Mists

Wastes lost during loading or unloading can contaminate storm water. Vacuum transfer systems minimize waste loss.

Sediments or Wastes Should be Prevented from Being Tracked Offsite

Waste and sediment tracked offsite can end up on the streets where they are picked up by storm water runoff. Avoid this by using vehicles with specially designed tires, washing vehicles in a designated area before they leave the site, and controlling the wash water by providing a drainage system.

Minimized Storm Water Runoff from Land Disposal Sites

Take precautions to minimize the runoff of polluted storm water from land application sites. Some precautions are detailed as follows:

- Choose the land application site carefully. Characteristics that help prevent runoff include: slopes under six percent, permeable soils, a low water table, locations away from wetlands or marshes, and closed drainage systems.

- Avoid applying waste to the site when raining when the ground is frozen or saturated with water. Grow grasses on areas dedicated to land disposal to stabilize the soils and reduce the volume of surface water runoff from the site.

- Maintain adequate barriers between the land application site and receiving waters.

- Erosion control techniques including mulching and matting, filter fences, straw bales, diversion terracing, or sediment basins.

- Perform routine maintenance to make sure that erosion control or site stabilization measures are working.

SUMMARY OF INDUSTRIAL WASTE MANAGEMENT AND OUTSIDE MANUFACTURING BMPS

- Conduct a waste reduction assessment.
- Institute industrial waste source reduction and recycling BMPs.
- Prevent runoff and run-on from contacting the waste management area.
- Minimize runoff from land application sites.

MWM-4 OUTSIDE STORAGE OF RAW MATERIALS, BYPRODUCTS, OR FINISHED PRODUCTS

Raw materials, byproducts, finished products, containers, and material storage areas exposed to rain/runoff can pollute storm water. Storm water can become contaminated by a wide range of contaminants (metals, oil, and greases) when solid materials wash off or dissolve into water, or by spills or leaks. Potential sources of storm water contamination and select BMPs that can reduce or eliminate those sources are listed below.

Materials Should be Protected from Rainfall, Run-On and Runoff

The best way to avoid contaminating storm water from outside material storage areas is to prevent rain or storm water run-on from coming in contact with the material(s). This can be done by:

- Storing the material indoors
- Covering the area with a roof
- Covering the material with a temporary covering made of polyethylene, polyurethane, polypropylene, or Hypalon
- Minimizing storm water run-on by enclosing the area or building a berm around the area

These materials should not be stored outside or in areas where they can contaminate storm water:

- Fuels
- Raw materials
- Byproducts
- Intermediates
- Final products
- Process residuals

SUMMARY OF BMPs FOR OUTSIDE STORAGE OF RAW MATERIALS, BYPRODUCTS, OR FINISHED PRODUCTS

- Cover or enclose materials.

MWM-5 CONTAINMENT DIKING

Containment dikes are temporary or permanent earthen or concrete berms or retaining walls that are designed to hold spills. Diking, one of the most common types of containment, is an effective method of pollution prevention for aboveground liquid storage tanks and rail car or tank truck loading and unloading areas. Diking can provide one of the best protective measures against the contamination of storm water because it surrounds the area of concern and holds the spill, keeping spill materials separated from the storm water outside the diked area.

Diking can be used at any industrial facility but is most commonly used for controlling large spills or releases from liquid storage areas and liquid transfer areas.

Containment dikes should be large enough to hold an amount equal to the largest single storage tank at the particular facility plus the volume of rainfall. For rail car and tank truck loading and unloading operations, the diked area should be capable of holding an amount equal to any single tank truck compartment. Materials used to construct the dike should be strong enough to safely hold spilled materials. The materials used usually depend upon what is available onsite and the substance to be contained, and may consist of earth (soil or clay), concrete, synthetic materials (liners), metal or other impervious materials. In general, strong acids and bases may react with metal containers, concrete, and some plastics, so where spills may consist of these substances, other alternatives should be considered. Some of the more reactive organic chemicals may also need to be contained with special liners. If there are any questions about storing chemicals in certain dikes because of their construction materials, refer to the MSDSs.

Containment dikes may need to be designed with impervious materials to prevent leaking or contamination of storm water, surface, and groundwater supplies.

Similarly, uncontrolled overflows from dikes areas containing spilled materials or contaminated storm water should be prevented to protect nearby surface waters or groundwater. Therefore, dikes should have either pumping systems (Refer to Sumps BMP SE-5) or vacuum trucks available to remove the spilled materials. When evaluating the performance of the containment system, you should pay special attention to the overflow system, since it is often the source of uncontrolled leaks. If overflow systems do not exist, accumulated storm water should be released periodically. Contaminated storm water should be treated prior to release. Mechanical parts, such as pumps or even manual systems (slide gates, stopcock valves), may require regular cleaning and maintenance.

When considering containment diking as a BMP, consult local authorities about any regulations governing construction of such structures to comply with local and state requirements. Facilities located in a flood plain should contact their local flood control authority to ensure that construction of the dikes is permitted.

Containment dike inspections should be conducted during or after significant storms or spills to check for washouts or overflows. In addition, regularly checking containment dikes (testing to ensure that dikes are capable of holding spills) is recommended. Soil dikes may need to be inspected more frequently.

Changes in vegetation, inability of the structure to retain storm water dike erosion, or soggy areas indicate problems with the dike's structure. Damaged areas should be patched and stabilized immediately, where necessary. Earthen dikes may require special maintenance of vegetation, such as mowing and irrigation.

Advantages of Containment Diking	Disadvantages of Containment Diking
• Contains spills, leaks, and other releases and prevent them from flowing into runoff conveyances, nearby streams, or underground water supplies. • Permits materials collected in dikes to be recycled. • Is a common industry practice for storage tanks and already required for certain chemicals	• May be too expensive for some smaller facilities • Requires maintenance • Could collect contaminated storm water, possibly resulting in infiltration of storm water to groundwater

MWM-6 CURBING

Like containment diking, curbing is a barrier that surrounds an area of concern. Curbing functions in a similar way to prevent spills and leaks from being releases to the environment by routing runoff to treatment or control areas. The terms curbing and diking are sometimes used interchangeably.

Because curbing is usually small scale, it cannot contain large spills the same way as diking; however, curbing is common at many facilities in small areas where handling and transferring liquid materials occur.

Curbing can be used at all industrial facilities. It is particularly useful in areas where liquid materials are transferred and as a storm water runoff control.

Common materials for curbing include earth, concrete, synthetic materials, metal, or other impenetrable materials. Asphalt is also a common material used in curbing.

For maximum efficiency of curbing, spilled materials should be removed immediately, to allow space for future spills. Curbs should have pumping systems, rather than drainage systems, for collecting spilled materials. Manual or mechanical methods, such as those provided by sump systems can be used to remove the material (Refer to Sumps BMP SE-5). Curbing systems should be maintained through curb repair (patching and replacement).

When using curbing for runoff control, facilities should protect the berm by limiting traffic and installing reinforced berms in areas of concern.

Material spills that are stored within a curbed area can be tracked outside of that area when personnel and equipment leave the area. This tracking can be minimized by grading within the curbing to direct the spilled materials to a downslope of the curbing. This will keep the materials away from personnel and equipment that pass through the area. It will allow the materials to accumulate in one area making cleanup much easier.

Inspections should also be conducted before forecasted rainfall events and immediately after storm events. If spilled or leaked materials are observed, cleanup should start immediately. This will prevent overflows/contamination of storm water runoff. In addition, promptly cleaning up materials will prevent rainwater dilution, which can adversely affect recycling opportunities. Inspecting curbed areas should be conducted regularly, to clear clogging debris. Because curbing is sized to

contain small spill volumes, maintenance should also be conducted frequently to prevent overflow of any spilled materials.

Advantages of Curbing	Disadvantages of Curbing
• Excellent method to control run-on • Inexpensive • Easily installed • Materials spilled within curbed areas can be recycled • Exists as a common industry practice	• Not effective for holding large spills • May require more maintenance than diking

MWM-7 COVERING

Covering is the partial or total physical enclosure of materials, equipment, process operations, or activities. Covering certain areas or activities prevents storm water from coming into contact with potential pollutants and reduces material loss from wind blowing. Tarpaulins, plastic sheeting, roofs, buildings, and other enclosures are examples of covering that are effective in preventing storm water contamination. Covering can be temporary or permanent.

Covering is appropriate for outdoor material storage piles (stockpiles of dry materials, gravel, sand, compost, sawdust, wood chips, deicing salt, and building materials) and areas where liquids and solids in containers are stored or transferred. Although it may be too expensive to cover or enclose all industrial activities, cover high-risk areas (identified during the storm water pollutant source identification). For example, cover chemical preparation areas, vehicle maintenance areas, areas where chemically treated products are stored, and areas where salts are stored.

If covering or enclosing the entire activity is not possible, the high-risk part of the activity can often be separated from other processes and covered. Another option that reduces the cost of building a complete enclosure is to build a roof over the activity. A roof may also eliminate the need for ventilation and lighting systems.

Evaluate the strength and longevity of the covering, as well as its compatibility with the material or activity being enclosed. When designing an enclosure, consider access to materials, their handling, and transfer. Materials that pose environmental and safety dangers because they are radioactive, biological, flammable, explosive, or reactive require special ventilation and temperature considerations.

Covering alone may not protect exposed materials from storm water contact. Place the material on an elevated, impermeable surface or build curbing around the outside of the materials to prevent problems from run-on of uncontaminated storm water from adjacent areas.

Frequently inspect covering, such as tarpaulins, for rips, holes, and general wear. Anchor the covering with stakes, tie-down ropes, large rocks, tires, or other easily available heavy objects.

Practicing proper materials management within an enclosure or underneath a covered area is essential. For example, floor drainage within an enclosure should be properly designed and connected to the wastewater sewer where appropriate and allowed.

If connecting to an offsite wastewater sewer is considered, the local Publicly Owned Treatment Works should be consulted to find out if there are any pretreatment requirements or restrictions that must be followed.

Advantages of Covering	Disadvantages of Covering
• Simple and effective	• Requires frequent inspection
• Usually inexpensive	• May pose health or safety problems if enclosure is built over certain activities

MWM-8 SWEEPING

Sweeping with brooms, squeegees, or other mechanical devices is used to remove small quantities of dry chemicals and dry solids from areas that are exposed to rain or storm water runoff. These areas may include dust or contaminant covered bags, drums containing remaining materials on their lids, areas containing enclosed or covered materials, and spills of dry chemicals/solids. Cleaning by sweeping with brooms is a low-cost practice that can be performed by all employees and require no special equipment or training.

Sweeping can be used at many material handling areas and process areas. Timing is an important consideration for all mitigative practices. To be effective as a storm water control, cleanup must take place before rainfall or contact with storm water runoff or before an outside area is hosed down.

Do not limit cleanup activities to those outside activities that are exposed to rainfall. In many cases, tracking of materials to the outside from areas that are enclosed or covered (on shoes) may also occur.

Store brooms appropriately and do not expose them to precipitation. In addition, rules of compatibility also apply. Do not use the same broom to clean up two chemicals that are incompatible. Determine the compatibility between the brooms themselves and the chemical of concern before using this practice. If necessary, consult appropriate MSDS information.

Advantages of Sweeping	Disadvantages of Sweeping
• Inexpensive	• Labor-intensive practice
• Requires no special training	• Limited to small releases of dry materials
• Provides recycling opportunities	

MWM-9 SHOVELING

Shoveling is another manual cleanup method that is simple and low cost. Generally, shoveling can be used to remove larger quantities of dry chemicals and dry solids, as well as to remove wetter solids and sludges. Shoveling is also useful in removing accumulated materials from sites not accessible by mechanical cleanup methods.

Shoveling provides an added advantage over sweeping because cleanup methods are not limited to dry materials. In many cases, accumulated solids and sludges that are in ditches, sumps, or other facility locations can be effectively and quickly removed by shoveling.

Shovels can also be used to clean up contaminated frozen precipitation. Timing is an important consideration in any pollution reduction practice. Materials that could contaminate storm water runoff should be removed before any storm event.

Clean and store shovels properly. Plan for the transport and disposal or reuse of the shoveled materials.

Advantages of Shoveling	Disadvantages of Shoveling
• Inexpensive	• Labor-intensive
• Provides recycling opportunities	• Not an appropriate practice for large spills
• Can remediate larger releases and is effective for dry and wet materials	

MWM-10 SORBENTS

Sorbents are materials that are capable of cleaning up spills through the chemical processes of adsorption and absorption. Sorbents adsorb (an attraction to the outer surface of a material) or absorb (taken in by the material like a sponge) only when they come in contact with the sorbent materials. The sorbents must be mixed with a spill or the liquid must be passed through the sorbent. Often the particles are held together in structures called booms, pads, or socks. Sorbents include, but are not limited to, the following:

- Common Materials (clays, sawdust, straw, and fly ash) — Generally come in small particles that can be thrown onto a spill that is on a surface. The materials absorb the spill by taking up the liquid.

- Polymers (polyurethane and polyolefin) — Come in the form of spheres, beads, or foam tablets. These materials absorb a chemical spill by taking up the liquid into their open-pore structure.

- Activated Carbon — Comes in a powdered or granular form and can be mixed with liquids to remove pollutants. This sorbent works by adsorbing the organic to its surface and can be recycled and then reused by a process called regeneration.

- "Universal Sorbent Material" — Is a silicate glass foam consisting of rounded particles that can absorb the material.

Sorbents are useful BMPs for facilities with liquid materials onsite. Timing is important for these practices to be effective as a storm water BMP. Cleanup must take place before a rainfall. Sorbents are often used in conjunction with curbing or other similar features to clean up small spills within a contained area.

"Universal sorbent materials" are suitable for using on many compounds including acids, alkalis, alcohols, aldehydes, arsenate, ketones, petroleum products, and chlorinated solvents.

Activated carbon is useful for adsorbing many organic compounds. Organics that are diluted in water can be passed through a column that is filled with the activated carbon material to remove the organics, or the activated carbon can be mixed in the water and can then be filtered out.

Polyurethane is good with chemical liquids such as benzene, chlorinated solvents, epichlorohydrin, and phenol. Polyolefin is used to remove organic solvents, such as phenol and various chlorinated solvents. The beads and spheres are usually mixed into a spill by use of a blower and then area skimmed from the top surface by use of an oil broom.

More common materials such as clay, sawdust, straw, and fly ash can be used for a liquid spill on a surface that is relatively impenetrable, and are usually spread over the spill area with shovels.

Booms, pads, and socks are also useful in areas where there are small liquid spills or drips or where small amounts of solids may mix with small amounts of storm water runoff. They can function both to absorb the pollutants from the storm water and restrict the movement of a spill. Socks are often used together with curbing to clean up small spills.

Because sorbents work by a chemical or physical reaction, some sorbents are better than others for certain types of spills. Therefore, the use of sorbents requires that personnel know the properties of the spilled material(s) to know which sorbent is appropriate. To be effective, sorbents must adsorb the material spilled but must ***NOT*** react with the spilled material to form hazardous or toxic substances. Always follow the manufacturer's recommendations.

For sorbents to be effective, they must be applied immediately in the release area. The use of sorbent material is generally very simple: the sorbent is added to the area of release, mixed well, and allowed to adsorb or absorb. Many sorbents are not reusable once they have been used. Proper disposal is required.

Advantages of Sorbents	**Disadvantages of Sorbents**
• Work in water environments (booms and socks) • Offer recycling opportunities (some types of sorbents)	• Require a knowledge of the chemical makeup of a spill (to choose the best sorbent) • Offer no recycling opportunities (some types of sorbents) • May be expensive practice for large spills • May create disposal problems and increase disposal costs by creating a solid waste and potentially a hazardous waste.

MWM-11 GELLING AGENTS

Gelling agents are materials that interact with liquids either physically or chemically (thickening or polymerization). Some of the typical gelling agents are polyetlectrolytes, polyacrylamide, butyistyrene copolymers, polyacryionitrile, polyethylene oxide, and a gelling agent referred to as the universal gelling agent which is a combination of these synthetics.

Gelling interacts with a material by concentrating and congealing it to become semisolid. The semisolid gel later forms a solid material, which can then be cleaned up by manual or mechanical methods. The BMP of using a gelling agent is one of the few ways to effectively control a liquid spill before it reaches a receiving water or infiltrates into the soil and then groundwater.

Gelling agents are useful for facilities with significant amounts of liquid materials stored onsite. ***Gels cannot be used to clean up spills on surface water unless authorized by the U.S. Coast Guard or USEPA Regional Response Team.***

Gels can be used to stop the liquid's flow on land, prevent it from seeping into the soil, and reduce the surface spreading of a spill. Because of these properties, gels can reduce the need for extensive cleanup methods and reduce the possibility of storm water contamination from an uncontrolled industrial spill. As with sorbents, using gels simply involves the addition of the gel to the area of the spill, mixing well, and allowing the mass to congeal. To use gels correctly, however, personnel need to know the properties of the spilled materials so that they can choose the correct gel.

Timing is particularly important for using gelling agents. Gelling agents must be applied immediately after the spill to prevent the movement of materials. Use of gelling agents results in a large bulk of congealed mass that usually cannot be separated. As a result, this mass will need to be cleaned up by manual or mechanical methods and disposed of properly.

Advantages of Gelling Agents	Disadvantages of Gelling Agents
• Stop the movement of spilled or released liquid materials • Require no permanent structure	• May require knowledge of the spilled materials to select correct gelling agents • Usually offer no recycling opportunities • May be difficult to clean up • May create disposal problems/increase disposal costs by creating a solid waste and potentially a hazardous waste

SE-1 STORM WATER CONVEYANCES (Channels/Gutters/Drains/Sewers)

Storm water conveyances such as channels, gutters, drains, and sewers, collect storm water runoff and direct its flow. Storm water conveyances can be used for two different purposes; to keep uncontaminated storm water from coming in contact with areas of an industrial site where it may become contaminated with pollutants, and to direct the contaminated runoff to a treatment facility.

Storm water conveyances can be constructed or lined with many different materials, including: concrete, clay tiles, asphalt, plastics, metals, riprap, compacted soils, and vegetation. The type of material used depends upon the function of the conveyance, which can be temporary or permanent.

Storm water conveyances usually work well at most industrial sites. Storm water can be directed away from industrial areas by collecting it in channels or drains before it reaches these areas. Additionally, conveyances can be used to collect storm water downhill from industrial areas and keep it separate from runoff that has not been in contact with those areas. When potentially contaminated storm water is collected in a conveyance like this, it can be directed to a treatment facility on the site if necessary. (If a pollutant is spilled, is should ***NOT*** be allowed to enter a storm water conveyance or drain system).

Conveyance systems are most easily installed during facility construction. Using existing grades will decrease costs. Grades should be positive to allow for the continued movement of the runoff through the conveyance system; however, grades should not create an increase in velocity that increases erosion.

Storm water conveyances should be inspected for debris removal within 24 hours of rainfall. During periods of prolonged rainfall, inspect the conveyances daily, since heavy storms may clog or damage them. Repair damages to these structures as soon as possible.

Advantages of Storm Water Conveyances (Channels/Gutters/Drains/Sewers)	**Disadvantages of Storm Water Conveyances (Channels/Gutters/Drains/Sewers)**
• Direct storm water flows around industrial areas • Prevent temporary flooding of industrial site • Require low maintenance • Provide erosion resistant conveyance of storm water runoff • Provide long-term control of storm water flows	• Once flows are concentrated in storm water conveyances, they must be routed through stabilized structures all the way to their discharge to the receiving water or treatment plant to minimize erosion • May increase flow rates • May be impractical if there are space limitations • May not be economical, especially for small facilities or after a site has already been constructed

SE-2 DIVERSION DIKES

Diversion dikes or berms are structures used to block runoff from passing beyond a certain point. Temporary dikes are usually made with compacted soil and permanent dikes are constructed out of concrete, asphalt or similar materials.

Diversion dikes are used to prevent the flow of storm water runoff onto industrial areas. Limiting the volume of flow across industrial areas reduces the volume of storm water that may carry pollutants from the area, requiring treatment for pollutant removal. This BMP is suitable for industrial sites where significant volumes of storm water runoff tend to flow onto active industrial areas. Typically, dikes are built on slopes just uphill from an industrial area together with some sort of a conveyance such as a swale. The storm water conveyance is necessary to direct the water away from the dike so that the water will not pool and seep through the dike.

In planning for installing dikes, consider the slope of the drainage area, the height of the dike, the size of rainfall event it will need to divert, and the type of conveyance that will be used with the dikes. Steeper slopes result in higher volumes of runoff and higher velocities; therefore, the dike must be constructed to handle this situation. Remember that dikes are limited in their ability to manage large volumes of runoff.

Ideally, dikes are installed before industrial activity begins. However, dikes can be easily constructed at any time. Temporary dikes (usually made of soil) generally only last for 18 months or less, but they can be made into permanent structures by stabilizing them with vegetation. Vegetation is crucial for preventing the erosion of the dike.

Dikes should be inspected regularly for damage. This is especially important after storm events since a heavy rain may wash away parts of a temporary dike. Any necessary repairs should be made immediately to make sure the structure continues to function.

Advantages of Diversion Dikes	Disadvantages of Diversion Dikes
• Effectively limit storm water flows over industrial areas • Can be installed at any time • Are economically temporary structures, when built from soil onsite • Can be converted from temporary to permanent at any time	• Are not suitable for large drainage areas unless there is a gentle slope • May require maintenance after heavy rains

SE-3 GRADED AREAS FOR PAVEMENT

Land surfaces can be graded or graded and paved so that storm water runoff is directed away from industrial activity areas. The slope of the grade allows the runoff to flow, but limits the runoff from washing over areas that may be contaminated with pollutants. Like conveyances and dikes, graded areas can prevent runoff from contacting industrial areas and becoming contaminated with pollutants from these areas. Grading can be a permanent or temporary control measure.

Grading land surfaces is appropriate for any industrial site that has outdoor activities that may contaminate storm water runoff, such as parking lots or outdoor storage areas. Grading is often used with other practices, such as coverings, buffer zones, and other practices to reduce the runoff velocity and provide infiltration of the uncontaminated runoff, or to direct pollutant runoff to storm water treatment facilities.

Control and containment of runoff flows should be considered in the overall concept. The grading should control the uncontaminated flow by diverting it around areas that may have pollutants. The grading should also contain the contaminated flows or divert them to treatment facilities.

When re-grading and paving an industrial area, the use of concrete paving instead of asphalt should be considered. This is especially important in potential spill sites or hazardous material storage areas. Asphalt absorbs organic pollutants and can be slowly dissolved by some fluids, thus becoming a possible source of contaminants itself. This control measure should be used with a cover, such as a roof, in areas where contaminants are of concern so that precipitation does not fall on the area and wash the contaminants down slope.

Inspect paving regularly for cracks that may allow contaminants to seep into the ground. Also, check to make sure that the drains receiving the storm water flow from the paved area remain unclogged with sediment or other debris so that low areas do not flood and wash over the areas where the contaminants may exist.

Advantages of Graded Areas and Pavement	Disadvantages of Graded Areas and Pavement
• Is effective in limiting storm water contact with contaminants	• May be uneconomical to regrade and resurface large areas
• Is relatively inexpensive and easily implemented.	• May not be effective during heavy precipitation

SE-4 COLLECTION BASINS

Collection basins, or storage basins, are permanent structures where large spills or contaminated storm water are contained and stored before cleanup or treatment. Collection basins are designed to receive spills, leaks, etc., that may occur and prevent these materials from being released to the environment. Unlike containment dikes, collection basins can receive and contain materials from many locations across a facility.

Collection basins are commonly confused with treatment units such as ponds, lagoons, and other containment structures. Collection basins differ from these structures because they are designed to temporarily store storm water rather than treat it.

Collection basins are appropriate for all industrial sites where space allows. Collection basins are particularly useful for areas that have a high spill potential.

The design and installation considerations for collection basins include sizing the basin either to hold a certain amount of spill or a certain size storm, or both. In designing the collection system, the type of material for the conveyances, compatibility of various materials to be carried through the system, and requirements for compliance with state and local regulations should be considered. Ideally, the system should function to route the materials quickly and easily to the collection basin.

When spills occur, the collection system must route the spill or storm water immediately to the collection basin. The collection system and basin may require cleaning after a spill is contained. Remove the collection basin contents immediately to prevent an unintentional release and recycle the spilled material as much as possible. Inspect the structure on a regular basis and after storm events or spills. Depending upon the types of pollutants that may be in the storm water, or are collected as spills, design of the basin may require a liner to prevent infiltration into the groundwater. ***Make sure that the installation of this BMP does not violate state groundwater regulations.***

It is possible that the collection basin may handle combustible or flammable spilled materials, explosion-proof pumping equipment and controls or other appropriate precautions should be taken to prevent explosions or fires. ***Consult OSHA and local safety codes/standards for specific requirements and guidance.***

Advantages of Collection Basins	Disadvantages of Collection Basins
• Store contaminated storm water until directed to a treatment facility • Collect spills for recycling where materials are separated	• May need a conveyance system for increased effectiveness • May collect materials that are not compatible • May reduce the potential for recycling materials by collecting storm water which dilutes the materials • May create groundwater problems if pollutants infiltrate into ground

SE-5 SUMPS

Sumps are holes or low areas that are structured so that liquid spills or leaks will flow down toward a particular part of a containment area. Frequently, pumps are placed in a depressed area and are turned on automatically to transfer liquids away from the sump when the level of liquids gets too high. Sumps can be temporary or permanent.

Sumps can be used at all facilities. Sumps are used with other spill containment and treatment measures and can be located almost anywhere onsite. Sumps are frequently located in low-lying areas within material handling or storage areas.

When designing and installing a sump system, consider the pump location, function, and system alarms. Design and install the sump in the lowest lying area of a containment structure, allowing for materials to gather in the area of the sump. Construct the sump of impenetrable materials and provide a smooth surface so that liquids are funneled toward the pump. It may be appropriate to house the pumps in a shed or other structure for protection and stabilization.

There are numerous factors that should be considered when purchasing a pump. Base the size of the pump on the maximum expected volume to be collected in the containment structure. In some cases, more than one pump may be appropriate. Typically, pumps that can be submerged under the spill are the most appropriate for areas where large spills may occur and that may submerge the sump area. The viscosity (resistance to flow) of the material and the distance that the material must be pumped are also important considerations. Install pumps according the manufacturer's recommendations.

An alarm system can be installed for pumps that are used to remove collected materials. An alarm system can indicate that a pump should be operated by hand or that an automatically operated pump has failed to function. Ultimately, facility personnel should have some mechanism to take action to prevent spills from bypassing and overflowing containment structures.

The pumps and the alarm system used in the sump generally require regular inspections for service and maintenance of parts based upon manufacturer's recommendations.

If it is possible that the sump may handle combustible or flammable spilled materials, explosion-proof pumping equipment and controls or other appropriate precautions should be taken

to prevent explosions or fires. ***Consult OSHA and local safety codes/standards for specific requirements and guidance.***

Advantages of Sumps	Disadvantages of Sumps
• Provide a simple and quick collection method for recycling, reusing, or treating materials in a containment structure • Commonly used at industrial facilities	• Pumps may clog easily if not designed correctly • May require maintenance/servicing agreements with pump dealers • Costs for purchasing/replacing pumps may be high

SE-6 EXCAVATION PRACTICES

Excavation (removal of contaminated material) of released materials is typically conducted by mechanical equipment, such as Bobcats and backhoes.

Excavation removes the materials of concern and any deposition of contaminants reducing the potential for storm water contamination. Mechanical cleanup methods are typically less precise than manual cleanup methods, resulting in reduced opportunities for recycle and reuse.

Excavation practices are most useful for large releases of dry materials and for areas contaminated by liquid material releases. In excavation, be sure that all of the contaminated material is removed. The excavated area should be stabilized as soon as possible after excavation is completed (paving, establishing vegetation).

Timing is an important consideration for all pollution reduction practices to be effective as a storm water control. Cleanup must take place ***before*** a rainfall event.

Conduct inspections, operations and maintenance in accordance with a manufacturer's recommendations, which may include the following:

- A schedule for inspecting, maintaining, and servicing the equipment
- Parts replacement, rotation, and lubrication specifications
- Procedures for evaluating all parts

For any equipment used during cleanup, other considerations apply, including the following:

- Plows and backhoes should be stored appropriately with no exposure to precipitation
- Excavated materials should be properly handled and disposed of properly

Advantages of Excavation Practices	Disadvantages of Excavation Practices
• Cost effective method for cleaning up dry materials release • Common and simple	• Less precise, resulting in less recycling and reuse opportunities

SE-7 VACUUM AND PUMP SYSTEMS

Vacuum and pump systems are effective for cleaning up spilled or exposed materials.

The benefits of vacuum and pump cleanup systems are simplicity and speed. With such systems, only the spilled materials need be collected. Also, these systems are often portable and can be used at many locations to clean up releases to the environment. Portable systems can usually be rented.

Vacuum and pump systems can be used at any industrial facility; wet/dry materials can be collected with these systems. Vacuum systems can be used in material handling areas and process areas.

Consider the area of use and the most appropriate size for the system since these systems can be portable.

Advantages of Vacuum and Pump Systems	Disadvantages of Vacuum and Pump Systems
• Remove materials by air pressure or vacuum quickly and simply • Collect materials accurately • Offer good recycling opportunities	• Initial capital cost • Require equipment maintenance

SE-8 PIPE SLOPE DRAINS

Pipe slope drains reduce the risk of erosion by discharging runoff to stabilized areas. Made of flexible or rigid pipe, they carry concentrated runoff from the top to the bottom of a slope that has already been damaged by erosion or is at high risk for erosion. They are also used to drain saturated slopes that have the potential for soil slides. Pipe slope drains can be either temporary or permanent depending upon the method of installation and material used.

Pipe slope drains are used whenever it is necessary to convey water down a slope without causing erosion. They are especially effective before a slope has been stabilized or before permanent drainage structures are ready for use. Pipe slope drains may be used with other devices, including diversion dikes or swales, sediment traps, and level spreaders (used to spread out storm water runoff uniformly over the surface of the ground). Temporary pipe slope drains, usually flexible tubing or conduit, may be installed before constructing permanent drainage structures. Permanent slope drains may be placed on or beneath the ground surface; pipes, sectional downdrains, paved chutes, or clay tiles may be used.

Paved chutes may be covered with a surface of concrete or other impermeable material. Subsurface drains can be constructed of concrete, PVC, clay tile, corrugated metal, or other permanent material.

The drain design should be able to handle the volume of flow. The effective life span of a temporary pipe slope drain is up to 30 days after permanent stabilization has been achieved. The maximum recommended drainage area for pipe slope drains is 10 acres.

The inlets and outlets of a pipe slope drain should be stabilized. This means that a flared end section should be used at the entrance of the pipe. The soil around the pipe entrance should be fully compacted. The soil at the discharge end of the pipe should be stabilized with riprap (a combination of large stones, cobbles, and boulders). The riprap should be placed along the bottom of a swale which leads to a sediment trapping structure or another stabilized area.

Pipe slope drains should be inspected on a regular schedule and after any major storm. Be sure that the inlet from the pipe is properly installed to prevent bypassing the inlet and undercutting the structure. If necessary, install a headwall, riprap, or sandbags around the inlet. Check the outlet point for erosion and check the pipe for breaks or clogs. Install outlet protection (Refer to Outlet Protection BMP EC-12) if needed and promptly clear breaks and clogs.

Advantages of Pipe Slope Drains	Disadvantages of Pipe Slope Drains
• Can reduce or eliminate erosion by transporting runoff down steep slopes or by draining saturated soils • Easy to install and require little maintenance	• Require that the area disturbed by the installation of the drain should be stabilized or it, too, will be subject to erosion • May clog during a large storm

SE-9 SUBSURFACE DRAINS

A subsurface drain is a perforated pipe or conduit placed beneath the surface of the ground at a designed depth and grade. It is used to drain an area by lowering the water table. A high water table can saturate soils and prevent the growth of certain types of vegetation. Saturated soils on slopes will sometimes "slip" down the hill. Installing subsurface drains can help prevent these problems.

There are two types of subsurface drains: relief drains and interceptor drains. Relief drains are used to dewater an area where the water table is high. They may be placed in a gridiron, herringbone, or random pattern. Interceptor drains are used to remove water where sloping soils are excessively wet or subject to slippage. They are usually placed as single pipes instead of in patterns. Generally, subsurface drains are suitable only in areas where the soil is deep enough for proper installation. They are not recommended where they pass under heavy vehicle crossings.

Drains should be placed so that tree roots will not interfere with drainage pipes. The drain design should be adequate to handle the volume of flow. Areas disturbed by the installation of a drain should be stabilized or they, too, will be subjected to erosion. The soil layer must be deep enough to allow proper installation.

Backfill immediately after the pipe is placed. Material used for backfill should be open granular soil that is highly permeable. The outlet should be stabilized and should direct sediment-laden storm water runoff to a sediment trapping structure or another stabilized area.

Inspect subsurface drains on a regular basis and check for evidence of pipe breaks or clogging by sediment, debris, or tree roots. Remove blockage immediately, replace any broken sections, and restabilize the surface. If the blockage is from tree roots, it may be necessary to relocate the drain. Check inlets and outlets for sediment or debris. Remove and dispose of these materials properly.

Advantages of Subsurface Drains	Disadvantages of Subsurface Drains
• Provide an effective method for stabilizing wet sloping soils • An effective way to lower the water table	• May be pierced and clogged by tree roots • Should not be installed under heavy vehicle crossings • Cost more than surface drains because of the expenses of excavation for installation

SE-10 LEVEL SPREADERS

Level spreaders are devices used at storm water outlets to spread out collected storm water flows into sheetflow (runoff that flows over ground surface in a thin, even layer). Typically, a level spreader consists of a depression in the soil surface that spreads the flow onto a flat area across a gentle slope. Level spreaders then release the storm water flow onto level areas stabilized by vegetation to reduce speed and increase infiltration.

Level spreaders are most often used as an outlet for temporary or permanent storm water conveyances or dikes. Runoff that contains high sediment loads should be treated in a sediment trapping device before releasing into a level spreader.

The length of the spreader depends upon the amount of water that flows through the conveyance. Larger volumes of water need more spread to even out. Level spreaders are generally used with filter strips (Refer to Vegetated Filter Strips BMP 65). The depressions are then seeded with vegetation (Refer to Permanent Seeding BMP SECP-8).

Level spreaders should not be used on soil that might erode easily. They should be constructed on natural soils and not on fill material. The entrance to the spreader should be level so that the flow can spread out evenly.

The spreader should be inspected after every large storm event to check for damage. Heavy equipment and other traffic should be kept off the level spreader because these vehicles may compact the soil or disturb the grade of the slope. If ponding erosion channels develop, the spreader should be regraded. Dense vegetation should be maintained and damaged areas reseeded as needed.

Advantages of Level Spreaders	Disadvantages of Level Spreaders
• Reduce storm water flow velocity, encourage sedimentation and infiltration • Relatively inexpensive to install	• Can easily develop "short circuiting" (concentration of flows into small streams instead of sheetflow over the spreader) because of erosion or other disturbance • Cannot handle large quantities of sediment-laden storm water

SE-11 INFILTRATION TRENCHES

An infiltration trench usually consists of a long, narrow excavation ranging from 3 to 12 feet deep. The trench is filled with stone, which allows for temporary storage of storm water runoff in the open spaces between the stones. The stored storm water infiltrates into the surrounding soil or drains into underground pipes through holes and is then routed to an outflow point. Infiltration trenches are designed to remove both fine sediments and soluble pollutants instead of larger, coarse pollutants.

Infiltration trenches should be restricted to areas with certain soil, groundwater slope, area, and pollutant conditions. Infiltration trenches will not operate well in soils that have high clay contents, silt/clay soils, sandy/clay loams, or soils that have been compacted. Trenches should not be sited over fill soils because such soils are unstable. Hardened soils are often not suitable for infiltration trenches because these types of soils do not easily absorb water. Infiltration practices in general should not be used to manage contaminated storm water.

The drainage area contributing runoff to a single trench should not exceed 5 acres. Construction of trenches should not start until after all land-disturbing activities have ceased so that runoff with high levels of sediment does not fill in the structure.

If slopes draining into the trench are steeper than 5 percent, the runoff will enter the trench too fast and will overwhelm the infiltration capacity of the soil, casing overflow. The depth from the bottom of the trench to the bedrock layer and the seasonal high water table must be at least three feet. Infiltration trenches may not be suitable in areas where there are cold winters and deep frost levels.

Pretreating runoff before it is channeled to the trench is important to efficient operation because pretreatment removes sediment, grit, and oil. Reducing the pollutant load in the runoff entering the trench lengthens trench life. One method of pretreatment is to install a buffer zone just above the trench to act as a filter (Refer to Buffer Zones BMP SECP-5). In addition, a layer of filter fabric 1 foot below the bottom of the trench can be used to trap the sediments that get through the buffer strip. If excavation around the trenches is necessary, the use of light duty equipment will avoid compacting which could cause a loss of infiltration capability.

Infiltration trenches should be inspected at least once per year and after major rainfall events. Debris should be removed from all areas of the trench, especially the inlets and overflow channels. Dense vegetative growth should be maintained in buffer areas surrounding the trench.

Test wells can be installed in every trench to monitor draining times and provide information on how well the system is operating. ***Daily test well monitoring is necessary, especially after large storm events.*** If the trench does not drain after three days, it usually means that the trench is clogged.

Advantages of Infiltration Trenches	Disadvantages of Infiltration Trenches
• Preserve the natural water balance of the site • Effective for small sites • Remove pollutants effectively	• Require high maintenance when sediment loads are heavy • Have short life span, especially if not maintained properly • May be expensive (cost of excavation and fill material)

SE-12 POROUS PAVEMENTS/CONCRETE GRIDS AND MODULAR PAVEMENTS

Porous pavement, concrete grids, and modular pavements allow storm water to infiltrate so that the speed and amount of runoff from a site can be reduced.

Porous pavement can be constructed of either asphalt or concrete. With porous asphalt pavement, runoff infiltrates through a porous asphalt layer into a stone "reservoir" layer. Storm water runoff filters through the stone reservoir into the underlying subsoil or drains into underground pipes through holes and is routed away. The bottom and sides of the stone reservoir are lined with filter fabric to prevent the movement of soils into the reservoir area.

Porous concrete pavement is made out of a special concrete mix that has a high number of open spaces between the particles and a coarse surface texture. These open spaces allow runoff to pass through the surface to lower levels. This type of pavement can be placed directly on graded soils. When a subbase is used for stability, 6 inches of sand is placed under the concrete mixture. Up to 6 inches of storm water can be held on the surface of the pavement and within the concrete.

Concrete grids and modular pavement are constructed of precast concrete, poured-in-place concrete, brick, or granite. These types of pavements can also reduce the loading and pollutant concentrations in the runoff. Concrete grids and modular pavements are designed and/or constructed so that they have open spaces within the pavement through which storm water can infiltrate into the ground. These open spaces can be filled with gravel/sand/vegetation.

These structures are usually only suitable for low-volume parking areas (one-quarter acre to 10 acres) and lightly used access roads. Areas that are expected to get moderate or high volumes of traffic or heavy equipment can use conventional pavements (for the heavy traffic areas) that are sloped to drain to areas with the porous pavements. These pavements are not effective in drainage areas that receive runoff containing high levels of sediment.

The soil types over which concrete grids and modular pavement are to be placed should allow for rapid drainage through the pores in the pavement. These pavements are not recommended for sites with slopes steeper than 5 percent or sites with high water tables, shallow bedrock, fill soils, or localized clay lenses, which are conditions that would limit the ability of the runoff to infiltrate into surface soils. For example, the water table and bedrock should be at least 3 feet below the bottom

of the stone reservoir. Porous pavement will not operate well in windy areas where sediment will be deposited on the porous pavement.

Constructing these pavements should be timed so that installation occurs on the site after other construction activities are finished and the site has been stabilized. As a result, sediments are less likely to be tracked or carried onto the surface.

Properly installing these pavements requires a high level of construction expertise and workmanship. Only contractors who are familiar with installing these pavements should be used.

Designers of porous pavement areas should consider sediment and erosion control. Sediments must be kept away from the pavement area because they can clog the pores. Controls to consider for sediments include a diversion berm (earthen mound) around the edge of the pavement area to block the flow of runoff from certain drainages onto the pavement, or other filtering controls such as silt fences. Deicing salt mixtures, sands, or ash also may clog pores and should not be used for snow removal. Signs should be posted to prohibit these activities.

The infiltration of storm water runoff may contaminate groundwater sources, these pavements are not suitable for areas close to drinking water wells (at least 100 feet away is recommended).

Maintenance of the surface is very important. For porous pavements, this includes vacuum sweeping at least four times per year followed by high-pressure hosing to reduce the chance of sediments clogging the pores of the top layer. Potholes and cracks can be filled with typical patching mixes unless more than 10 percent of the surface area needs repair. Spot clogging may be fixed by drilling half-inch holes through the porous pavement layer every few feet.

The pavement should be inspected several times the first few months after installation and then annually. ***Inspections after large storms are necessary to check for pools of water.*** These pools may indicate clogging. The condition of adjacent vegetated filter strips, silt fences, or diversion dikes should also be inspected.

Concrete grids and modular pavements should be designed in accordance with manufacturer's recommendations. Designers also need information on soils, depth to the water table, and storm water runoff quantity and quality.

Maintenance of concrete grids and modular pavements is similar to that of the porous pavements; however, turf maintenance such as mowing fertilizing, and irrigation may be needed where vegetation is planted in the open spaces.

Advantages of Porous Pavements/Concrete Grids and Modular Pavements	**Disadvantages of Porous Pavements/Concrete Grids and Modular Pavements**
• Provide erosion control by reducing the speed and quantity of the storm water runoff from the site • Provide some treatment to the water by removing pollutants • Reduce the need for curbing and storm sewer installation and expansion • Improve road safety by providing a rough surface • Provide some recharge to local aquifers • Cost effective because they replace more expensive/complex treatment systems	• Can be more expensive than typical pavements • Easily clogged with sediment/oil; however, pretreatment and proper maintenance will prevent this problem • May cause groundwater contamination • Not structurally suited for high-density traffic or heavy equipment • Asphalt pavements may break down if gasoline is spilled on the surface • Less effective when the subsurface is frozen

SECP-1 SEDIMENT AND EROSION AND PREVENTION PRACTICES

Sites where soils are exposed to water, wind, or ice can have erosion and sedimentation problems. Sedimentation occurs when soil particles are suspended in surface runoff or wind and are deposited in streams or other water bodies.

Human activities can accelerate erosion by removing vegetation, compacting, or disturbing the soil, changing natural drainage patterns, and by covering the ground with impermeable surfaces (pavement, concrete, buildings). When the land surface is developed or "hardened" in this manner, storm water cannot infiltrate. This results in larger amounts of water moving more quickly across a site which can carry more sediment and other pollutants to streams and rivers.

Areas that may have a high potential for soil erosion are noted in the enclosed plan. This plan also includes areas with such heavy activity that plants cannot grow, soil stockpiles, stream banks, steep slopes, construction and demolition areas, and any area where the soil is disturbed, denuded (stripped of plants), and subject to wind and water erosion.

Seven ways to limit and control sediment and erosion:

- Leave as much vegetation (plants) onsite as possible
- Minimize the time that soil is exposed
- Prevent runoff from flowing across disturbed areas (divert the flow to vegetated areas)
- Stabilize the disturbed soils as soon as possible
- Slow down the runoff flowing across the site
- Provide drainageways for the increased runoff (use grassy swales rather than concrete drains; refer to Grassed Swales BMP SECP-10)
- Remove sediment from storm water runoff before it leaves the site

Using these measures to control erosion and sedimentation is an important part of storm water management. Selecting the best set of sediment and erosion prevention measures depends upon the nature of the activities onsite and other site-specific conditions.

The local Soil Conservation Service Office or County Extension Office can provide information on any special measures necessary to promote vegetation on severely eroded soils.

Vegetation Practices

Preserving existing vegetation or revegetating disturbed soil as soon as possible after construction is the most effective way to control erosion.

Four ways vegetation reduces erosion:

- Shields the soil surface from direct erosive impact of rain.
- Improves the soil's water storage porosity and capacity so more water can infiltrate into the ground.
- Slows the runoff and allows sediment deposits.
- Physically holds the soil in place with plant roots.

Vegetation cover can be grass, trees, shrubs, bark, mulch, or straw. Grasses are the most common type of cover used for revegetation because they grow quickly and provide erosion protection within days. Straw or mulch may be used during nongrowing seasons to prevent erosion. Keep existing shrubs and trees because their established root systems help prevent erosion.

Vegetation and other site stabilization practices can be either temporary or permanent controls. Temporary controls provide a cover for exposed or disturbed areas for short periods or until permanent erosion controls are in place. Permanent vegetative practices are used when activities that disturb the soil are completed or when erosion is occurring on an otherwise stabilized site.

SECP-2 DUST CONTROL (INDUSTRIAL)

Dust controls for material handling areas are prevent pollutants from entering storm water discharges by reducing the surface and air transport of dust caused by industrial activities. Consider the following types of controls:

- Water spraying
- Negative pressure systems (vacuum systems)
- Collector systems (bag and cyclone)
- Filter systems
- Street sweeping

The purpose of industrial dust control is to collect or contain dusts to prevent storm water runoff from carrying the dusts to the sewer collection system or to surface waters.

Dust control is useful in any process area, loading and unloading area, material handling areas, and transfer areas where dust is generated. Street sweeping is limited to paved areas.

Mechanical dust collection systems are designed according to the size of dust particles and the amount of air to be processed. Manufacturer's recommendations should be followed for installation (as well as the design of the equipment).

If water sprayers are used, dust-contaminated waters should be collected and taken for treatment. Areas will probably need to be resprayed to keep dust from spreading.

Two kinds of street sweepers are common: brush and vacuum. Vacuum sweepers are more efficient and work best when the area is dry.

Mechanical equipment should be operated according to the manufacturer's recommendations and should be inspected regularly.

Advantages of Dust Control (Industrial)	Disadvantages of Dust Control (Industrial)
• May cause a decrease of respiratory problems in employees around the site • May cause less material to be lost and may therefore save money • Provides efficient collection of larger dust particles (street sweepers)	• Generally more expensive than manual systems • May be impossible to maintain by plant personnel (the more elaborate equipment) • Labor and equipment intensive and may not be effective for all pollutants (street sweepers)

SECP-3 VEGETATION PRACTICES

Preserving existing vegetation or revegetating disturbed soil as soon as possible after construction is the most effective way to control erosion.

A vegetation cover reduces erosion potential in four ways:

- By shielding the soil surface from direct erosive impact of rain
- By improving the soil's water storage porosity and capacity so more water can infiltrate into the ground
- By slowing the runoff and allowing the sediment to drop out or deposit and
- By physically holding the soil in place with plant roots

Vegetative cover can be grass, trees, shrubs, bark, mulch, or straw. Grasses are the most common type of cover used for revegetation because they grow quickly, providing erosion protection within days. Other soil stabilization practices such as straw or mulch may be used during nongrowing seasons to prevent erosion. Newly planted shrubs and trees establish root systems more slowly, so keeping existing ones is a more effective practice.

Vegetative and other site stabilization practices can be either temporary or permanent controls. Temporary controls provide a cover for exposed or disturbed areas for short periods of time or until permanent erosion controls are put in place. Permanent vegetative practices are used when activities that disturb the soil are completed or when erosion is occurring on an otherwise stabilized site.

SECP-4 PRESERVATION OF NATURAL VEGETATION

The preservation of natural vegetation (existing trees, vines, brushes, and grasses) provides natural buffer zones. By preserving stabilized areas, it minimizes erosion potential, protects water quality, and provides aesthetic benefits. This practice is used as a permanent control measure.

This technique applies to all types of sites. Areas where preserving vegetation can be particularly beneficial are floodplains, wetlands, stream banks, steep slopes, and other areas where erosion controls would be difficult to establish, install, or maintain.

Preserving vegetation on a site should be planned before any site disturbance begins. Preservation requires good site management to minimize the impact of construction activities on existing vegetation. Clearly mark the trees to be preserved and protect them from ground disturbances around the base of the tree. Proper maintenance is important to ensure healthy vegetation that can control erosion. Different species, soil types, and climatic conditions will require different maintenance activities such as mowing, fertilizing, lining, irrigation, pruning, and weed and pest control.

Maintenance should be performed regularly, especially during construction. ***Some state/local regulations require natural vegetation to be preserved in sensitive areas. Consult the appropriate state/local agencies for more regulatory information.***

Advantages of Preservation of Natural Vegetation	Disadvantages of Preservation of Natural Vegetation
• Can handle higher quantities of storm water runoff than newly seeded areas • Does not require time to establish (effective immediately) • Increases the filtering capacity because the vegetation and root structure are usually denser in preserved natural vegetation than in newly seeded or base areas • Enhances aesthetics • Provides areas for infiltration, reducing the quantity and velocity of storm water runoff • Allows areas where wildlife can remain undisturbed • Provides noise buffers and screens for onsite operations • Usually requires less maintenance (irrigation, fertilizer) than planting new vegetation	• Requires planning to preserve and maintain the existing vegetation • May not be cost effective with high land costs • May construct area available for construction activities

SECP-5 BUFFER ZONES

Buffer zones are vegetated strips of land used for temporary or permanent water quality benefits. Buffer zones are used to decrease the velocity of storm water runoff, which in turn helps to prevent soil erosion. Buffer zones are different from vegetated filter strips because buffer zone effectiveness is not measured by its ability to improve infiltration. The buffer zone can be an area of vegetation that is left undisturbed during construction, or it can be newly planted.

The buffer zone technique can be used at any site that can support vegetation. Buffer zones are particularly effective on floodplains, next to wetlands, along stream banks, and on steep, unstable slopes.

If buffer zones are preserved, existing vegetation, good planning, and site management are needed to protect against disturbances such as grade changes, excavation, damage from equipment, and other activities. Establishing new buffer strips requires the establishment of a good dense turf, trees, and shrubs. Careful maintenance is important to ensure healthy vegetation. The need for routine maintenance such as mowing, fertilizing, liming, irrigating, pruning, and weed and pest control will depend upon the species of plants and trees involved, soil types, and climatic conditions. Maintaining planted areas may require debris removal and protection against unintended uses or traffic.

Many state/local storm water program or zoning agencies have regulations which define required or allowable buffer zones especially near sensitive areas such as wetlands. Contact the appropriate state/local agencies for their requirements.

Advantages of Buffer Zones	Disadvantages of Buffer Zones
• Provide aesthetic as well as water quality benefits • Provide areas for infiltration, which reduces amount and speed of storm water runoff • Provide areas for wildlife habitat • Provide areas for recreation • Provide buffers and screens for onsite noise if trees or large brushes are used • Low maintenance requirements • Low cost when using existing vegetation	• May not be cost effective to use if the cost of land is high • Are not feasible if land is not available • Require plant growth before they are effective

SECP-6 STREAM BANK STABILIZATION

Stream bank stabilization is used to prevent stream bank erosion from high velocities and quantities of storm water runoff. Typical methods include the following:

- Riprap — Large angular stones placed along the stream bank or lake.
- Gabion — Rock-filled wire cages used to create a new stream bank.
- Reinforced Concrete — Concrete bulkheads and retaining walls that replace natural stream banks and create a non-erosive surface.
- Log Cribbing — Retaining walls built of logs to anchor the soils against erosive forces; usually built on the outside of stream bends.
- Grid Pavers — Precast or poured-in-place concrete units placed along stream banks to stabilize the stream bank and create open spaces where vegetation can be established.
- Asphalt — Asphalt paving placed along the natural stream bank to create a non-erosive surface.

Stream bank stabilization is used where vegetative stabilization practices are not practical and where the stream banks are subject to heavy erosion from increased flows or disturbance during construction. Stabilization should occur before any land development in the watershed area. Stabilization can also be retrofitted when stream bank erosion occurs.

Stream bank stabilization structures should be planned and designed by a licensed professional engineer. ***Applicable federal, state, and local requirements should be followed, including Clean Water Act Section 404 regulations.*** An important design feature of stream bank stabilization methods is the foundation of the structure; the potential for the stream to erode the sides and bottom of the channel should be considered to make sure the stabilization measure will be supported properly. Structures can be designed to protect and improve natural wildlife habitats. Only pressure-treated wood should be used in log structures. Permanent structures should be designed to handle expected flood conditions. A well-designed layer of stone can be used in many ways and in many locations to control erosion and sedimentation. Riprap is either a uniform size or graded (different sizes) and is usually applied in an even layer throughout

the stream. Reinforced concrete structures may require positive drainage behind the bulkhead or retaining wall to prevent erosion around the structure. Gabion and grid pavers should be installed according to manufacturer's recommendations.

Stream bank stabilization structures should be inspected during and after each large storm event. Structures should be maintained as installed. Structural damage should be repaired as soon as possible to prevent further damage to or erosion of the stream bank.

Advantages of Stream Bank Stabilization	Disadvantages of Stream Bank Stabilization
• Can provide control against erosive forces caused by the increase in storm water flows created during land development	• Does not provide the water quality or aesthetic benefits that vegetative practices could
• Usually will not require as much maintenance as vegetative erosion controls	• Should be designed by qualified professional engineers, which may increase project costs
• May provide wildlife habitats	• May be expensive (materials costs)
• Forms a dense, flexible, self-healing cover that will adapt well to uneven surfaces (riprap)	• May require additional permits for structure
	• May alter stream dynamics which cause changes in the channel downstream
	• May cause negative impact to wildlife habitats

SECP-7 MULCHING, MATTING, AND NETTING

Mulching is a temporary soil stabilization or erosion control practice where materials such as grass, hay, woodchips, wood fibers, straw, or gravel are placed on the soil surface. In addition to stabilizing soils, mulching can reduce the speed of storm water runoff over an area. When used together with seeding or planting, mulching can aid in plant growth by holding the seeds, fertilizers, and topsoil in place, by preventing birds from eating seeds, helping to retain moisture, and by insulating against extreme temperatures. Mulch mattings are materials (jute or other wood fibers) that have been formed into sheets of mulch that are more stable than normal mulch. Netting is typically made from jute, other wood fiber, plastic, paper, or cotton and can be used to hold the mulching and matting to the ground. Netting can also be used alone to stabilize soils while the plants are growing; however, it does not retain moisture or temperature well. Mulch binders (either asphalt or synthetic) are sometimes used instead of netting to hold loose mulches together.

Mulching is often used alone in areas where temporary seeding cannot be used because of the season or climate. Mulching can provide immediate, effective, and inexpensive erosion control. On steep slopes and critical areas such as waterways, mulch matting is used with netting or anchoring to hold it in place.

Mulch seeded and planted areas where slopes are steeper than 2:1, where runoff is flowing across the area, or when seedlings need protection from bad weather.

Using mulch may or may not require a binder, netting, or the tacking of mulch to the ground. Effective netting and matting require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil and erosion will occur underneath the material. Final grading is not necessary before mulching. Mulched areas should be inspected often to find where mulched material has been loosened or removed. Such areas should be reseeded (if necessary) and the mulch cover replaced immediately. Mulch binders should be applied at rates recommended by the manufacturer or, if asphalt is used, at rates of approximately 480 gallons per acre.

Advantages of Mulching, Matting, and Netting	Disadvantages of Mulching, Matting, and Netting
• Provide immediate protection to soils that are exposed and that are subject to heavy erosion • Retain moisture, which may minimize the need for watering • Require no removal because of natural deterioration of mulching and matting	• May delay germination of some seeds because cover reduces the soil surface temperature • Netting should be removed after usefulness is finished, than landfilled or composted

SECP-8 PERMANENT SEEDING AND PLANTING

Permanent grass seeding and planting trees and brush provides soil stabilization by holding soil particles in place. Vegetation reduces sediment and runoff to downstream areas by slowing the runoff velocity and permitting greater runoff infiltration. Vegetation also filters sediments, helps the soil absorb water, improves wildlife habitats, and enhances site aesthetics.

Permanent seeding and planting is appropriate for any grade or cleared area where long-lived plant cover is desired. Some areas where permanent seeding is especially important are filter strips, buffer areas, vegetated swales, steep slopes, and stream banks. This practice is effective on areas where soils are unstable because of their texture, structure; a high water table, high winds, or steep slope. When seeding in northern areas during fall or winter, cover the area with mulch to provide a protective barrier against cold weather (Refer to Mulching BMP SECP-7). Seeding should also be mulched if the seeded area slopes 4:1 or more, if soil is sandy or clayey, or if weather is excessively hot or dry. Plant when conditions are most favorable for growth. When possible, use low-maintenance local plant species. Install all other erosion control practices such as dikes, basins, and surface runoff control measures before planting.

For this practice to work, it is important to select appropriate vegetation, prepare a good seedbed, properly time planting, and water and fertilize. Planting local plants during their regular growing season will increase the chances for success and may lessen the need for watering. Check seeded areas frequently for proper watering and growth conditions.

Topsoil should be used on areas where topsoils have been removed, where the soils are dense or impermeable, or where mulching and fertilizers alone cannot improve soil quality. Topsoiling should be coordinated with the seeding and planting practices and should not be planned while the ground is frozen or too set. Topsoil layers should be at least 2 inches deep (or similar to the existing topsoil depth).

Remove as little existing topsoil as possible to minimize erosion and sedimentation. All site controls should be in place before the topsoil is removed. If topsoils are brought in from another site, it is important that its texture is compatible with the subsoils onsite; for example, sandy topsoils are not compatible with clay subsoils.

Stockpiling of topsoils onsite requires good planning so soils will not obstruct other operations. If soil is to be stockpiled, consider using temporary seeding, mulching, or silt fencing to prevent or

control erosion. Inspect the stockpiles frequently for erosion. After topsoil has been spread, inspect it regularly, and reseed or replace areas that have eroded.

Advantages of Permanent Seeding and Planting	Disadvantages of Permanent Seeding and Planting
• Improves the aesthetics of a site • Provides excellent stabilization • Provides filtering of sediments • Provides wildlife habitat • Relatively inexpensive	• May require irrigation to establish vegetation • Depends initially upon climate and weather for success

SECP-9 SODDING

Sodding stabilizes an area by establishing permanent vegetation, providing erosion and sedimentation controls, and providing areas where storm water can infiltrate the ground.

Sodding is appropriate for any grades or cleared area that might erode and where a permanent, long-lived plant cover is needed immediately. Examples of where sodding can be used are buffer zones, stream banks, dikes, swales, slopes, outlets, level spreaders, and filter strips.

The soil surface should be fine-graded before laying down the sod. Topsoil may be needed in areas where the soil textures are inadequate (Refer to Permanent Seeding and Planting BMP SECP-8). Lime and fertilizers should be added to the soil to promote good growth conditions. Sodding can be applied in alternating strips or other patterns, or alternate areas can be seeded to reduce expense. Sod should not be planted during very hot or wet weather. Sod should not be placed on slopes that are greater than 3:1 if they are to be mowed. If placed on steep slopes, sod should be laid with staggered joints/be pegged. In areas such as steep slopes or next to running waterways, chicken wire, jute, or other netting can be placed over the sod for extra protection against lifting (Refer to Mulching, Matting, and Netting BMP SECP-7). Sod should be rolled or compacted immediately after installation to ensure firm contact with the underlying topsoil. Inspect the sod frequently after it is first installed, especially after large storm events, until it is established as permanent cover. Remove and replace dead sod. Watering may be necessary after planting and during periods of intense heat/lack of rain.

Advantages of Sodding	Disadvantages of Sodding
• Can provide immediate vegetative cover and erosion control • Provide more stabilizing protection than initial seeding through dense cover formed by sod • Produces lower week growth than seeded vegetation • Can be used for site activities within a shorter time than can seeded vegetation • Can be placed at any time of the year as long as moisture conditions in the soil area favorable, except when the ground is frozen	• Purchase and installation costs are higher than for seeding • May require continued irrigation if the sod is placed during dry seasons or on sandy soils

SECP-10 GRASSED SWALES

Grassed swales are vegetated depressions used to transport, filter, and remove sediments. Grassed swales control high runoff rates by reducing the speed of the runoff and by reducing the volume of the runoff through infiltration of the storm water. Pollutants are removed because runoff travels slowly and infiltrates into the soil and because the vegetation in the grass swale works as a filter or strainer.

Grassed swales are suitable for most areas where storm water runoff is low. Certain factors will affect the operation of grassed swales, including soil type, land features, and the depth of the soil from the surface to the water table (top of the drenched portion of the soil or bedrock layer). The soil must be permeable for runoff to be able to infiltrate well. Sandy soils will not hold vegetation well or from a stable channel structure. Steep slopes will increase runoff rates and create greater potential for erosion. Storm water flows will not be easily absorbed where the water table is near the surface. Swales are most useful for sites smaller than 10 acres. Even without highly permeable soils, swales reduce velocity and are used for that reason.

Grassed swales usually do not work well for construction runoff because the runoff has high sediment loads.

The channel of the swale should be as level as possible to maximize infiltration. Side slopes in the swale should be designed to no steeper than 3:1 to minimize channel erosion. Plans should consider:

- Use of existing topography and existing drainage patterns
- Highest flow rate is expected from a typical storm to determine the most practical size for the swale (in keeping with state or local requirements).

The swale should be lightly tilled before grass is planted, and a dense cover of grasses (seed or sod) should be planted. The location of the swale will determine the best type of vegetation.

Check dams may be installed in the swales to reduce runoff speed and increase infiltration.

Maintenance activities for the swales include those practices needed to maintain healthy, dense vegetation and to retain efficient infiltration and movement of the storm water into and

through the swale. Periodic mowing, reseeding, and weed control are required to maintain pollutant removal efficiency. The swale and channel outlet should be kept free from sediment buildup, litter, brush, or fallen tree limbs.

Periodic inspections will identify erosion problems or damaged areas. Damaged or eroded areas of the channel should be repaired as soon as possible. Areas with damaged vegetation should be reseeded/replanted immediately.

Advantages of Grassed Swales	Disadvantages of Grassed Swales
• Easily designed and constructed	• Cannot control runoff from very large storms
• Provide moderate removal of sediments if properly constructed and maintained	• If they do not drain property between storms, can encourage nuisance problems such as mosquitoes, ragweed, dumping, and erosion
• May provide a wildlife habitat	• Not capable of removing significant amounts of soluble nutrients
• Inexpensive	• Cannot treat runoff with high sediment loadings
• Can replace curb and gutter systems	
• Can last for long periods of time if well maintained	

EC-1 DUST CONTROL (LAND DISTURBANCE AND DEMOLITION AREAS)

Dust controls for land disturbance and demolition areas are any controls that reduce the potential for particles being carried through air or water. Types of dust control are:

- Irrigation — Irrigation is a temporary measure involving a light application of water to moisten the soil surface. The process should be repeated as necessary.

- Minimization of Denuded Areas — Minimizing soil exposure reduces the amount of soil available for transport and erosion. Soil exposure can be lessened by temporary or permanent soil stabilization controls, such as seeding, mulching, topsoiling, spreading crushed stone or coarse gravel, or tree planting. Maintaining existing vegetation on a site will also help control dust.

- Windbreaks — Windbreaks are temporary or permanent barriers that reduce airborne particles by slowing wind velocities (slower winds do not suspend particles). Leaving existing trees and large shrubs in place will create effective windbreaks. More temporary types of windbreaks are solid board fences, snow fences, tarp curtains, hay bales, crate walls, and sediment walls.

- Tillage —- Deep plowing will roughen the soil surface to bring up to the surface cohesive clods of soil, which in turn rest on top of dusts, protecting them from wind and water erosion. This practice is commonly practiced in arid regions where establishing vegetation may take time.

- Chemical Soil Treatment (palliatives) — These are temporary controls that are applied to soil surfaces in the form of spray-on adhesives, such as anionic asphalt emulsion, latex emulsion, resin-water emulsions, or calcium chloride. The palliative is the chemical used. These should be used with caution as they may create pollution if not used correctly.

Dust controls can be used on any site where dust may be generated and where the dust may cause onsite and offsite damage. Dust controls are especially critical where reduced rainfall levels expose soil particles for transport by air and runoff. Dust control should be used in conjunction with other sedimentation controls such as traps.

Soil exposure should be limited to control dust during land disturbance and at demolition area. Work that causes soil disturbance or involves demolition should be done in phases and accompanied by temporary stabilization measures, when possible. These precautions will minimize the amount of soil that is disturbed at any one time and help control dust.

Oil should not be used to control dust because of its high potential for polluting storm water discharges.

Irrigation will be most effective if site drainage systems are checked to ensure that the right amount of water is used. Too much water can cause runoff problems.

Chemical treatment is only effective on mineral soils, as opposed to muck soils, because the chemicals bond better to mineral soils. Vehicular traffic should be routed around chemically-treated areas to avoid tracking the chemicals. Certain chemicals may be inappropriate for some types of soils or application areas. Local governments usually have information about restrictions on the types of palliatives that may be used. Special consideration must be given to preserving groundwater quality whenever chemicals are applied to the land.

Since most of these techniques are temporary controls, sites should be inspected often and materials should be reapplied when needed. The frequency for these inspections depends upon site-specific conditions, weather conditions, and the types of technique used.

Advantages of Dust Control (Land Disturbance and Demolition Areas)	Disadvantages of Dust Control (Land Disturbance and Demolition Areas)
• Can help prevent wind- and water-based erosion of disturbed areas and will reduce respiratory problems in employees • Some types can be implemented quickly at low cost and effort (except wind breaks) • Helps preserve the aesthetics of the site and screens certain activities from view (wind breaks) • Vegetative wind breaks are permanent and an excellent alternative to chemical use	• Some types are temporary and must be reapplied or replenished regularly • Some types are expensive (irrigation and chemical treatment) and may be ineffective under certain conditions • May result in health/environmental hazards, if over-application of the chemicals leaves large amounts exposed to wind and rain erosion or groundwater contamination • May create excess runoff that the site was not designed to control (irrigation) • May cause increased offsite tracking of mud (irrigation) • Is not as effective as chemical treatment or mulching and seeding; requires land space that may not be available at all locations (wind breaks)

EC-2 TEMPORARY SEEDING

Temporary seeding means growing a short-term vegetative cover (plants) on disturbed site areas that may be in danger of erosion. The purpose of temporary seeding is to reduce erosion and sedimentation by stabilizing disturbed areas that will not be stabilized for long periods, or where permanent plant growth is not necessary or appropriate. This practice uses fast-growing grasses whose root systems hold down the soils so that they are less apt to be carried offsite by storm water runoff or wind. Temporary seeding also reduces the problems associated with mud and dust from bare soils surfaces during construction.

Temporary seeding should be performed on areas which have been disturbed by construction and which are likely to be redisturbed, but not for several weeks or more. Typical areas might include denuded areas, soil stockpiles, dikes, dams, sides of sediment basins, and temporary road banks. Temporary seeding should take place as soon as practicable after the last land disturbing activity in an area. Temporary seeding may not be an effective practice in arid and semi-arid regions where the climate prevents fast plant growth, particularly during the dry seasons. In those areas, mulching or chemical stabilization may be better for the short term (Refer to Mulching BMP SECP-7 and Chemical Stabilization BMP EC-3).

Proper seed bed preparation and the use of high-quality seed are needed to grow plants for effective erosion control. Soil that has been compacted by heavy traffic or machinery may need to be loosened. Successful growth usually requires that the soil be tilled before the seed is applied. Topsoiling is not necessary for temporary seeding; however, it may improve the chances of establishing temporary vegetation in an area. Seed bed preparation may also require applying fertilizer/lime to the soil to make conditions more suitable for plant growth. Proper fertilizer, seeding mixtures, and seeding rates vary depending upon the location of the site, soil types, slopes, and season. Local suppliers, state and local regulatory agencies, and the U.S. Department of Agriculture Soil Conservation Service will supply information on the best seed mixes and soil-conditioning methods.

Seeded areas should be covered with mulch to provide protection from the weather. Seeding on slopes of 2:1 or more, in adverse soil conditions, during excessively hot or dry weather, or where heavy rain is expected should be followed by spreading mulch (Refer Mulching BMP SECP-7).

Frequent inspections are necessary to ensure that conditions for growth are good. If the plants do not grow quickly or thick enough to prevent erosion, the area should be reseeded as soon as possible. Seeded areas should be kept adequately moist. If normal rainfall is insufficient the seeded area should be watered. Watering rates should be watched so that over-irrigation (which can cause erosion itself) does not occur.

Advantages of Temporary Seeding	Disadvantages of Temporary Seeding
• Generally inexpensive and easy to do	• Depends heavily upon the season and rainfall rate for success
• Establishes plant cover fast when conditions are good	• May require extensive fertilizing of plants grown on some soils, which can cause problems with local water quality
• Stabilizes soils well, is aesthetic, and can provide sedimentation controls for other site areas	• Requires protection from heavy use, once seeded
• May help reduce costs of maintenance on other erosion controls (sediment basins may need to be cleaned out less often)	• May produce vegetation that requires irrigation and maintenance

EC-3 CHEMICAL STABILIZATION

Chemical stabilization practices, often referred to as a chemical mulch, soil binder, or soil palliative (Refer to Dust Control BMP EC-1), are temporary erosion control practices. Materials made of vinyl, asphalt, or rubber are sprayed onto the surface of the soil to hold in place and protect against erosion from storm water runoff and wind. Many of the products used for chemical stabilization are human-made, and many different products are on the market.

Chemical stabilization can be used as an alternative in areas where temporary seeding practices cannot be used because of the season or climate. It can provide immediate, effective, and inexpensive erosion control anywhere erosion is occurring on a site.

The application rates and procedures recommended by the manufacturer of a chemical stabilization product should be followed as closely as possible to prevent the products from ponding and from creating large areas where moisture cannot get through.

Advantages of Chemical Stabilization	**Disadvantages of Chemical Stabilization**
• Easily applied to the surface of the soil	• Can create impervious surfaces (where water cannot get through), which may in turn increase the amount and speed of storm water runoff
• Effective in stabilizing areas where plants will not grow	• May caused harmful effects on water quality if not used correctly
• Provides immediate protection to soils that are in danger of erosion	• Usually more expensive than vegetative cover

EC-4 INTERCEPTOR DIKES AND SWALES

Interceptor dikes (ridges of compacted soil) and swales (excavated depression) are used to keep upslope runoff from crossing areas where there is a high risk of erosion. They reduce the amount and speed of flow and then guide it to a stabilized outfall (point of discharge) or sediment trapping area. (Refer to Outlet Protection BMP EC-12; Level Spreaders BMP SE-10; Vegetated Filter Strips BMP EC-16; Sediment Traps BMP EC-10; and Temporary Sediment Basins BMP EC-11). Interceptor dikes and swales divert runoff using a combination of earthen dike and vegetated swale (Refer to Grassed Swales BMP SECP-10). Runoff is channeled away from locations where there is a high risk of erosion by placing a diversion dike or swale at the top of a sloping disturbed area. Dikes and swales also collect overland flow, changing it into concentrated flows (flows that are combined). Interceptor dikes and swales can be either temporary or permanent storm water control structures.

Interceptor dikes and swales are generally built around the perimeter of a construction site before any major soil-disturbing activity takes place. Temporary dikes or swales may also be used to protect existing buildings; areas, such as stockpiles; or other small areas that have not yet been fully stabilized. When constructed along the upslope perimeter of a disturbed or high-risk area (though not necessarily all the way around it), dikes or swales prevent runoff from uphill areas from crossing the unprotected slope. Temporary dikes or swales constructed on the down-slope side of the disturbed or high-risk area will prevent runoff that contains sediment from leaving the site before sediment is removed. For short slopes, a dike or swale at the top of the slope reduces the amount of runoff reaching the disturbed area. For longer slopes, several dikes or swales are placed across the slope at intervals. This practice reduces the amount of runoff that accumulates on the face of the slope and carries the runoff safely down the slope. In all cases, runoff is guided to a sediment trapping area or a stabilized outfall before release.

Temporary dikes and swales are used in areas of overland flow; if they remain in place longer than 15 days, they should be stabilized. Runoff channeled by a dike or swale should be directed to an adequate sediment trapping area or stabilized outfall. Care should be taken to provide enough slope for drainage but not too much slope to cause erosion due to high runoff flow speed. Temporary interceptor dikes and swales may remain in place as long as 12 to 18 months (with proper stabilization) or be rebuilt at the end of each day's activities. Dikes or swales should remain in place until the area they were built to protect is permanently stabilized. Interceptor dikes and swales can be permanent controls. However, permanent controls should be designed to handle runoff after construction is complete; should be permanently stabilized; and should be inspected and maintained regularly. Temporary and permanent control measures should be inspected once

each week on a regular schedule and after every storm. Repairs necessary to the dike and flow channel should be made promptly.

Advantages of Interceptor Dikes and Swales	Disadvantages of Interceptor Dikes and Swales
• Are simple and effective for channeling runoff away from areas subject to erosion • Can handle flows from large drainage areas • Are inexpensive because they use materials and equipment normally found onsite	• If constructed improperly, can cause erosion and sediment transport since flows are concentrated • May cause problems to vegetation growth if water flow is too fast • Require additional maintenance, inspections, and repairs

EC-5 FILTER FENCE

A filter fence, also called "silt fence" is a temporary measure for sedimentation control. It usually consists of posts with filter fabric stretched across the posts and sometimes with a wire support fence. The lower edge of the fence is vertically trenched and covered by backfill. A silt fence is used in small drainage areas to detain sediment. These fences are most effective where there is overland flow or in minor swales or drainageways. They prevent sediment from entering receiving waters. Silt fences are also used to catch windblown sand. Aside from the traditional wooden post and filter fabric method, there are several variations of silt fence installation including silt fence which can be purchased with pockets pre-sewn for using with steel fence posts.

A silt fence should be installed before major soil disturbance in the drainage area. Such a structure is only appropriate for drainage areas of 1.0 acre or less with velocities of 0.5 cubic feet per second or less. The fence should be placed across the bottom of a slope or minor drainageway along a line of uniform elevation (perpendicular to the direction of flow) and can be used at the outer boundary of the work area. The fence does not have to surround the work area completely. In addition, a silt fence is effective where sheet and rill (small watercourse that has steep sides and is usually on a few inches deep) erosion may be a problem. Silt fences should not be constructed in streams or swales. Install silt fences in accordance with the manufacturer's recommendations.

A silt fence is not appropriate for a large area or where the flow rate is greater than 0.5 cubic feet per second. This type of fence can be more effective than a straw bale barrier if properly installed and maintained and may be used in combination with other erosion/sediment practices.

The effective life span for a silt fence is approximately 6 months. During this period, the fence requires frequent inspection and prompt maintenance to maintain its effectiveness. Inspect the fence after each rainfall. Check for areas where runoff eroded a channel beneath the fence, or where the fence was caused to sag or collapse by runoff flowing over the top. Remove and properly dispose of sediment when it is one-third to one-half the height of the fence or after each storm.

Advantages of Filter Fence	Disadvantages of Filter Fence
• Remove sediments and prevents downstream damage from sediment deposits	• May result in failure from improper choice of pore size in the filter fabric or improper installation
• Reduces the speed of runoff flow	• Should not be used in streams
• Minimal clearing and grubbing required for installation	• Only appropriate for small drainage areas with overland flow
• Inexpensive	• Frequent inspection and maintenance is necessary to ensure effectiveness

EC-6 STRAW BALE BARRIER

Straw bales can be used as temporary sediment barrier. They are placed end to end in a shallow excavated trench (with no gaps in between) and staked into place. If properly installed, they can detain sediment and reduce flow velocity from small drainage areas. A straw bale barrier prevents sediment from leaving the site by trapping the sediment in the barrier while allowing the runoff to pass through. It can also be used to decrease the velocity of sheetflow or channel flows of low-to-moderate levels.

A straw bale barrier should be installed before major soil disturbance in the drainage area. This type of barrier is placed perpendicular to the flow, across the bottom of a slope or minor drainageway where there is sheetflow. It can be used at the perimeter of the work area, although it does not have to surround it completely. It can also be very effective when used in combination with other erosion and sediment control practices. A straw bale barrier may be used where the length of slope behind the barrier is less than 100 feet and where the slope is less than 2:1.

The success of a straw bale barrier depends upon proper installation. The bales must be firmly staked into the entrenchment ditch and the ditch must be properly backfilled. To function effectively, the bales must be placed end to end and there can be no gaps between the bales.

Straw bale barriers are useful for approximately 3 months. They must be inspected and repaired immediately after each rainfall or daily if there is prolonged rainfall. Damaged straw bales require immediate replacement. After each storm, or on a regular basis, trapped sediments must be removed and disposed of properly.

Advantages of a Straw Bale Barrier	Disadvantages of a Straw Bale Barrier
• Can prevent downstream damage from sediment deposits if properly installed, used, and maintained • Can be an inexpensive way to reduce or prevent erosion	• May not be used in streams or large swales • Poses a risk of washouts if the barrier is installed improperly or a storm is severe • Short life span and a high inspection and maintenance requirement • Appropriate for only small drainage areas • Easily subject to misuse and can contribute to sediment problems

EC-7 BRUSH BARRIER

A brush barrier is a temporary sediment barrier constructed from materials resulting from onsite clearing and grubbing. It is usually constructed at the bottom perimeter of the disturbed area. Filter fabric is sometimes used as an anchor over the barrier to increase its filtering efficiency. Brush barriers are used to trap and retain small amounts of sediment by intercepting the flow from small areas of soil disturbance.

A brush barrier should only be used to trap sediment from runoff which is from a small drainage area. The slope which the brush barrier is placed across should be very gentle. Do not place a brush barrier in a swale or any other channel. Brush barriers should be constructed below areas subject to erosion.

Brush barrier construction barrier should be started as soon as clearing and grubbing has produced enough material to make the structure. Wood chips should not be included in the material used for the barrier because of the possibility of leaching. When the site has been stabilized and any excess sediment has been disposed of properly, the filter fabric can be removed. Over time, natural vegetation will establish itself within the barrier, and the barrier itself will decompose.

It should not be necessary to maintain the brush barrier unless there is a very large amount of sediment being deposited. If used, the filter fabric anchor should be checked for tears and the damaged sections replaced promptly. The barrier should be inspected after each rainfall and checked for areas breached by concentrated flow. If necessary, repairs should be made promptly and excess sediment removed and disposed of properly.

Advantages of a Brush Barrier	Disadvantages of a Brush Barrier
• Can help prevent downstream damage from sediment deposits • Constructed of cleared onsite materials and, thus, is inexpensive • Usually requires little maintenance, unless there are very heavy sediment deposits	• Does not replace a sediment trap or basin • Appropriate for only small drainage areas • Very limited sediment retention

EC-8 GRAVEL OR STONE FILTER BERM

A gravel or stone filter berm is a temporary ridge constructed of loose gravel, stone, or crushed rock. It slows and filters flow, diverting it from an exposed traffic area. Diversions constructed of compacted soil may be used where there will be little or no construction traffic. They are also used for directing runoff to a stabilized outlet.

This method is appropriate where construction will accommodate vehicular traffic. Berms are meant for use in areas with shallow slopes. They may also be used at traffic areas within the construction site.

Berm material should be well graded gravel or crushed rock. The spacing of the berms will depend upon the slope's steepness: berms should be *placed* ***closer together as the slope increases.*** The diversion should be inspected daily, after each rainfall, or if breached by construction or other vehicles. All needed repairs should be performed immediately. Accumulated sediment should be removed and properly disposed of and the filter material replaced, as necessary.

Advantages of a Gravel or Stone Filter Berm	**Disadvantages of a Gravel or Stone Filter Berm**
• Very efficient method of sediment control	• More expensive than methods that use onsite materials • Very limited life span • Difficult to maintain because clogging from mud and soil

EC-9 STORM DRAIN INLET PROTECTION

Storm drain inlet protection is a filtering measure placed around any inlet or drain to trap sediment. This mechanism prevents the sediment from entering inlet structures. Additionally, it serves to prevent the silting-in (clogging) of inlets, storm drainage systems, or receiving channels. Inlet protection may be composite of gravel and stone with a wire mesh filter, block and gravel, filter fabric, or sod.

This type of protection is appropriate for small drainage areas where storm drain inlets will be ready for use before final stabilization. Storm drain inlet protection is also used where a permanent storm drain structure is being constructed onsite. Straw bales are not recommended for this purpose. Filter fabric is used for inlet protection when storm water flows are relatively small with low velocities. This practice cannot be used where inlets are paved because the filter fabric should be staked. Block and gravel filters can be used where velocities are higher. Gravel and mesh filters can be used where flows are higher and subject to disturbance by site traffic. Sod used for inlet filters is generally used where sediments in the storm water runoff are low.

Storm drain inlet protection is not meant for use in drainage areas exceeding 1 acre or for large concentrated storm water flows. Installing this measure should take place before any soil disturbance in the drainage area. The type of material used will depend upon site conditions and the size of the drainage area. Inlet protection should be used in combination with other measures, such as small impoundments or sediment traps, to provide more effective sediment removal. ***Inlet protection structures should be inspected regularly, especially after a rainstorm.*** Repairs and silt removal should be performed as necessary. Storm drain inlet protection structures should be removed only after the disturbed areas are completely stabilized.

Advantages of Storm Drainage Inlet Protection	Disadvantages of Storm Drain Inlet Protection
• Prevents clogging of existing storm drainage systems and the siltation of receiving waters • Reduces the amount of sediment leaving the site	• May be difficult to remove collected sediment • May cause erosion elsewhere if clogging occurs • Practical only for low sediment, low volume flows

EC-10 SEDIMENT TRAP

A sediment trap is formed by excavating a pond or by placing an earthen embankment across a low area or drainage swale (vegetated depressions used to transport, filter, and remove sediments). (Refer to Grassed Swales BMP SECP-10). An outlet or spillway is constructed using large stones or aggregate to slow the release of runoff. The trap retains the runoff long enough to allow most of the silt to settle out.

A temporary sediment trap may be used in conjunction with other temporary measures, such as gravel construction entrances, vehicle wash areas, slope drains, diversion dikes and swales, or diversion channels. This device is appropriate for sites with short time schedules.

Sediment traps are suitable for small drainage areas, usually no more than 10 acres with no unusual drainage features. The trap should be large enough to allow the sediments to settle and should have a capacity to store the collected sediment until it is removed. The volume of storage required depends upon the amount and intensity of expected rainfall and on estimated quantities of sediment in the storm water runoff.

A sediment trap is effective for approximately 18 months. During this period, the trap should be readily accessible for periodic maintenance and sediment removal. Traps should be inspected after each rainfall and cleaned when no more than half the design volume has been filled with collected sediment. The trap should remain in operation and be properly maintained until the site area is permanently stabilized by vegetation/when permanent structures are in place.

Advantages of a Sediment Trap	Disadvantages of a Sediment Trap
• Protects downstream areas from clogging or damage due to sediment deposits	• Suitable only for a limited area
• Inexpensive and simple to install	• Effective only if properly maintained
• Can simplify the design process by trapping sediment at specific spots onsite	• Will not remove very fine silts and clays
	• Short life span

EC-11 TEMPORARY SEDIMENT BASIN

A temporary sediment basin is a settling pond with a controlled storm water release structure used to collect and store sediment produced by construction activities. A sediment basin can be constructed by excavation or by placing an earthen embankment across a low area or drainage swale (vegetated depressions used to transport, filter, and remove sediments). (Refer to Grassed Swales BMP SECP-10). Sediment basins can be designed to maintain a permanent pool or to drain completely dry. The basin detains sediment-laden runoff from larger drainage areas long enough to allow most of the sediment to settle out.

The pond has a gravel outlet or spillway to slow the release of runoff and provide some sediment filtration. By removing sediment, the basin helps prevent clogging of offsite conveyance systems and sediment-loading of receiving waterways which helps prevent destruction of waterway habitats.

A temporary sediment basin should be installed before clearing and grading is undertaken. It should not be built on an embankment in an active stream. The creation of a dam in such a site may result in the destruction of aquatic habitats. Dam failure can also result in flooding. A temporary sediment basin should be located only where there is sufficient space and appropriate topography. The basin should be made large enough to handle the maximum expected amount of site drainage. Fencing around the basin may be necessary for safety or vandalism reasons.

A temporary sediment basin used in combination with other control measures, such as seeding or mulching, is especially effective for removing sediments.

Temporary sediment basins are usually designed for disturbed areas larger than 5 acres. The pond should be large enough to hold runoff long enough for sediment to settle. Sufficient space should be allowed for collected sediments. The useful life of a temporary sediment basin is about 12 to 18 months.

Sediment trapping efficiency is improved by providing the maximum surface area possible. Because finer silts may not settle out completely, additional erosion control measures should be used to minimize release of fine silt. ***Runoff should enter the basin as far from the outlet as possible to provide maximum retention time.***

Sediment basins should be readily accessible for maintenance and sediment removal. They should be inspected after each rainfall and be cleaned out when about half the volume has been filled with sediment. The sediment basin should remain in operation and be properly maintained until the site area is permanently stabilized by vegetation/when permanent structures are in place. The embankment forming the sedimentation pool should be well compacted and stabilized with vegetation. If the pond is near a residential area, it is recommended for safety reasons that a sign be posted and that the area be secured by a fence. A well-built temporary sediment basin that is large enough to handle the post-construction runoff volume may later be converted to use as a permanent storm water management structure.

Advantages of a Temporary Sediment Basin	**Disadvantages of a Temporary Sediment Basin**
• Protects downstream areas from clogging or damage due to sediment deposits generated during construction activities • Can trap smaller sediment particles than sediment traps can because of the longer detention time	• Generally suitable for small areas • Requires regular maintenance and cleaning • Will not remove very fine silts and clays unless used in conjunction with other measures • More expensive way to remove sediment than several other methods • Requires careful adherence to safety practices since ponds are attractive to children

EC-12 OUTLET PROTECTION

Outlet protection reduces the speed of concentrated storm water flows and reduces erosion or scouring at storm water outlets and paved channel sections. Outlet protection also lowers the potential for downstream erosion. This type of protection can be achieved through a variety of techniques, including stone or riprap, concrete aprons, paved sections and settling basins installed below the storm drain outlet.

Outlet protection should be installed at all pipe, interceptor dike, swale, or channel section outlets where the velocity of flow may cause erosion at the pipe outlet and in the receiving channel. Outlet protection should also be used at outlets where the velocity of flow at the design capacity may result in plunge pools (small permanent pools located at the inlet to or the outfall from applied BMPs. Outlet protection should be installed early during construction, but may be added at any time, as necessary.

The exit velocity of the runoff as it leaves the outlet protection structure should be reduced to levels that minimize erosion. Outlet protection should be inspected on a regular schedule to look for erosion and repairs should be made promptly.

Advantages of Outlet Protection	Disadvantages of Outlet Protection
• Provides, with riprap-line apron (the most common outlet protection), a relatively low cost method that can be installed easily on most sites • Removes sediment in addition to reducing flow speed • Can be used at most outlets where the flow speed is high • Inexpensive but effective measure • Requires less maintenance than many other measures	• May be unsightly • May cause problems in removing sediment (without removing and replacing the outlet protection structure itself) • May require frequent maintenance for rock outlets with high velocity flows

EC-13 CHECK DAMS

A check dam is a small, temporary or permanent dam constructed across a drainage ditch, swale, or channel to lower the speed of concentrated flows. Reduced runoff speed reduces erosion and gully formation in the channel which allows sediments and other pollutants to settle out.

A check dam should be installed in steeply sloped swales, or in swales where adequate vegetation cannot be established. A check dam may be built from logs, stone, or pea gravel-filled sandbags.

Check dams should be used only in small open channels that drain 10 acres or less. The dams should not be placed in streams (unless approved by appropriate state authorities).

The center section of the check dam should be lower than the edges. Dams should be spaced so that the toe of the upstream dam is at the same elevation as the top of the downstream dam.

After each significant rainfall, check dams should be inspected for sediment and debris accumulation. Sediment should be removed where it reaches one half the original dam height. Check for erosion at edges and repair promptly as required. After construction is complete, all stone and riprap should be removed if vegetative erosion controls will be used as a permanent erosion control measure. It will be important to know the expected erosion rates and runoff flow rate for the swale (vegetated depressions used to transport, filter, and remove sediments) (refer to Grassed Swales BMP SECP-10) in which this measure is to be installed. A licensed professional engineer should design this type of BMP.

Advantages of Check Dams	Disadvantages of Check Dams
• Are inexpensive and easy to install • May be used permanently if designed properly • Allow a high proportion of sediment in the runoff to settle out • Reduce velocity and provide aeration of the water • May be used where it is not possible to divert the flow or otherwise stabilize the channel	• May kill grass linings in channels if the water level remains high after it rains or if there is significant sedimentation • Useful only for drainage areas of 10 acres or less

EC-14 SURFACE ROUGHENING

Surface roughening is a temporary erosion control practice. The soil surface is roughened by the creation of horizontal grooves, depressions, or steps that run parallel to the contour of the land. Slopes that are not fine-graded and that are left in a roughened condition can also control erosion. Surface roughening reduces the speed of runoff, increases infiltration, and traps sediment. Surface roughening also helps establish vegetative cover by reducing runoff velocity and giving seed an opportunity to take hold and grow.

Surface roughening is appropriate for all slopes. To slow erosion, roughening should be done as soon as possible after the vegetation has been removed from the slope. Roughening can be used with both seeding and planting and temporary mulching to stabilize an area. For steeper slopes and slopes that will be left roughened for longer periods of time, a combination of surface roughening and vegetation is appropriate.

Different methods can be used to roughen the soil surface on slopes. They include stair-step grading, grooving (using disks, spring harrows, or teeth on a front-end loader), and tracking (driving a crawler tractor up and down a slope, leaving the cleat imprints parallel to the slope contour). The selection of an appropriate method depends upon the grade of the slope, mowing requirements after vegetative cover is established, whether the slope was formed by cutting or filling, and types of equipment available.

Cut slopes with a gradient steeper than 3:1 but less than 2:1 should be stair-step graded or groove cut. Stair-step grading works well with soils containing large amounts of small rock. Each step catches material discarded from above and provides a level site where vegetation can grow. Stairs should be wide enough to work with standard earth moving equipment. Grooving can be done by any implement that can be safely operated on the slope, including those described above. Grooves should not be less than 3 inches deep nor more than 15 inches apart. Fill slopes with a gradient steeper than 3:1 but less than 2:1 should be compacted every 9 inches of depth. The face of the slope should consist of loose, uncompacted fill 4 to 6 inches deep that can be left rough or can be grooved as described above, if necessary.

Any cut or filled slope that will be mowed should have a gradient less than 3:1. Such a slope can be roughened with shallow grooves parallel to the slope contour by using normal tilling. Grooves should be close together (less than 10 inches) and not less than 1 inch deep. Any gradient with a slope greater than 2:1 should be stair-stepped.

It is important to avoid excessive compacting of the soil surface, especially when tracking, because soil compaction inhibits vegetation growth and causes higher runoff speed. It is best to limit roughening with tracked machinery to sandy soils that do not compact easily and to avoid tracking on clay soils. Surface roughened areas should be seeded as quickly as possible. Regular inspections should be made of all surface roughened areas, especially after storms. If rills, (small watercourses that have steep sides and are usually only a few inches deep) appear, they should be filled, graded again, and reseeded immediately. Proper dust control procedures should be followed when surface roughening.

Advantages of Surface Roughening	Disadvantages of Surface Roughening
• Provides a degree of instant erosion protection for bare soil while vegetative cover is being established • Inexpensive and simple for short-term erosion control	• Limited effectiveness in anything more than a gentle rain • Only temporary; if roughening or vegetative cover is washed away in a heavy storm or the vegetation does not take hold, the surface will have to be re-roughened and new seed laid

EC-15 GRADIENT TERRACES

Gradient terraces are earthen embankments or ridge-and-channels constructed with suitable spacing and with an appropriate grade. They reduce erosion damage by capturing surface runoff and directing it to a stable outlet at a speed that minimizes erosion.

Gradient terraces are usually limited to use on land that has no vegetation with a water erosion problem, or where it is expected that water erosion will be a problem. Gradient terraces should not be constructed on slopes with sandy or rocky soils. They will be effective only where suitable runoff outlets are or will be made available.

Gradient terraces should be designed and installed according to a plan determined by an engineering survey and layout. It is important that gradient terraces are designed with adequate outlets, such as a grassed waterway, vegetated area, or tile outlet. Every outlet should direct the runoff from the terrace system to a point where the outflow will not cause erosion or other damage. Vegetative cover should be used in the outlet where possible. The design elevation of the water surface of the terrace should not be lower than the design elevation of the water surface in the outlet at their junction, when both are operating at design flow. ***Terraces should be inspected regularly at least once a year and after major storms.*** Proper dust control procedures should be followed while constructing these features (Refer to Dust Control BMP EC-1).

Advantages of Gradient Terraces	Disadvantages of Gradient Terraces
• Reduce runoff speed and increase the distance of overland runoff flow	• May significantly increase cut and fill cost and cause sloughing if excessive water infiltrates the soil
• Hold moisture better than do smooth slopes and minimize sediment loading of surface runoff	• Not practical for sandy, steep, or shallow soils

EC-16 VEGETATED FILTER STRIPS

Vegetated filter strips are gently sloping areas of natural vegetation or are graded and artificially planted areas used to provide infiltration, remove sediments and other pollutants, and reduce the flow and velocity of the storm water moving across the terrain. Vegetated filter strips provide permanent storm water control measures on a site.

Vegetative filter strips are suited for areas where the soils are well drained or moderately well drained and where the bedrock and the water table are well below the surface. Vegetated filter strips will not function well on steep slopes, in hilly areas, or in highly paved areas because of the high velocity of runoff. Sites with slopes of 15 percent or more may not be suitable for filtering storm water flows. However, they should still be vegetated. This practice can be put into place at any time, provided that climatic conditions allow for planting.

A filter strip must be approximately 20 feet wide, minimum, to function well. The length of the strip should be approximately 50 to 75 feet. Where slopes become steeper, the length of the strip must be increased. Forested strips are always preferred to vegetated strips, and existing vegetation is preferred to planted vegetation. In planning for vegetated strips, consider climatic conditions, since vegetation may not take hold in especially dry/cold regions.

Regular inspections are necessary to ensure the proper functioning of the filter strips. Removing sediments and replanting may be necessary on a regular basis. The entire area should be examined for damage due to equipment and vehicles. Vegetation should be dense. The portions of the strip where erosion may have created ponding of runoff should be inspected and this situation can be eliminated by grading.

Advantages of Vegetated Filter Strips	Disadvantages of Vegetated Filter Strips
• Provide low to moderate treatment of pollutants in storm water while providing a natural look to a site • Can provide habitat for wildlife • Can screen noise and views if trees or high shrubs are planted on the filter strips • Easily constructed and implemented • Inexpensive	• Not effective for high velocity flows (large paved areas or steep slopes) • Require significant land space • May have a short useful life due to clogging by sediments and oil and grease

Appendix E
Industrial Storm Water Notice of Intent