

# Section 1

## Introduction

Stormwater runoff is part of a natural hydrologic cycle. However, human activities particularly urbanization and agriculture, can alter natural drainage patterns and add pollutants to rivers, lakes, and streams as well as coastal bays and estuaries, and ultimately, the ocean. Urban runoff is a significant source of water pollution, causing possible declines in fisheries, restrictions on swimming, and limiting our ability to enjoy many of the other benefits that water resources provide (USEPA, 1992). Urban runoff in this context includes all flows discharged from urban land uses into stormwater conveyance systems and receiving waters and includes both dry weather non-stormwater sources (e.g., runoff from landscape irrigation, etc.) and wet weather stormwater runoff. In this handbook, urban runoff and stormwater runoff are used interchangeably.

For many years the effort to control the discharge of stormwater focused on quantity (e.g., drainage, flood control) and, to a limited extent, on quality of the stormwater (e.g., sediment and erosion control). However, in recent years awareness of the need to improve water quality has increased. With this awareness federal, state and local programs have been established to pursue the ultimate goal of reducing pollutants contained in stormwater discharges to our waterways. The emphasis of these programs is to promote the concept and the practice of preventing pollution at the source, before it can cause environmental problems (USEPA, 1992). However, where further controls are needed, treatment of polluted runoff may be required.

### 1.1 Handbook Purpose and Scope

The purpose of this handbook is to provide general guidance for selecting and implementing Best Management Practices (BMPs) to reduce the discharge of pollutants in runoff from industrial facilities and selected commercial businesses to waters of the state.

Federal and state programs require selected industries to obtain a National Pollutant Discharge Elimination System (NPDES) permit and to prepare a Stormwater Pollution Prevention Plan (SWPPP). This handbook provides guidance on the identification and selection of BMPs that are the cornerstone of an effective SWPPP. Due to the diversity in receiving waters, site conditions, and local requirements across California, it is not the intent of this handbook to dictate the actual selection of BMPs or guarantee compliance with NPDES permit requirements or local requirements, but rather to provide the framework for an informed selection of BMPs.

#### 1.1.1 Users of the Handbook

This handbook provides guidance suitable for use by individuals involved with controlling urban runoff pollution from industrial and commercial sites urban runoff pollution control. The target audience for this handbook includes: operators and owners of industrial and commercial facilities that are required to obtain an NPDES permit for stormwater discharges; and operators and owners of other industrial and commercial facilities that are not required to obtain an NPDES permit, but are committed to implementing BMPs for their sites or activities.

## 1.1.2 Organization of the Handbook

The handbook is organized to assist the user in selecting and implementing BMPs to reduce impacts of stormwater discharges on receiving waters. The handbook consists of the following sections:

### **Section 1 Introduction**

*This section provides a general review of the sources and impacts of urban stormwater discharges and provides an overview of the federal and state programs regulating stormwater discharges.*

### **Section 2 Stormwater Pollution Prevention Planning for Industrial and Commercial Facilities**

*This section describes the process that is followed in preparing an industrial Stormwater Pollution Prevention Plan (SWPPP).*

### **Section 3 Source Control BMPs**

*BMP fact sheets presented in this section address source control BMPs to be considered for industrial facilities. The section also addresses source control BMPs for commercial businesses and introduces business-specific guide sheets.*

### **Section 4 Treatment Control BMPs**

*BMP fact sheets presented in this section address maintenance and inspection requirements for treatment control BMPs that may be in use at industrial and commercial facilities.*

### **Section 5 Monitoring, Reporting, and Program Evaluation**

*This section outlines the monitoring program used to assess the implementation of the SWPPP. Record keeping and reporting requirements are also addressed.*

### **Section 6 Glossary and List of Acronyms**

*This section identifies terms and abbreviations used in the handbooks.*

### **Appendix A General Industrial Activities Stormwater Permit**

*This appendix includes a copy of the statewide General NPDES Permit for industrial facilities.*

### **Appendix B**

*This appendix identifies facilities with stormwater discharges associated with industrial activity.*

### **Appendix C Sample SWPPP**

*This appendix contains a sample SWPPP.*

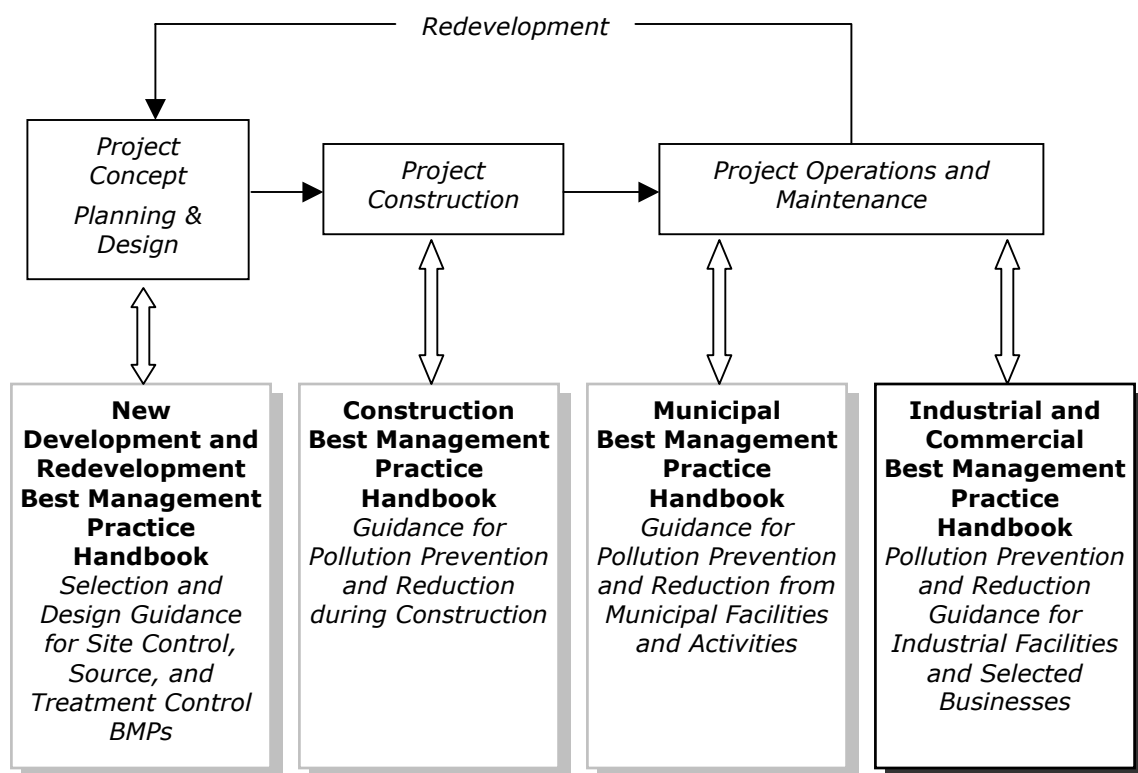
### **Appendix D Business Category Stormwater Pollution Control Guide Sheets**

*This appendix contains "guide sheets" for specific categories and subcategories of commercial businesses.*

### 1.1.3 Relationship to other Handbooks

This handbook is one of four handbooks developed by the California Stormwater Quality Association (CASQA) to address BMP selection. Collectively, the four handbooks address BMP selection throughout the life of a project – from planning and design – through construction – and into operation and maintenance. Individually, each handbook is geared to a specific target audience during each stage of a project.

#### *Project Lifecycle*



This handbook, the Industrial and Commercial Handbook, addresses selection and implementation of BMPs to eliminate or to reduce the discharge of pollutants associated with industrial and commercial activities.

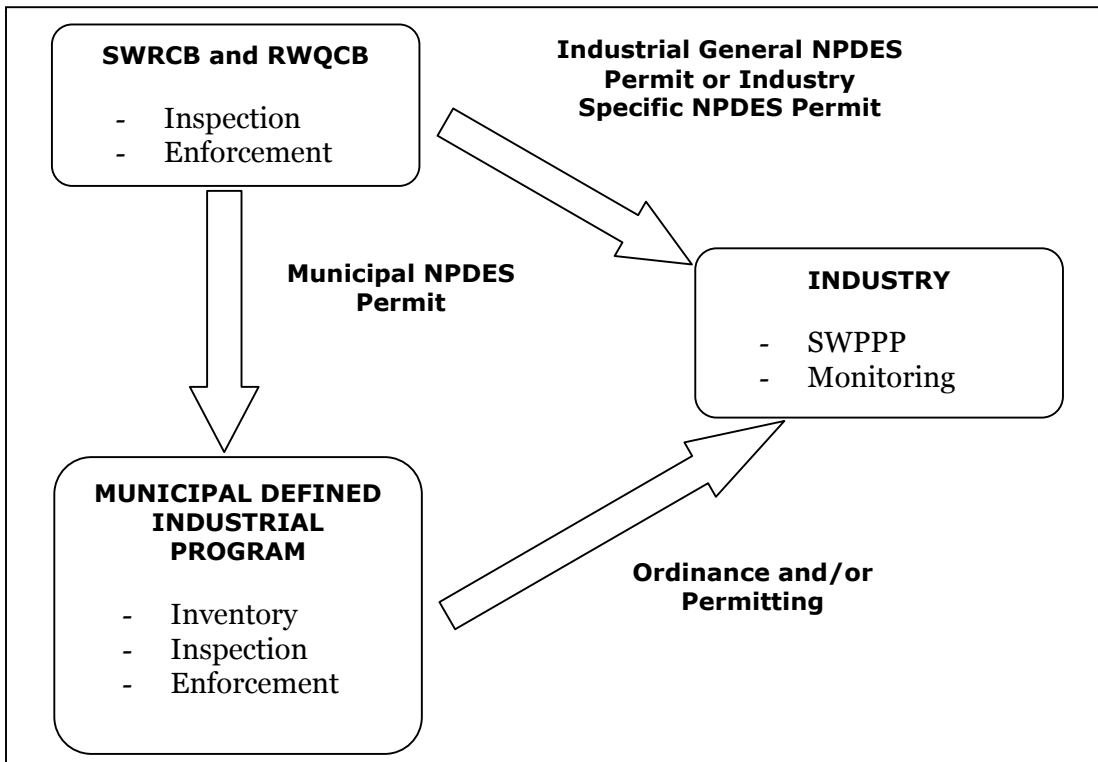
For a comprehensive understanding of stormwater pollution control throughout the life cycle of the project, it is recommended that the reader obtain and become familiar with all four handbooks. Typically, municipal stormwater program managers, regulators, environmental organizations, and stormwater quality professionals will have an interest in all four handbooks. For a focused understanding of stormwater pollution control during a single phase of the project life cycle, a reader may obtain and become familiar with the handbook associated with the appropriate phase. Typically, contractors, construction inspectors, industrial site operators, commercial site operators, some regulators, and some municipal staff may have an interest in a single handbook.

## 1.2 Stormwater Pollutants and Impacts on Water Quality

Stormwater runoff naturally contains numerous constituents; however, urbanization and urban activities (including industrial and commercial activities) typically increase constituent concentrations to levels that may impact water quality. Pollutants associated with stormwater include sediment, nutrients, bacteria and viruses, oil and grease, metals, organics, pesticides, and gross pollutants (floatables). In addition, nutrient-rich stormwater runoff is an attractive medium for vector production when it accumulates and stands for more than 72 hours. Stormwater pollutants are described in Table 1-1.

## 1.3 Regulatory Requirements

The Federal Clean Water Act, as amended in 1987, is the principal vehicle for the control of stormwater pollutants. Other programs that directly or indirectly deal with the control of stormwater pollutants include: Federal Coastal Zone Act Reauthorization Amendments of 1990; the Porter-Cologne Act; and the State Hazardous Waste Source Reduction and Management Review Act. The implementation of stormwater programs must take place at a number of levels: federal, state, local, and industrial. The industrial owner and operator must understand the relationship between the agencies, their jurisdictions, and the requirements of each as shown in Figure 1-1.



**Figure 1-1**  
**California Regulatory Framework Associated with Industrial Stormwater**

**Table 1-1 Pollutant Impacts on Water Quality**

<b>Sediment</b>	Sediment is a common component of stormwaters, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.
<b>Nutrients</b>	Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.
<b>Bacteria and viruses</b>	Bacteria and viruses are common contaminants of stormwater. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.
<b>Oil and Grease</b>	Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants, and waste oil disposal.
<b>Metals</b>	Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies.
<b>Organics</b>	Organics may be found in stormwater in low concentrations. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. In addition, deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways.
<b>Pesticides</b>	Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.
<b>Gross Pollutants</b>	Gross Pollutants (trash, debris, and floatables) may include heavy metals, pesticides, and bacteria in stormwater. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic “eye sore” in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes, and estuaries sometimes causing fish kills.
<b>Vector Production</b>	Vector production (e.g., mosquitoes, flies, and rodents) is frequently associated with sheltered habitats and standing water. Unless designed and maintained properly, standing water may occur in treatment control BMPs for 72 hours or more, thus providing a source for vector habitat and reproduction (Metzger, 2002).

The regulatory relationship presented in Figure 1-1 applies to industrial facilities. For commercial businesses, oversight is provided by local jurisdictions and typically reflects a less formally regulated approach. Further discussion regarding this approach is presented in Section 2.

In the following sections, various programs are discussed in relationship to the control of pollutants in industrial stormwater. The discussion, however, is not conclusive and the user is advised to contact local regulatory officials for further information.

### **1.3.1 Federal NPDES Program**

In 1972, the Clean Water Act (CWA) was amended to provide that the discharge of pollutants to waters of the United States from any point source is effectively prohibited, unless the discharge is in compliance with a NPDES permit. The 1987 amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial stormwater discharges under the NPDES program.

The stormwater regulations associated with the CWA require specific categories of industrial facilities which discharge industrial stormwater, to obtain an NPDES permit. Those facilities which discharge industrial stormwater either directly to surface waters (e.g., rivers, lakes, etc.) or indirectly, through municipal separate storm drains, must be covered by a permit. This includes the discharge of “sheet flow” through a drainage system or other conveyance.

Federal law requires that industrial stormwater discharges meet all provisions of Section 301 and 402 of the CWA in order to control pollutant discharges. These provisions require the use of best available technology (BAT) economically available and best conventional pollution control technology (BCT) to reduce pollutants and any more stringent controls necessary to meet water quality standards.

### **1.3.2 State NPDES Program**

In California, the State Water Resources Control Board (SWRCB) through the nine Regional Water Quality Control Boards (RWQCB) administers the NPDES stormwater permitting program. For industrial facilities and construction activities, the SWRCB elected to issue statewide general permits that apply to all stormwater discharges requiring an NPDES permit. A copy of the General Permit for industrial facilities is provided in Appendix A.

In addition to the stormwater industrial General Permit, the RWQCB may, at their discretion, issue an industry-specific General Permit. For this reason, the readers are advised to contact their local RWQCB. Industries may also request an individual NPDES permit instead of the general permit. The process, however, is expensive and time consuming and the RWQCB may eventually choose not to issue an individual permit. RWQCBs are only expected to consider individual permits where an individual facility has unique characteristics or poses a significant threat to water quality.

The General Permit generally requires facility operators to:

1. Eliminate unauthorized non-stormwater discharges.

2. Develop and implement a stormwater pollution prevention plan (SWPPP).
3. Perform monitoring of stormwater discharges and authorized non-stormwater discharges.

### 1.3.3 Municipal NPDES Program

Municipalities are also required to develop programs to monitor and control pollutants in stormwater discharges from their municipal systems. Such control may include regulating stormwater discharges from industrial and commercial facilities that the municipality determines are contributing pollutants to the municipal storm drain system. Thus, it is important for the industrial and commercial facility owners and operators located within such municipalities to realize that there may be municipal requirements on stormwater discharges from their facilities. It is imperative that owners and operators check with the local authority responsible for stormwater management. Note that in most cases, compliance with the General Permit will effectuate compliance with local requirements. More often than not, local regulations represent a narrowing of the range of references under the General Permit to reflect local conditions. Many municipal NPDES permits require the municipality to develop and implement a program to address discharges of urban runoff associated with certain commercial facilities. These programs vary widely throughout the state.

## 1.4 Definitions

Many of the most common terms related to stormwater quality control are defined in the Glossary (see Section 6). Throughout the handbook the user will find references to the following terms:

***NPDES General Permit for Stormwater Discharges.*** NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the national program for administering and regulating Sections 307, 318, 402 and 405 of the Clean Water Act (CWA). In California, the State Water Resources Control Board (SWRCB) has issued a General Permit for stormwater discharges associated with industrial activities (see Appendix A).

***Notice of Intent (NOI)*** is a formal notice to the SWRCB submitted by the owner/operators of existing industrial facilities. The NOI provides information on the permittee, location of discharge, type of discharge and certifies that the permittee will comply with conditions of the Industrial General Permit. The NOI is not a permit application and does not require approval.

***Stormwater Pollution Prevention Plan (SWPPP)*** is a written plan that documents the series of phases and activities that, first, characterizes your site, and then, prompts you to select and carry out actions which reduce pollutants in stormwater discharges.

***Stormwater Pollution Control Plan (SWPCP)*** is a less formal plan than the SWPPP that addresses the implementation of BMPs at facilities and businesses not covered by a General Permit but that have the potential to discharge pollutants.

***Best Management Practices (BMP)*** is defined as any program, technology, process, siting criteria, operating method, measure, or device, which controls, prevents, removes, or reduces pollution.

**Source Control BMPs** are operational practices that prevent pollution by reducing potential pollutants at the source. They typically do not require maintenance or construction.

**Treatment Control BMPs** are methods of treatment to remove pollutants from stormwater.

## 1.5 References and Resources

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF). 1999. Standard Methods for the Examination of Water and Wastewater 20<sup>th</sup> Edition.

General Industrial Storm Water Permit, State Water Resources Control Board (SWRCB), 1997.

Guidance Manual for Developing a Storm Water Pollution Plan for Industrial Facilities. Washington State Department of Ecology. Revised April, 1998, Publication No. WQ-R-93-015. On-line: <http://www.ecy.wa.gov/pubs/93015.pdf>

Metzger, M.E., D.F. Messer, C.L. Beitia, C.M. Myers, and V.L. Kramer. 2002. The dark side of storm Water runoff management: disease vectors associated with structural BMPs. Storm Water 3(2): 24-39.

Storm Water Management for Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices. United States Environmental Protection Agency. 1992. On-line: <http://www.ntis.gov>

Urban Runoff Quality Management. Water Environment Federation/American Society of Civil Engineers. 1998. On-line: <http://www.wef.org>