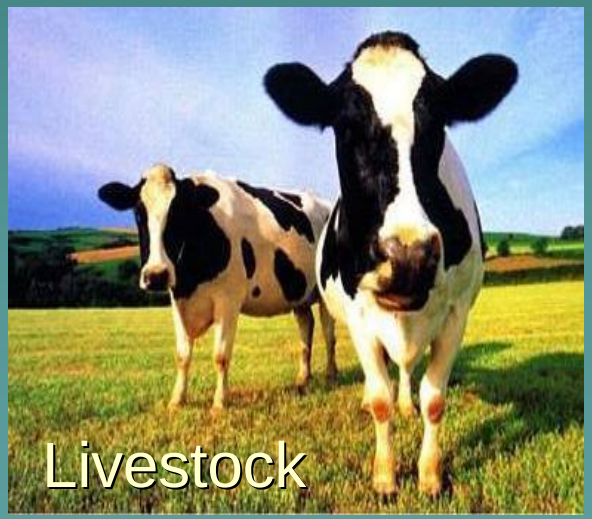
Construction Storm Water Training for Management 2-Hour Module

General Overview of Storm Water Requirements

Introduction

- **Course Highlights**
  - General Overview of Storm Water Requirements
  - Consequences of Non-Compliance
  - Causes of Erosion
  - Categories of BMPs to Prevent Erosion and Water Pollution
  - Dewatering Requirements
  - Sampling and Analysis

Why is Clean Water Important



All of these life forms depend on clean water for their existence

Impacts of Erosion

- Sediment is the number one pollutant of the nations rivers and lakes
- "An estimated 80 Millions Tons of solids are discharged annually from construction sites into receiving waters"

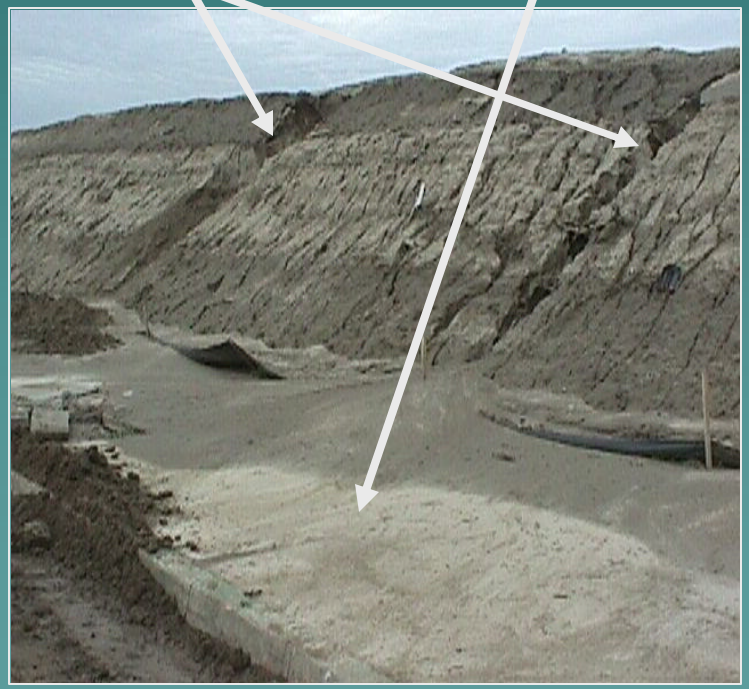
  According to the EPA

Impacts of Erosion

- "On a unit basis, construction sites export sediment at 20 to 1,000 times the rates of other land uses." *According to the EPA*

Construction Site Pollutants

Erosion and Sedimentation



Construction Wastes

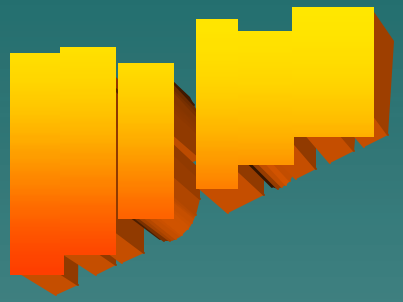
Construction Site Pollutants

- One gallon of oil has the potential to contaminate up to one million gallons of water

StormWater/CleanWater protection program

Regulations/Permits

- 1972 Federal Clean Water Act (CWA)
  - Amend to Prohibit Any Discharge of Pollutants from a Point Source
- 1987 Amendments to the CWA
  - Added Section 402(p) Establishing the Framework for Regulations Regarding Municipal and Industrial Discharges
- 1990 EPA Published Final Regulations
  - Established Permit Requirements for Storm Water Discharges Associated with Industrial (Including Construction) Activities
- 1992 California's General Permit was Adopted
  - Established Requirements for Discharges Associated with Construction Activities
  - Revised in 1999; Modified in 2001 to Include Monitoring – 02 Permit
  - Modified in 2002; Effective March 10, 2003 Construction Activity with Soil Disturbance = 1 acre
- 1999 Caltrans NPDES Permit was issued – 03 Permit and Storm Water Management Plan (SWMP)



General Construction Permit Objectives

- To restore or protect the beneficial uses of our water resources
- Applies to projects that disturb one acre or more
- Storm Water Pollution Prevention Plan (SWPPP)
- Monitoring Program and Reporting Requirements (M&RP)
- SWPPP and M&RP must be implemented concurrent with the commencement of construction
- **Note: Water Pollution Control Programs are Required for Projects that Disturb < 1 Acre**

SWPPP/WPCP Differences

SWPPP

- = 1 acre
- Comply with Federal and State Regulations
- Comply with SWRCB's NPDES Construction General Permit
- NOC/WDID Required
- Comprehensive Plan Including:
  - Certifications
  - Project Description
  - Roles/Responsibilities
  - Location and Site Maps
  - Run-on and Runoff Calculations
  - Potential Pollutant Sources
  - Temporary and Post-Construction BMPs
  - Detailed Inspection/Maintenance Requirements
  - Training
  - Sampling and Analysis Plan

WPCP

- <1 acre
- Caltrans-required
- NOC/WDID Not Required
- Abbreviated Plan Including:
  - Project Description
  - Roles/Responsibilities
  - Location and Site Maps
  - Potential Pollutant Sources
  - Temporary BMPs
  - Training

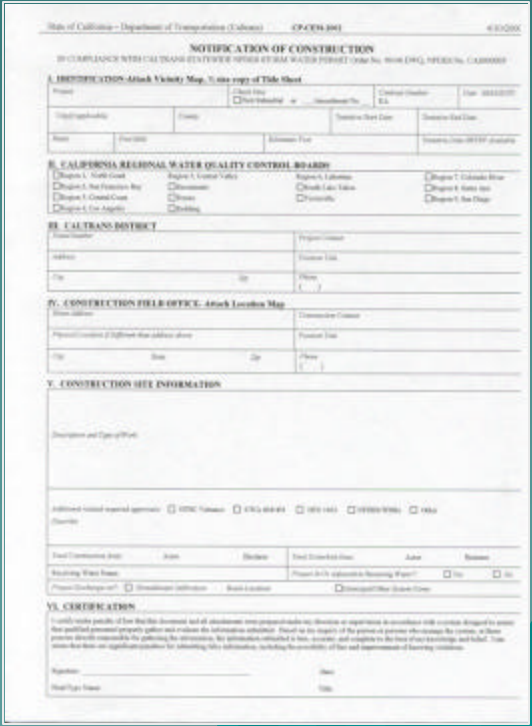
Who Enforces These Laws/Permits?

- EPA
- SWRCB / RWQCB
- Other Agencies

- **Private Citizens**
  - NRDC
  - Baykeepers
  - Other Watchdog Groups

Notification of Construction (NOC)

- Submitted to RWQCB at least 30 days prior to construction
- Equivalent to Notice Of Intent (NOI)
- Included information:
  - Tentative start date and duration
  - Estimate of affected acres and vicinity map
  - RE in charge and telephone number
  - Field office information and location map


NOTIFICATION OF CONSTRUCTION

I. IDENTIFICATION-Attach Vicinity Map. Use copy of Title Sheet

II. CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

III. CALTRANS DISTRICT

IV. CONSTRUCTION FIELD OFFICE. Attach Location Map

V. CONSTRUCTION SITE INFORMATION

VI. CERTIFICATION

SWPPP Requirements

- SWPPP should be a dynamic, defensible, living document
- Identify pollutant sources or potential pollutant sources that may impact storm water discharges
- Implement BMPs to reduce pollutants in storm water discharges from the construction site.
- Monitor the site and perform inspections of control practices implemented as part of the SWPPP
- Document the inspections and the results, as well as corrective action which is to be taken as a result
- Evaluate and revise controls, and amend the SWPPP

SWPPP Outline

I. Title Page
II. Certification Page
III. <u>Amendments</u>
IV. Table of Contents
V. Introduction
VI. Source Identification
    I. Topography Map
    II. Site Map

SWPPP Outline (cont.)

VII. Narrative Descriptions

I. Site Estimates and Descriptions of Onsite Soil

II. Pollutants Likely to be Present in Storm Water Discharges

III. Toxic Materials

IV. Erosion and Sediment Control Practices

V. Non-Storm Water Management

VI. Maintenance, Inspection and Repair of Structural Controls

VII. Spill Prevention and Control

VIII. Post-Construction Storm Water Management (Permanent)

IX. Personnel Training

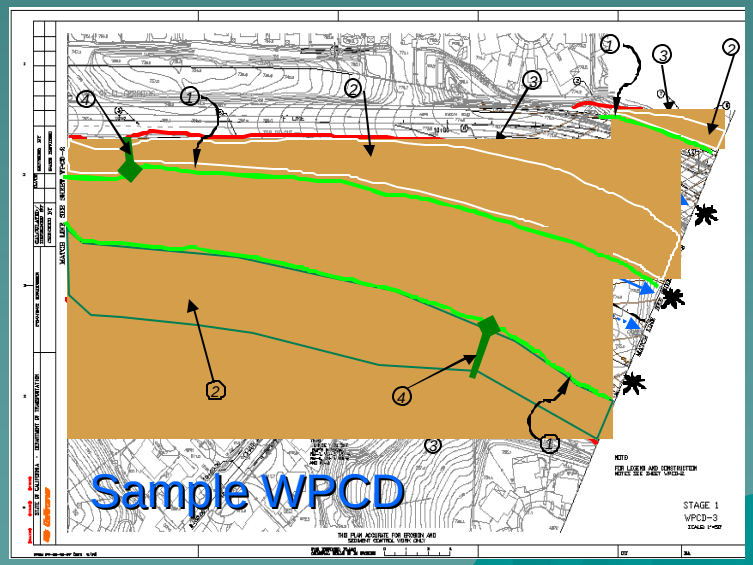
X. Lists of Contractors/Sub-Contractors

XI. Other Plans

XII. Monitoring and Documentation

Example
Water Pollution Control Drawing

1. Areas of soil disturbance
2. Surface water locations
3. Areas of existing vegetation to be preserved
4. Drainage patterns and slopes as they will appear after major grading is completed
5. Areas and methods of storage for soils, materials and wastes
6. Vehicle and equipment storage and service areas
7. Existing and planned paved areas and buildings
8. Location and type of post-construction control practices



Inspection Requirements

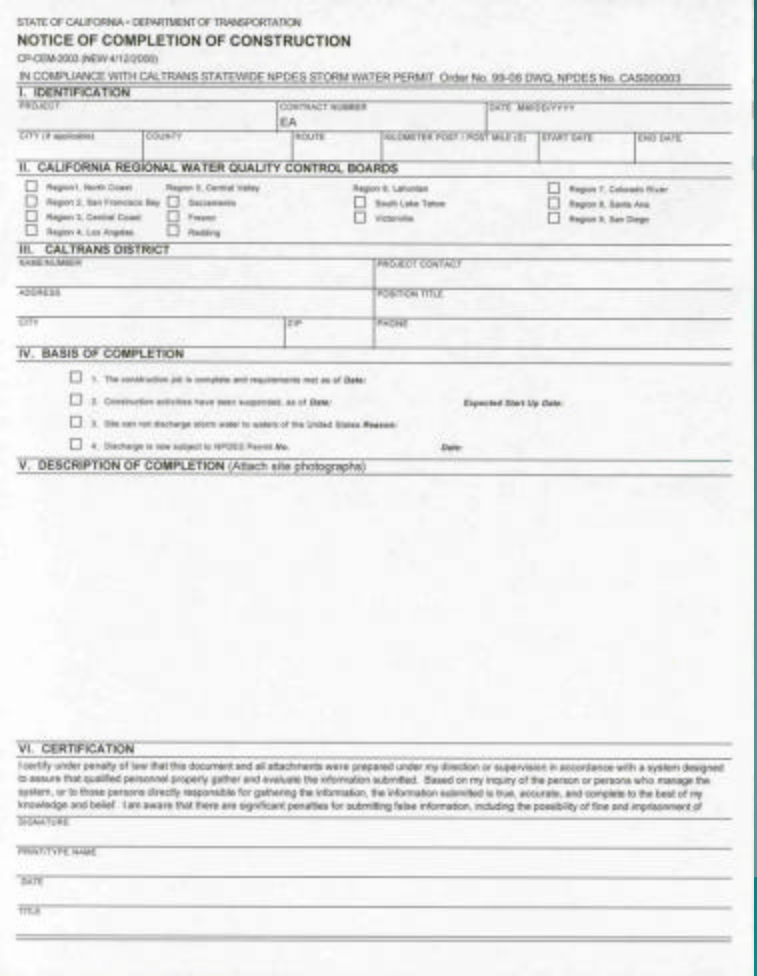
- Rainy Season Inspections
  - At least weekly
  - Prior to a forecast storm
  - After a rain event that causes runoff from the construction site and
  - At 24-hour intervals during extended rain events and
  - As specified in project Special Provisions

- Non-Rainy Season Inspections
  - At least every 2 weeks
  - Prior to a forecast storm
  - After a rain event that causes runoff from the construction site and
  - At 24-hour intervals during extended rain events and
  - As specified in project Special Provisions or District requirements

- Implementation Requirements
  - Are the Recommended Combination of BMPs being implemented per Table 2-2, and 2-3
  - Are the appropriate Non-Storm Water Management BMPs being used
  - Are the appropriate Waste Management and Materials Pollution Control BMPs being used

NCC Requirements

- The Notice of Completion of Construction (NCC) equivalent to the NOT
- Meet Final Stabilization Requirements
  - Special Provision requirements
  - NPDES permit requirements
- Insert into SWPPP Attachment P at end of project
- Only required for SWPPP projects



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

NOTICE OF COMPLETION OF CONSTRUCTION

CP-CEM-3003 (NEW 4/12/2000)

IN COMPLIANCE WITH CALTRANS STATEWIDE NPDES STORM WATER PERMIT, Order No. 99-06 DWQ, NPDES No. CAS000003

I. IDENTIFICATION

PROJECT | CONTRACT NUMBER: EA | DATE: MM/DD/YYYY

CITY (if applicable) | COUNTY | ROUTE | KILOMETER POST / POST MILE (E) | START DATE | END DATE

II. CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

☐ Region 1, North Coast
☐ Region 2, San Francisco Bay
☐ Region 3, Central Coast
☐ Region 4, Los Angeles
☐ Region 5, Central Valley
☐ Sacramento
☐ Fresno
☐ Redding
☐ Region 6, Lahontan
☐ South Lake Tahoe
☐ Victorville
☐ Region 7, Colorado River
☐ Region 8, Santa Ana
☐ Region 9, San Diego

III. CALTRANS DISTRICT

NAME/NUMBER | PROJECT CONTACT

ADDRESS | POSITION TITLE

CITY | ZIP | PHONE

IV. BASIS OF COMPLETION

☐ 1. The construction job is complete and requirements met as of *Date:*

☐ 2. Construction activities have been suspended, as of *Date:* *Expected Start Up Date:*

☐ 3. Site can not discharge storm water to waters of the United States *Reason:*

☐ 4. Discharge is now subject to NPDES Permit *No.* *Date:*

V. DESCRIPTION OF COMPLETION (Attach site photographs)

VI. CERTIFICATION

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

SIGNATURE

PRINT/TYPE NAME

DATE

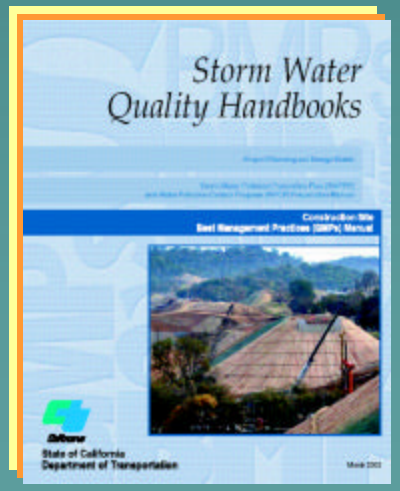
TITLE

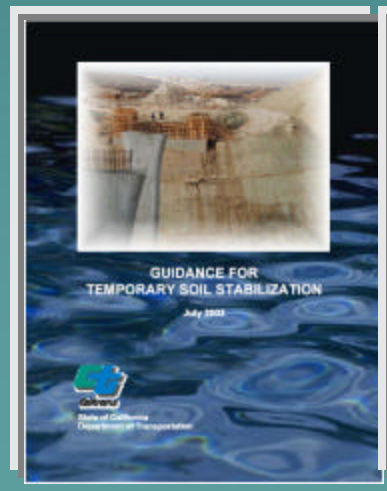
Available online at http://www.dot.ca.gov/hq/construc/cpb/CEM2003.pdf

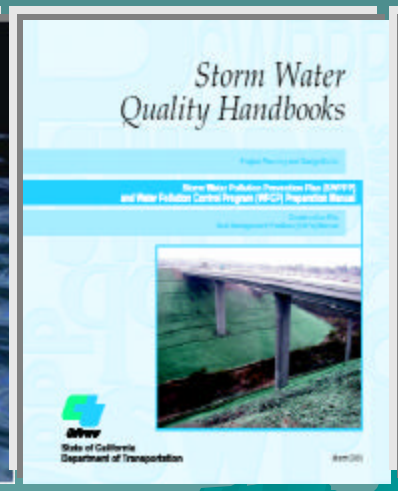
Caltrans Guidance Manuals

- Caltrans Storm Water Quality Handbooks and Manuals
  - Project Planning and Design Guide
  - SWPPP/WPCP Preparation Manual
  - Construction Site BMPs Manual
  - Guidance for Temporary Soil Stabilization
  - Field Guide to Construction Dewatering

    - **Get Manuals online at** http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm **or hard copies are available from Caltrans Publications**



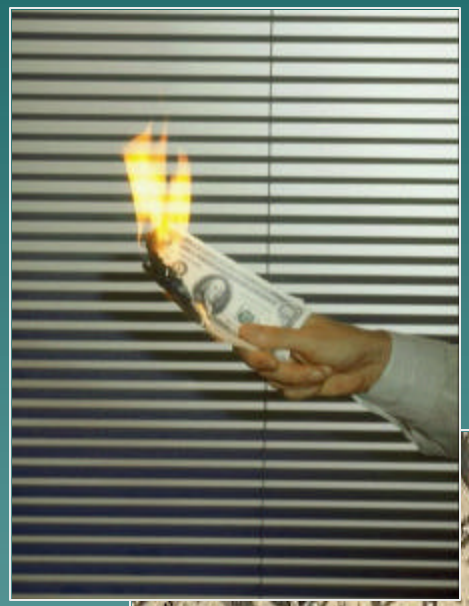




Consequences of Non-Compliance

Summary of Fines and Penalties

- Federal – fines of up to **$32,500 PER DAY** can be imposed for **UNINTENTIONAL** violation, up to **$55,000** per day for an **INTENTIONAL** violation, in addition to criminal liability and responsibility for cleanup costs
- State – Penalties of up to an additional **$10,000 per day plus $10/gallon** of sediment-laden or polluted water discharged for each violation
- Failure to Submit a Notice of Intent for Coverage under the appropriate storm water NPDES permit. **Minimum $5,000 plus recovery of staff costs**
- Failure to submit an annual report of construction certification when required by the Regional Board. **Minimum $1,000 plus recovery of staff costs**
- Violation of Permit Terms or Basin Plan Prohibitions **Minimum amount is the economic savings of the violation**



Current Regulatory Atmosphere

- **"The Learning Curve is Over"**

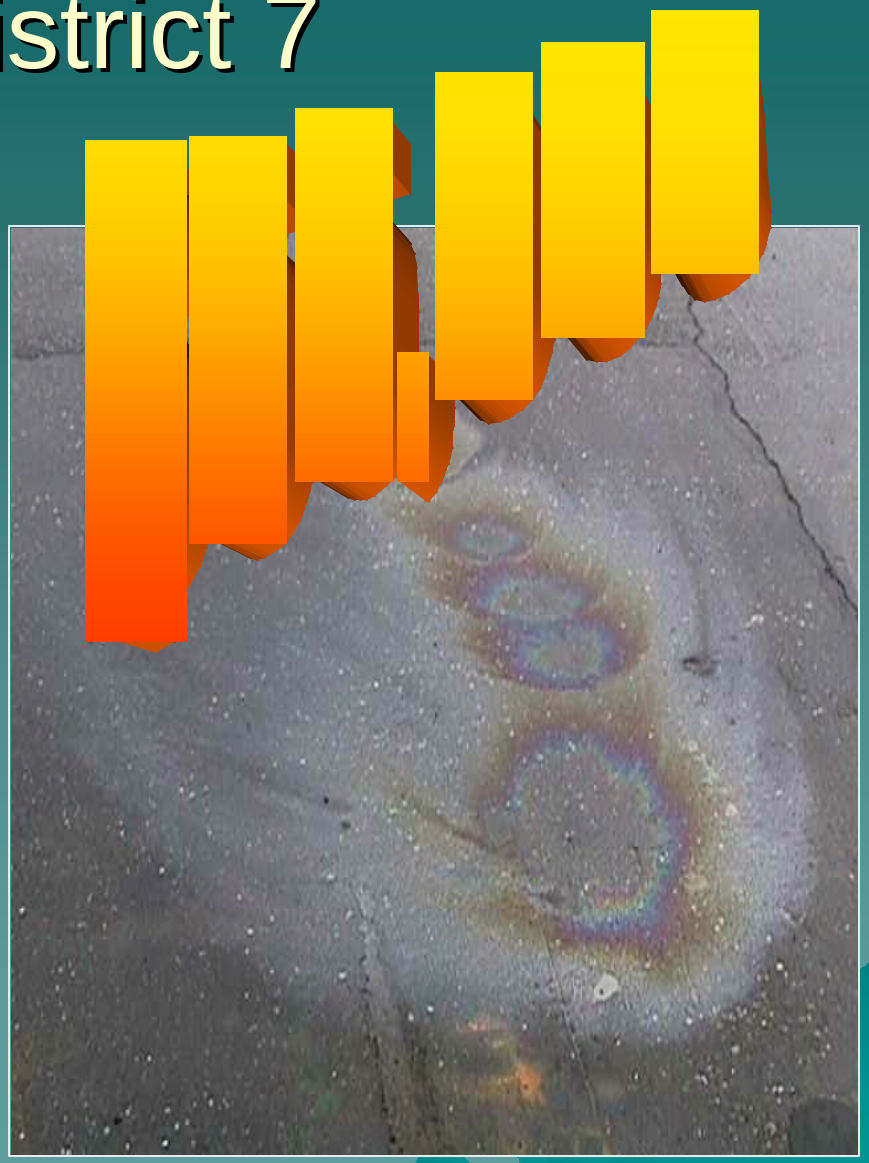
Violation and Order for Compliance 1998 District 12

USEPA Region 9 Cited Contractor and Agency as Follows:

- "...excessive amounts of sediment to the storm drain..."

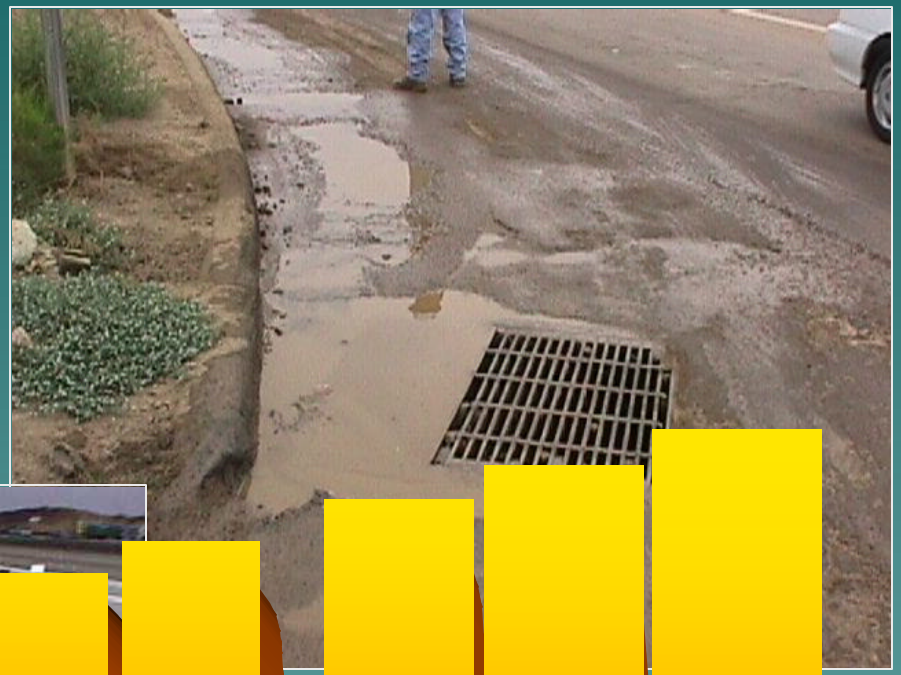
Violation and Order for Compliance 1998 District 7

- "...excessive amounts of sediment to the storm drain..."
- "...discharge of false work and miscellaneous construction debris to ...Creek and ... River."
- " A sheen of fuel floating on the storm water ... 40 feet from a drain inlet."



Violation and Order for Compliance 1998 District 11

- "..sloppy runoff-control practices at Caltrans construction sites, drainage facilities and maintenance yards"
  San Diego Baykeeper



Causes of Erosion

Definition of Erosion

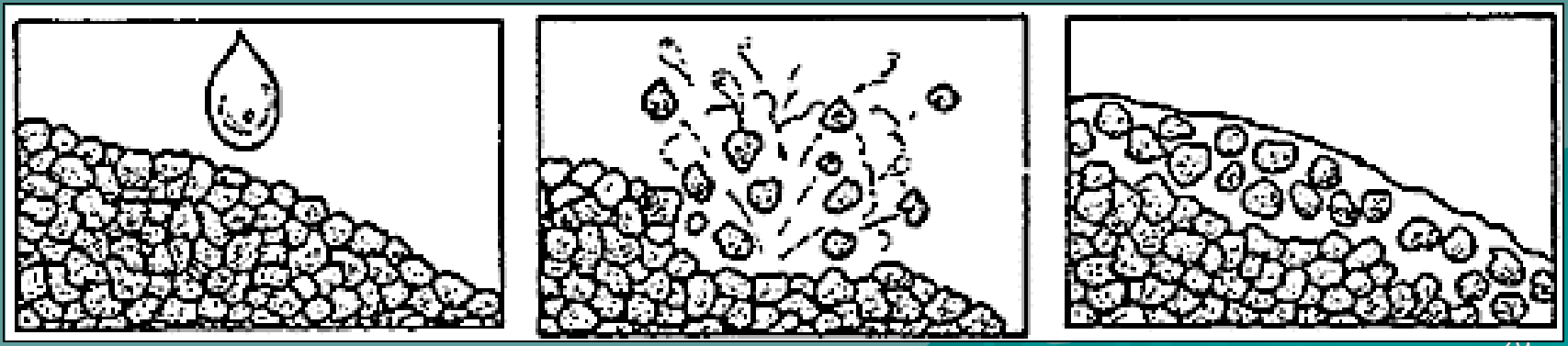
- Soil erosion is the process by which soil particles become detached by water, wind, or gravity and are transported from their original location.

Types of Erosion

- Splash Erosion
- Sheet Erosion (Overland Flow)
- Rill Erosion
- Gully Erosion
- Channel Erosion

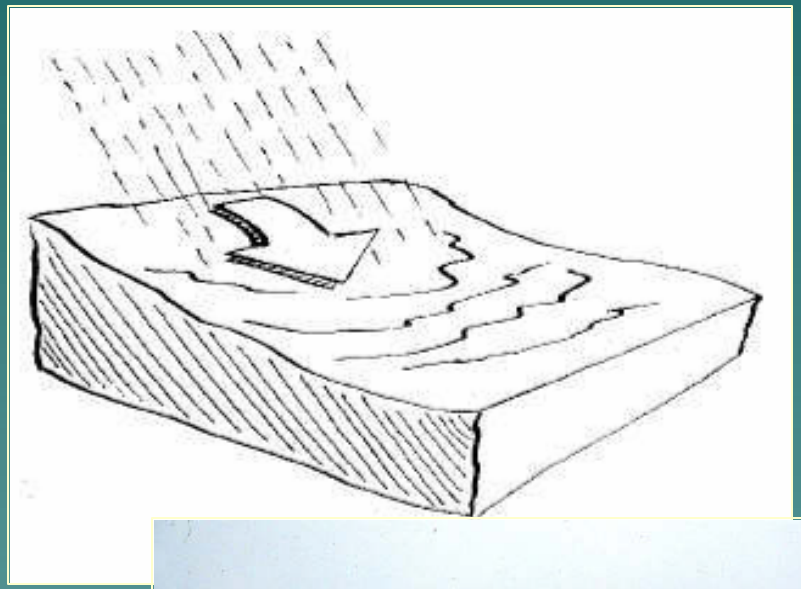
Splash Erosion

- Rain drops striking bare soil directly at 20 mph
  - Detaches soil particles
  - Particles can then be transported by the action of water and/or wind



Sheet Erosion (Overland Flow)

- The removal of a uniform thin layer of soil by raindrop splash or water run-off
- Surface film of water 2-3 mm deep
- This process may occur unnoticed on exposed soil even though raindrops are eroding large quantities of soil
- This process eventually becomes more dramatic via the formation of rills and gullies



Rill Erosion

- Shallow surface flows that become condensed
- Increased velocity and turbulence.
- Well-defined tiny channels
- The rate of rill erosion can be approximately 100X greater than sheet erosion

Gully Erosion

- Accumulating runoff becomes concentrated and forms small rills throughout the soil
- Several rills may form throughout a slope and eventually may join together to form Gullies
- The rate of gully erosion can be approximately 100X greater than rill erosion

Channel Erosion

- Results from increased volume, velocity and or duration of flow, and concentration of flow - primarily from increased impervious surfaces.
- Channel erosion occurs in areas where tributaries, storm drains and or culverts flow into unprotected channels

Turbidity/Sedimentation

- Turbidity is solid particulate matter, that is in suspension and is being transported

- Sedimentation is the deposition of the eroded material

Categories of BMPs to Prevent Erosion and Water Pollution

BMP Installation

BMP Categories

- Temporary Soil Stabilization
- Temporary Sediment Control
- Wind Erosion Control
- Tracking Control
- Non-Storm Water Management
- Waste Management and Materials Pollution Control

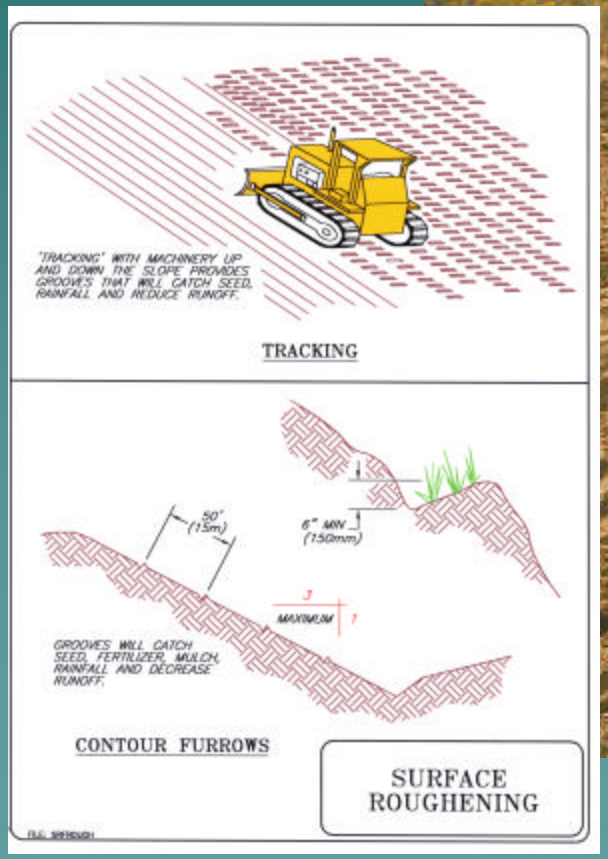
Temporary Soil Stabilization

ID	BMP Name
SS-1	Scheduling
SS-2	Preservation of Existing Vegetation
SS-3	Hydraulic Mulch
SS-4	Hydroseeding
SS-5	Soil Binders
SS-6	Straw Mulch
SS-7	Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats
SS-8	Wood Mulching
SS-9	Earth Dikes/Drainage Swales & Lined Ditches
SS-10	Outlet Protection/Velocity Dissipation Devices
SS-11	Slope Drains
SS-12	Streambank Stabilization

Soil Preparation

- Proper preparation of the soil is necessary prior to the application of soil stabilization materials

Soil Preparation



Soil Stabilization

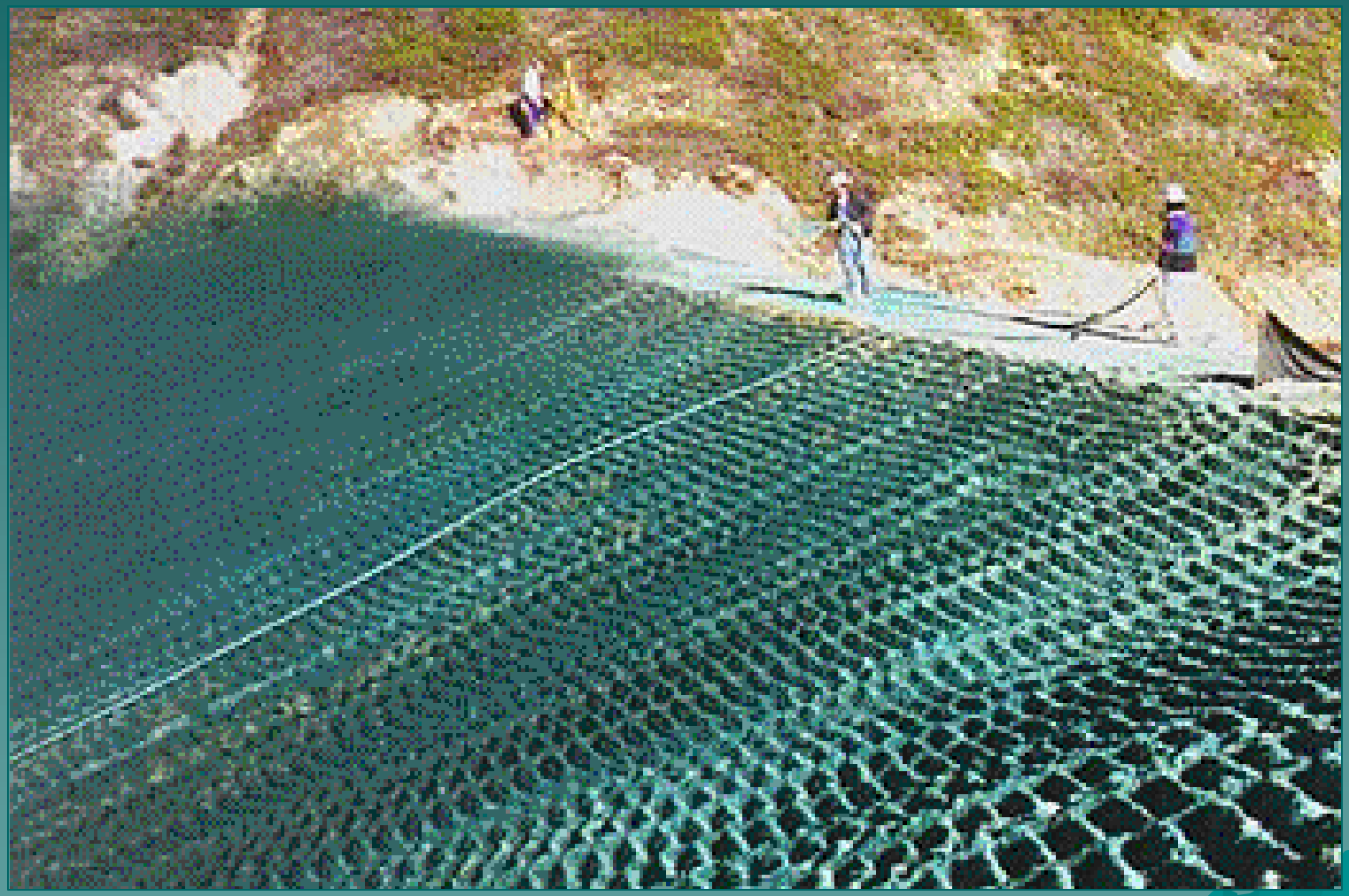
Unstabilized slope vs. Stabilized slope

Inadequate Soil Stabilization

Lack of soil stabilization

Inadequate Soil Stabilization

Adequate Soil Stabilization



Proper of soil preparation and stabilization

Temporary Sediment Control

ID	BMP Name
SC-1	Silt Fence
SC-2	Sediment / Desilting Basin
SC-3	Sediment Trap
SC-4	Check Dam
SC-5	Fiber Rolls
SC-6	Gravel Bag Berm
SC-7	Street Sweeping and Vacuuming
SC-8	Sandbag Barrier
SC-9	Straw Bale Barrier
SC-10	Storm Drain Inlet Protection

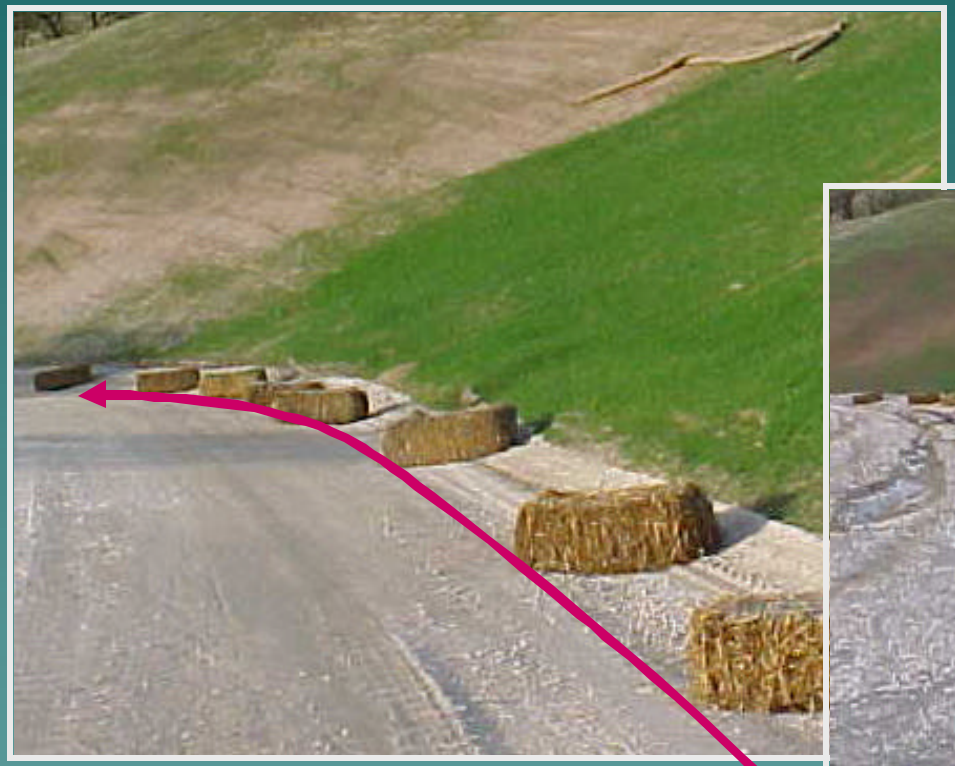
Inadequate Sediment Control

Improper silt fence application can cause erosion

Incorrect - up and down slopes

Incorrect application – across concentrated flow

Inadequate Sediment Control



Improperly installed hay bales

Adequate Sediment Control

Proper silt fence and fiber roll installation

Adequate Sediment Control

Proper drain inlet protection

Effective Combination of Erosion and Sediment Control

Effective Combination of Erosion and Sediment Control

SC-1 Silt Fence, SS-6 Straw Mulch

Correct installation of silt fence on a slope stabilized with Straw Mulch

Straw Mulch application

Effective Combination of Erosion and Sediment Control

SC-1 Silt Fence, SC-5 Fiber Rolls, SS-3 Hydraulic Mulch

Effective Combination of Erosion and Sediment Control

SC-1 Silt Fence,
SS-7 Erosion Control Blanket

Effective Combination of Erosion and Sediment Control

SC-1 Silt Fence, SS-6 Straw Mulch

Tracking Control

ID	BMP Name
TC-1	Stabilized Construction Entrance/Exit
TC-2	Stabilized Construction Roadway
TC-3	Entrance/Outlet Tire Wash

Inadequate Tracking Control

Lack of stabilized entrance/exit

Adequate Tracking Control

Large diameter rock used as a stabilized entrance/exit.

Inadequate Tracking Control

Stabilized entrance/exit on right gets little use vs. unstabilized area on left

Adequate Tracking Control

Possible solution: Block other entrance/exit

Wind Erosion Control

ID	BMP Name
WE-1	Wind Erosion Control

Lack of wind erosion controls

Adequate dust control

Non-Storm Water Management BMPs

ID	BMP Name
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Grinding Operations
NS-4	Temporary Stream Crossing
NS-5	Clear Water Diversion
NS-6	Illicit Connection / Illegal Discharge Detection and Reporting
NS-7	Potable Water / Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-11	Pile Driving Operations
NS-12	Concrete Curing
NS-13	Material and Equipment Use over Water
NS-14	Concrete Finishing
NS-15	Structure Demolition/Removal Over or Adjacent to Water

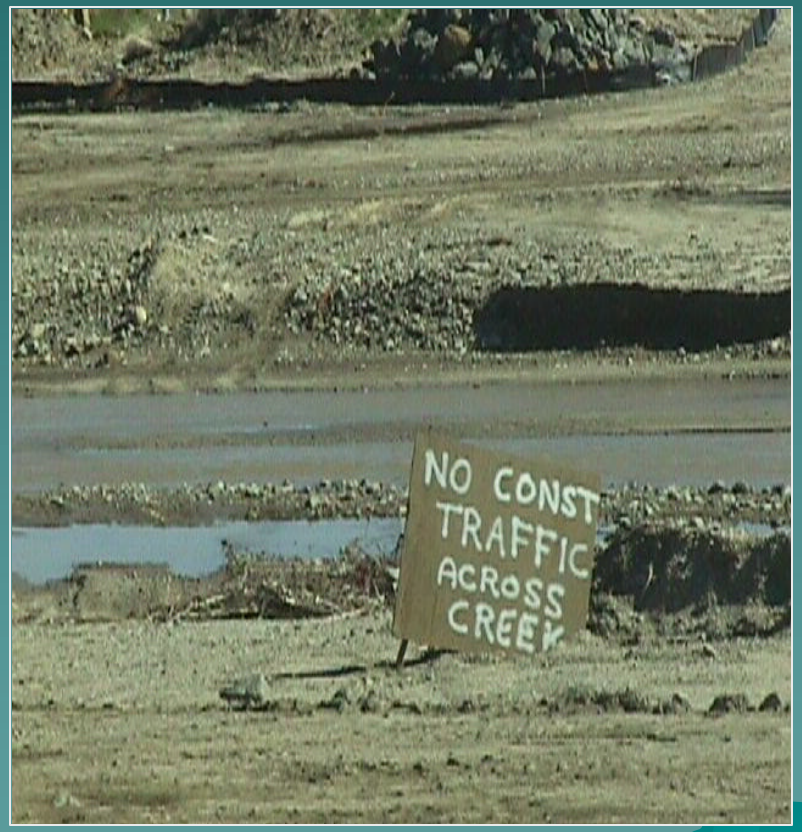
Adequate and Inadequate Non-Storm Water BMP Implementation

Mobile fueling operations require BMPs

Inadequate Non-Storm Water BMP Implementation

Prevent non-storm water discharges

Adequate and Inadequate Non-Storm Water BMP Implementation



Properly manage temporary stream crossings

Adequate Non-Storm Water BMP Implementation

Clear water diversion prevents off-site runoff from contacting construction site pollutants

Waste Management and Material Pollution Control BMPs

ID	BMP Name
WM-1	Material Delivery and Storage
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-6	Hazardous Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Waste Management
WM-9	Sanitary / Septic Waste Management
WM-10	Liquid Waste Management

Adequate and Inadequate Waste Management and Materials Pollution BMP Implementation

Well maintained temporary containment facility

Substances that require storage in a containment facility

Adequate Waste Management and Materials Pollution BMP Implementation

Proper spill control

Inadequate Waste Management and Materials Pollution BMP Implementation

Solid waste needs to be managed and properly disposed

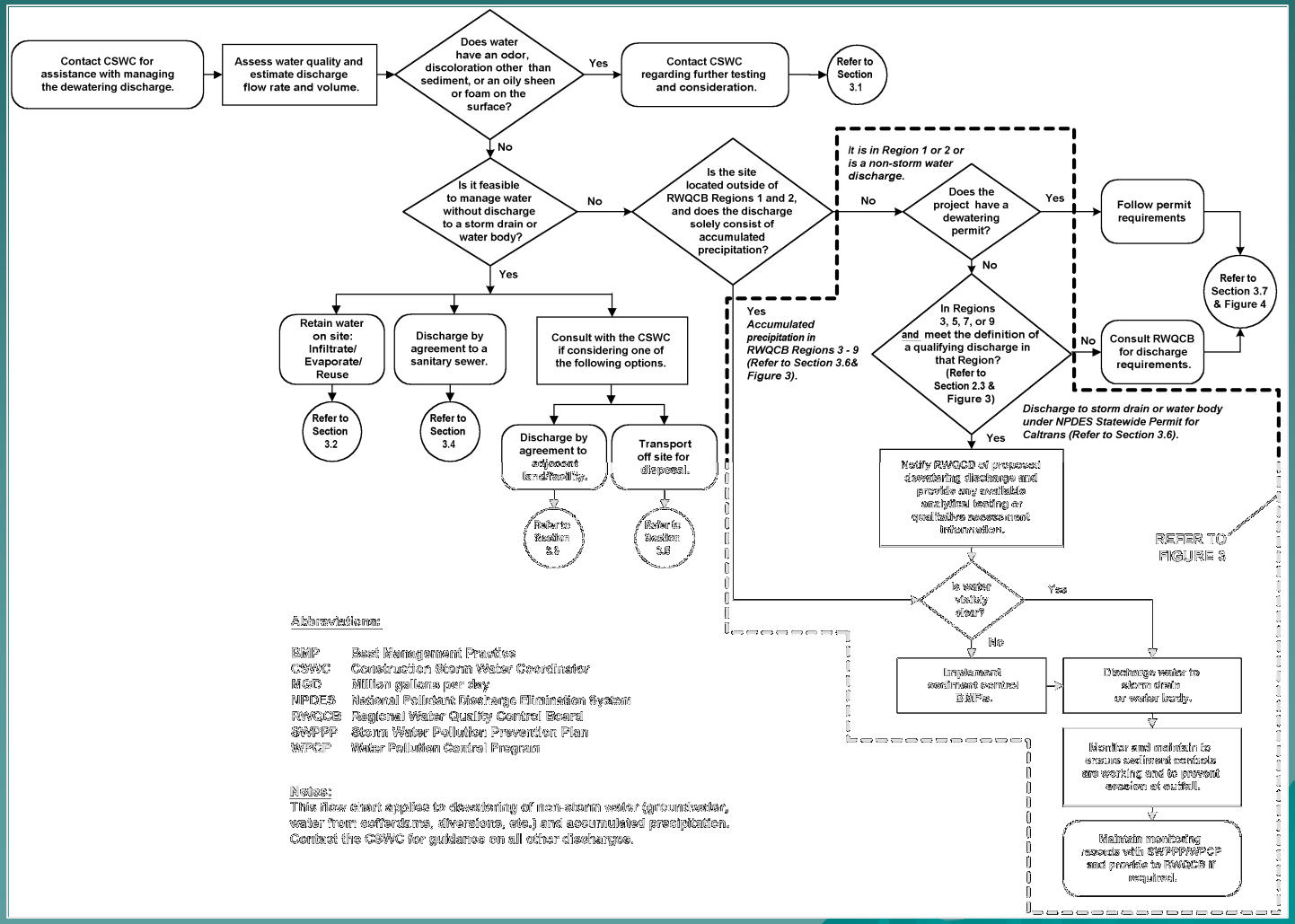
Inadequate Waste Management and Materials Pollution BMP Implementation

Concrete washout

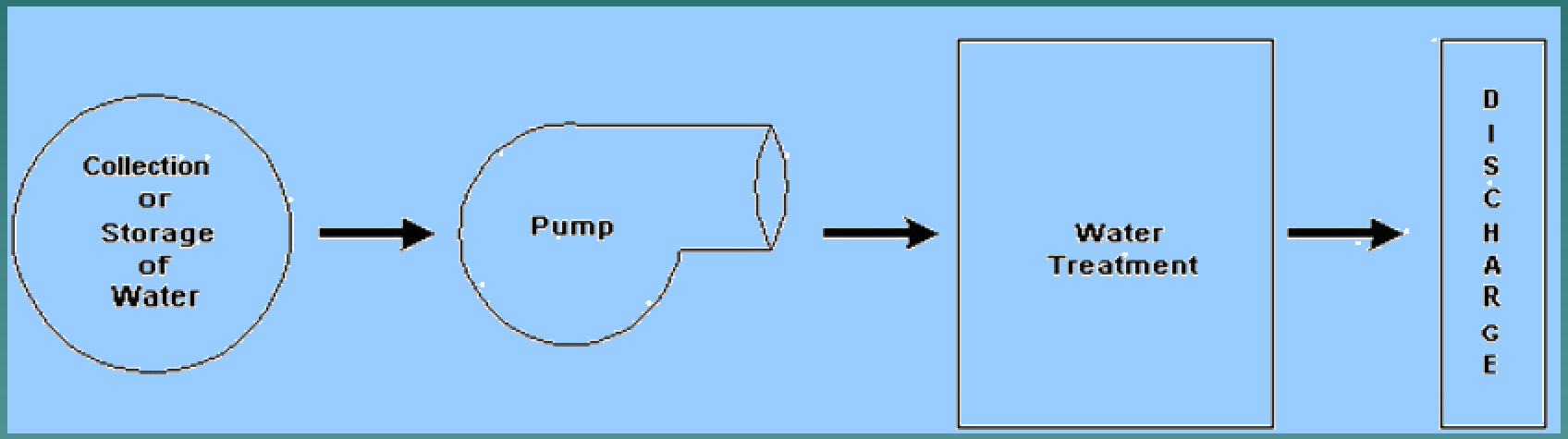
Uncontrolled concrete washouts

Dewatering Requirements

Dewatering Operations Management Flow Chart



General Dewatering and Discharge Process



Dewatering Management Options

Retain water onsite

Discharge to adjacent land or facility

Discharge to public sanitary sewer system

Treat and discharge to storm drain system

Sediment Treatment Options

Desilting/Sediment Basin

Weir Tanks

Dewatering Tanks

Filter Bags

Sand Media Filter

Cartridge and Pressurized Bag Filters

Sampling and Analysis

Sampling and Analysis Requirements

- Modification to the General Construction Permit – adopted April 2001
  - Implement specific sampling and analytical procedures to determine whether BMPs implemented are:
    - Preventing further impairment, from storm water discharge, of 303(d) listed water bodies for sedimentation/siltation or turbidity.
    - Preventing other non-visible pollutants from causing or contributing to exceedances of water quality objectives.
- The Modification is Now included in the “02” Permit

Intention of Sampling and Analysis

- The requirements are intended to determine if BMPs implemented on the construction site are effective for preventing sediment/silt and other non-visible pollutants from impacting water quality objectives.

Types of Pollutants

Sediment/Silt and Turbidity

Non Visible Pollutants -

Construction Materials

Sampling and Analysis Plan

- **Applies:**
  - To projects where construction activities result in 0.4 hectares (1 acre) or more of soil disturbance and when there will be a storm water discharge directly to a Water of the United States (e.g. USGS blue line) or to a storm sewer system that discharges into a Water of the United States
  - Water of the U.S. defined go to www.epa.gov/region6/6en/w/watersus.htm

Sampling for Sedimentation/Siltation/Turbidity

- Project Discharges Directly into 303(d) Water Body
  - Identify sampling locations for monitoring discharges
    - Upstream of the project
    - Immediately down stream from last discharge point of the project
    - Run-on that enters the Caltrans right-of-way
  - Sampling must occur during the first two hours of discharge
    - During daylight hours – sunrise to sunset
    - Year round / seven days a week – including holidays
  - Sample a maximum of four events per month
    - Minimum 72 hours of dry weather between events
  - Samples collected by personnel trained in water quality sampling procedures
    - Contractors staff or Laboratory personnel

Sampling for Non-Visible Pollutants

- **Sampling and Analysis required:**
  - Within two hours after discharge occurs, one of the following occurs:
    - Construction material, wastes, and activities are not stored under watertight conditions
    - Applicable BMPs are not properly implemented
    - The construction site historically was used as a site that may have had non-visible pollutants on it
    - Soil amendments or soil stabilizers have been previously applied
- **Sample Collection:**
  - First two hours of discharge
    - During daylight hours – sunrise to sunset
    - Seven days a week / year round including holidays
  - Personnel trained in water quality sampling procedures
    - Contractors staff or laboratory personnel
  - Sampling locations – per approved plan
    - Down gradient from discharge location, which drains the area of the observed breach, malfunction, leakage, spill, or suspected contamination
    - Uncontaminated up gradient background sample

Conditions that Don't Require Sampling

- Sedimentation/Siltation/Turbidity (non-direct discharge) – SAP not required
  - Discharges that flow to tributaries of 303(d) waters that are not listed themselves as impaired
  - Discharges to Municipal Separate Storm Sewer Systems including Caltrans storm drainage system
- Non-Visible Pollutants
  - Spilled materials or waste are completely removed prior to a rain event
  - Materials and wastes are properly stored (in a watertight condition), disposed of or incorporated into the work prior to a rain event

Caltrans Pollutant Testing Guidance Tables

Pollutant Testing Guidance Table [1]

Cleaning Products	Acids	No	**pH** Acidity Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride)	HACH pH Test Kit or pH Meter HACH Acidity Test Kit	EPA 150.1 (pH) SM 2310B (Acidity) EPA 300.0 (Anion)
	Bleaches	No	**Residual Chlorine**	HACH Chlorine Test Kit	SM 4500-CL G (Res. Chlorine)
	Detergents	Yes - Foam	Visually Observable - No Testing Required		
	TSP	No	**Phosphate**	HACH Phosphate Test Kit	EPA 365.3 (Phosphate)
	Solvents	No	**VOC**	None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)

Notes:

1 If specific pollutant is known, analyze only for that specific pollutant. See MSDS to verify.

2 For each construction material, test for one of the pollutant indicators. **Bolded** pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.

3 See www.hach.com for some of the test kits.

4 If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.

5 Only if special handling requirements are required in the Standard Special Provisions for aerial deposited lead.

6 If used with a dye or fiber matrix, it is considered visually observable and no testing is required.

7 Based upon research conducted by Caltrans, the following copolymers/polymers do not discharge pollutants and no water quality sampling and analysis is <u>not</u> required: Super Tak™, M-Binder™, Fisch Stik™, Pro40dc™, Fisch-Bond™, and Soil Master WR™.