

Caltrans Construction Stormwater Pollution Prevention Training



Water Quality Sampling and Analysis on Construction Sites

Module 5

Who Are We

- ⇒ **Who am I?**
- ⇒ **What is my background?**
- ⇒ **What is my storm water background?**
- ⇒ **What is my sampling background?**
- ⇒ **Audience Introductions**

Why Are You Here?

- ➔ To Learn About SWRCB and Caltrans Sampling and Analysis Requirements
- ➔ To Review SAP Guidelines
- ➔ To Review Sample Collection Procedures

What Will You Learn?

- ➔ **What are the pollutants of concern**
- ➔ **The requirements of Resolution 2001-046**
- ➔ **Caltrans requirements**
- ➔ **How to use the Pollutant Testing Guidance Table**
- ➔ **How to review Sampling and Analysis Plans**
- ➔ **An overview of field sampling methods**



Keep in mind

- ➔ **Caltrans personnel will not be taking water quality samples – this is the responsibility of the contractor**
- ➔ **RE and inspector are responsible for making sure contractor does his responsibilities**
- ➔ **WPCP projects are not subject to these requirements**

Glossary

- ➔ **BMP** - Best Management Practice
- ➔ **CSWC** – Construction Storm Water Coordinator
- ➔ **NPDES** - National Pollutant Discharge Elimination System
- ➔ **RWQCB** - Regional Water Quality Control Board
- ➔ **SAP** – Sampling and Analysis Plan
- ➔ **SSP** – Standard Special Provision
- ➔ **SWPPP** - Storm Water Pollution Prevention Plan
- ➔ **SWRCB** - State Water Resources Control Board

Introduction

➔ Course Highlights

⇒ *Introduction*

⇒ NPDES Permit Requirements

⇒ Caltrans Requirements

- Caltrans Special Provisions and Handbooks

⇒ 303(d) Sedimentation / Siltation or Turbidity

⇒ Non-visible Pollutants

⇒ Sampling and Analysis Plan Review Guidelines

⇒ Contractor Sample Collection Procedures

⇒ Inspection Tips



Introduction

➔ First things first

- ⇒ Caltrans personnel will not be collecting any samples – this is the responsibility of the contractor or their lab
- ⇒ Sampling and Analysis requirements apply to SWPPP projects only – for now

Introduction

➔ What are these Sampling and Analysis requirements intended to do?

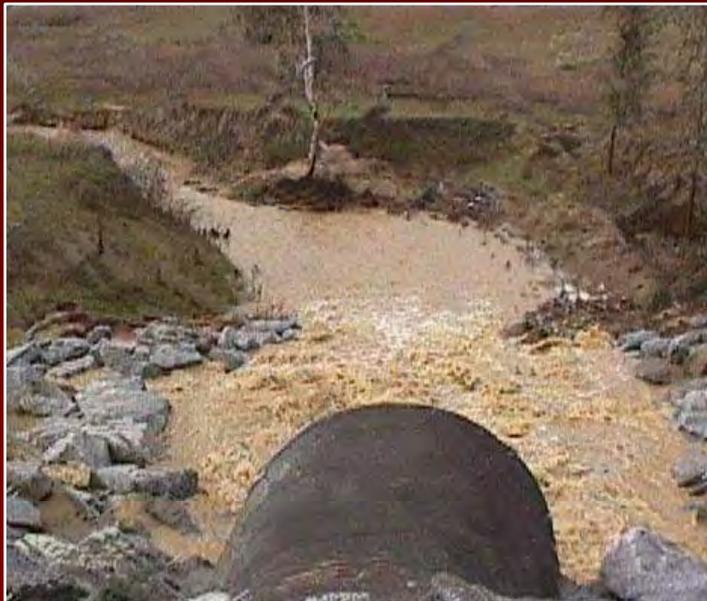
- ⇒ The requirements are intended to determine if BMPs implemented on the construction site are effective for preventing sediment/silt and other non-visible pollutants from impacting water quality objectives.



Introduction

What are the Pollutants

Sediment/Silt and
Turbidity



Non Visible Pollutants -
Construction Materials



Introduction

➔ How do they Affect Your Site?

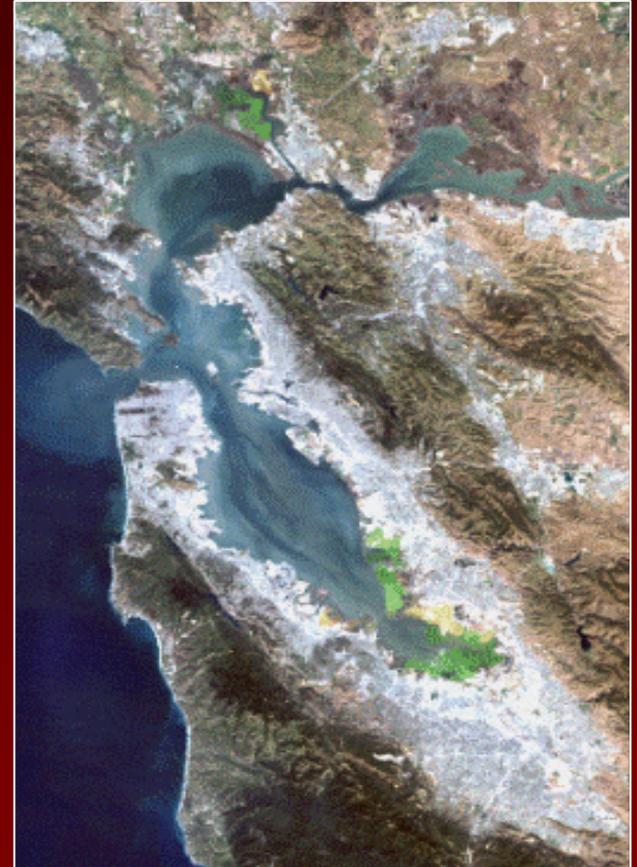
⇒ Almost every job site has the potential to contribute pollutants to storm water runoff such as:

- Sediments from disturbed soil areas
- Toxic pollutants from chemical compounds and materials used to build projects, including structures



Introduction

- ⇒ 303(d) listed Water Bodies
 - ⇒ In 2002, 685 water bodies where listed as impaired in the State of California, most of them for multiple pollutants.
 - ⇒ 134 of the 685 water bodies are listed as impaired for sediment / siltation and turbidity
 - ⇒ Example 303(d) water bodies: Tomales Bay, Morro Bay, Truckee River, Lake Elsinore and Buena Vista Lagoon



Introduction

➔ What is....

⇒ Sediment

- Soil particles that have been dislodged from their original or placed location and deposited down gradient

⇒ Siltation

- The deposition of finely divided soil and rock particles upon the bottom of streams and river beds and in reservoirs

⇒ Turbidity

- Cloudiness of water quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. Measured in Nephelometric Turbidity Units (NTU)

Introduction

➔ Sediment / silt in a water body:

- Decreases water clarity, which causes a decrease in aquatic plant production, obscures sources of food, habitats, refuges, and nesting sites of fish
- Fills gravel spaces in stream bottoms, smothering fish eggs and juvenile fish
- Carries nutrients such as nitrogen and phosphorous that may cause algal blooms
- Pesticides attach to soil particles and enter waters
- Decreases recreational, commercial, and aesthetic values of water bodies
- Decreases quality of drinking water



Introduction

➔ Turbidity

- ⇒ Turbidity in water bodies effects both aquatic and human life by increasing bacteria levels, introducing viruses, and protozoan.
- ⇒ Blocks light transmission and light penetration
- ⇒ Reducing oxygen levels
- ⇒ Affecting the food chain
- ⇒ Change in temperature



Introduction

➔ Non-Visible Pollutants

⇒ They are not visually detectable in storm water discharges

- Examples: Acids, Solvents, Lime, Gypsum, Copolymer



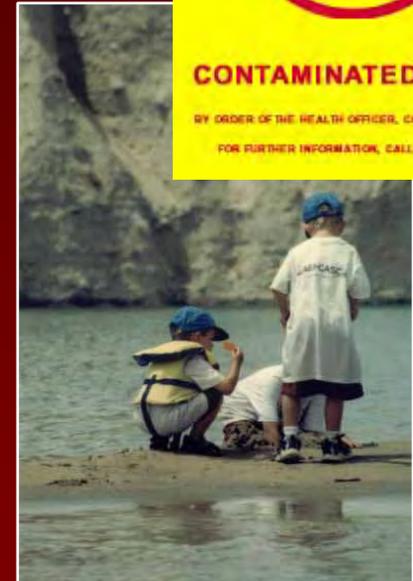
Introduction

- ➔ How do Non-Visible Pollutants effect water bodies
 - ⇒ They can dissolve or remain suspended in water or get deposited on the bed
 - ⇒ Deteriorates water quality
 - ⇒ Affects aquatic ecosystems
 - ⇒ Pollutants can also seep down and effect groundwater

Introduction

➔ Why should we care

- ⇒ The effects of water pollution are not only devastating to people but also to animals, fish, and birds
- ⇒ Polluted water is unsuitable for drinking, recreation, agriculture, and industry. It diminishes the aesthetic quality of lakes and rivers
- ⇒ Contaminated water destroys aquatic life and reduces its reproductive ability
- ⇒ Nobody can escape the effects of water pollution



Quick Fact Review

- ➔ **What are the new Sampling and Analysis requirements intended to do?**

Quick Fact Review

➔ **What is a 303(d) listed water body?**



➔ Course Highlights

⇒ Introduction

⇒ ***NPDES Permit Requirements***

⇒ Caltrans Requirements

- Caltrans Special Provisions and Handbooks
- 303(d) Sedimentation / Siltation or Turbidity

⇒ Non-Visible Pollutants

⇒ Sampling and Analysis Plan Review Guidelines

⇒ Contractor Sample Collection Procedures

⇒ Inspection Tips

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➔ Included in the Permit (02)

⇒ 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.

➔ 303(d) List of Water Bodies Impaired due to Sediment/Siltation and Turbidity

- http://www.waterboards.ca.gov/tmdl/303d_lists.html

➔ Exceptions Listed in Permit (02)

⇒ Discharges from Tribal Lands

- Construction on Tribal Lands is regulated by a US EPA permit

⇒ Lake Tahoe Hydrologic Unit

- Lahontan Regional Water Control Board adopted a separate NPDES permit for the Lake Tahoe Hydrologic Unit

Quick Fact Review

- ➔ **What are the two general categories of pollutants that may be subject to sampling and analysis ?**

➔ Course Highlights

⇒ Introduction

⇒ NPDES Permit Requirements

⇒ ***Caltrans Requirements***

- ***Caltrans Special Provisions and Handbooks***

⇒ 303(d) Sedimentation / Siltation or Turbidity

⇒ Non-Visible Pollutants

⇒ Sampling and Analysis Plan Review Guidelines

⇒ Contractor Sample Collection Procedures

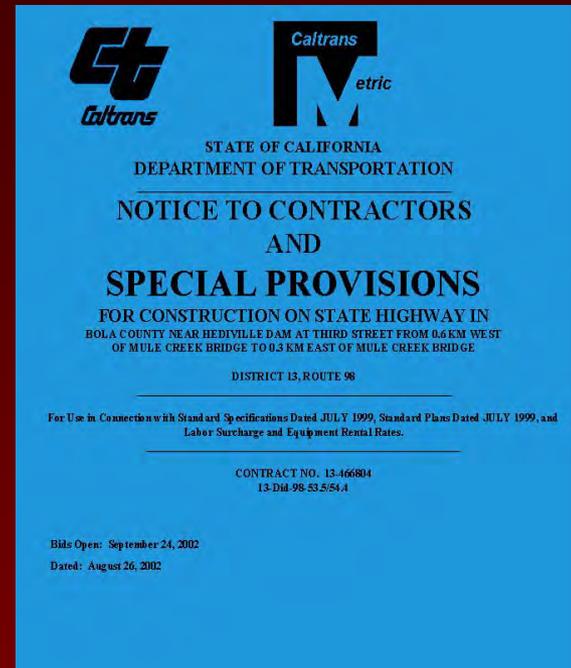
⇒ Inspection Tips



Contract Special Provisions

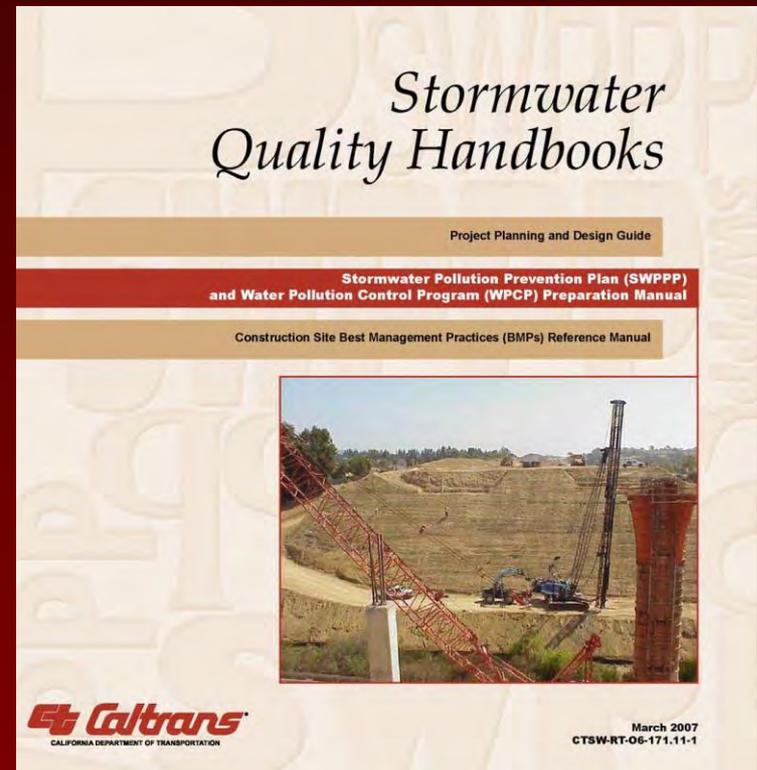
➔ Section 10-1.02 Water Pollution Control

- ⇒ Issued to satisfy the NPDES Permit requirements
- ⇒ Defines water pollution control requirements
- ⇒ **Sampling and Analytical Requirements**



Construction Handbook

- ➔ SWPPP and WPCP Preparation Manual
 - ⇒ Updated version
 - ⇒ Section 600.4 Sampling and Analysis Plan for Sediment
 - ⇒ Section 600.5 Sampling and Analysis Plan for Non-Visible Pollutants
 - ⇒ Attachment R Sampling Activity Log/Chain of Custody Form
 - ⇒ Attachment S Pollutant Testing Guidance Table
 - ⇒ Attachment T Sampling Data Reporting Form



➔ Course Highlights

⇒ Introduction

⇒ NPDES Permit Requirements

⇒ Caltrans Requirements

- Caltrans Special Provisions and Handbooks

⇒ ***303(d) Sedimentation / Siltation or Turbidity***

⇒ Non-Visible Pollutants

⇒ Sampling and Analysis Plan Review Guidelines

⇒ Contractor Sample Collection Procedures

⇒ Inspection Tips



303(d) Water Bodies

⇒ Sediment / Silt / Turbidity

- ⇒ Projects that discharge directly into a 303(d) water body listed for Sediment / Silt / Turbidity require a SAP
 - List of 303(d) water bodies available from SWRCB
http://www.waterboards.ca.gov/tmdl/303d_lists.html
- ⇒ Determine whether there is a net increase in sediment load from storm water discharge from the project

303(d) Water Bodies

Sediment / Silt / Turbidity

- ➔ Exemptions (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



Sediment / Silt / 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

Sediment / Silt / Turbidity Sampling Triggers

Is sampling required ?

Assume:

- River is 303(d) listed impaired for sediment
- Time is 0700
- Rain event began 45 minutes ago
- Direct discharge has occurred



YES

Sediment / Silt / Turbidity Sampling Triggers

Where should samples be taken ?

Downstream of
project

Upstream of
project



Remember: SAFETY FIRST

303(d) Water Bodies

Sediment / Silt / Turbidity

➔ Analytical Requirement

⇒ Impaired due to Sedimentation / Siltation

- Settleable Solids (SS)
- Total Suspended Solids (TSS)
- Or Suspended Sediment Concentration (SSC)

⇒ Impaired due to Turbidity

- Nephelometric Turbidity Units (NTU)

⇒ Laboratory analysis in accordance with 40 Code of Federal Regulations (CFR) Part 136

- By State of Ca. Department of Health Services certified laboratory

⇒ Field analysis by Contractor

- Collection, analysis, and equipment calibration in accordance with manufacturer's specifications

303(d) Water Bodies

Sediment / Silt / Turbidity

➔ Sample Documentation

- ⇒ Water quality sample analytical results and Quality Assurance / Quality Control (QA/QC) Data
 - Submitted to Resident Engineer
 - 5 days for field analysis
 - 30 days for laboratory
 - Evaluation of results
 - Filed with SWPPP document
 - Category 20

Evaluation of Results

➔ Data Evaluation

- ⇒ The contractor will submit an evaluation of the water quality sample analytical results, including figures with sample locations and QA/QC data for every sampling event.
- ⇒ Should downstream samples exceed upstream or background levels, the WPCM will evaluate:
 - BMPs
 - Site Conditions
 - Surrounding influences/other site factors

Evaluation of Results

➔ Data Evaluation

- ⇒ Contractor will determine probable cause for the increase in levels downstream
- ⇒ Appropriate BMPs will be repaired or modified to mitigate increases/discharges
- ⇒ Any revisions to the BMPs will be recorded as an amendment to the SWPPP

Reporting of Results

➔ Sampling Data Reporting Form

- ⇒ SWPPP Preparation Manual Appendix A, Attachment T
- ⇒ Contractor to use form to electronically submit data to the RE or other person designated by Caltrans
- ⇒ Contractor to sign and certify all data reporting forms

303(d) Water Bodies

⇒ What if

⇒ Data shows an increase in the pollutant

⇒ The contractor should

- Identify the location of the BMP failure
- Repair or replace any BMP that has failed
- Maintain any BMP that is not functioning properly due to lack of maintenance
- Evaluate whether any additional or alternative BMPs should be implemented
- Amend SWPPP if additional BMPs were installed

303(d) Water Bodies

What may be Causing the Increase?

- ➔ Exposed soil areas with inadequate erosion control measures
- ➔ Poorly stabilized slopes
- ➔ Lack of perimeter sediment controls
- ➔ Areas of concentrated flow or unprotected soils
- ➔ Poorly maintained erosion and sediment controls
- ➔ Unprotected stockpiles
- ➔ Failure of other erosion or sediment control BMPs

303(d) Water Bodies

- ➔ How is Sampling and Analysis for Sediment/Siltation or Turbidity paid for?
 - ⇒ Extra Work at Force Account

■ Course Highlights

- ◆ Introduction
- ◆ Regulations
- ◆ Caltrans Requirements
 - ◆ Caltrans Special Provisions and Handbooks
- ◆ 303(d) Sedimentation / Siltation or Turbidity
- ◆ ***Non-Visible Pollutants***
 - ◆ Sampling and Analysis Plan Review Guidelines
 - ◆ Contractor Sample Collection Procedures
 - ◆ Inspection Tips



Non-Visible Pollutants



■ SAP

◆ Applies:

- ◆ To projects where construction activities result in 0.4 hectares (1 acre) or more of soil disturbance and when there will be a stormwater 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

Non-Visible Pollutants

■ What are they?

- ◆ Pollutants, other than sediment, that are known or should be known to occur on construction sites that can't be seen in stormwater discharges

How do I know if I have to sample for them?

- ◆ Use the pollutant testing guidance table

Examples: Asphalt Products, Cleaning products, Pesticides, fertilizers or soil amendments

Pollutant Testing Guidance Table

Pollutant Testing Guidance Table

Aluminum Sulfate	No	Aluminum	TDS Meter: HACH Sulfate Test Kit	EPA 200.8 (Metal)
		TDS		EPA 160.1 (TDS)
		Sulfate		EPA 300.0 (Sulfate)
Sulfur-Elemental	No	Sulfate	HACH Sulfate Test Kit	EPA 300.0 (Sulfate)

Pollutant Testing Guidance Table

Masonry products	No	Visually Observable - No Testing Required		
		pH	HACH pH Test Kit or pH Meter	EPA 150.1 (pH)
		Alkalinity	HACH Alkalinity Test Kit	SM 2320 (Alkalinity)

Pollutant Testing Guidance Table

Pollutant Testing Guidance Table 1

Category	Construction Site Material	Visually Observable?	Pollutant Indicators 2	Suggested Analyses Field 3	Laboratory
Asphalt Products (Sections 37, 38, 92, 93, 94, and Special Provisions)	Hot Asphalt	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
	Asphalt Emulsion				
	Liquid Asphalt (tack coat)				
	Cold Mix	Yes, Black Solid Material	Visually Observable - No Testing Required		
	Crumb Rubber				
Asphalt Concrete (Any Type)	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required			
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 801/602 or EPA 624 (VOC)	
		SVOC	None	EPA 625 (SVOC)	

None	HACH Nitrate Test Kit	EPA 300.0 (Nitrate)
		EPA 365.3 (Phosphate)
None	HACH Phosphate Test Kit	EPA 351.3 (TKN)
		EPA 200.8 (Metal)
		EPA 415.1 (TOC)
		EPA 300.0 (Nitrate)
None	HACH Nitrate Test Kit	EPA 351.3 (TKN)
		EPA 410.4 (COD)
		Observable - No Testing Required
None	HACH pH Test Kit or pH Meter HACH Alkalinity Test Kit	Check lab for specific herbicide
		Check lab for specific pesticide
None	HACH pH Test Kit or pH Meter HACH Alkalinity Test Kit	SM 2320 (Alkalinity)
		EPA 150.1 (pH)
None	HACH Calcium Test Kit	EPA 200.8 (Metal)
		EPA 200.7 (Calcium)
		Visually Observable - No Testing Required
		Visually Observable - No Testing Required
None	HACH Acidity Test Kit or pH Meter HACH Alkalinity Test Kit	SM 2310B (Acidity)
		SM 2320 (Alkalinity)
		EPA 150.1 (pH) EPA 601/602 or EPA 624 (VOC) EPA 625

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Pollutant Testing Guidance Tables

Pollutant Testing Guidance Table

Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
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 **not** required: Super Tak™, M-Binder™, Fisch Stik™, Pro40dc™, Fisch-Bond™, and Soil Master WR™.

Pollutant Testing Guidance Tables

Pollutant Testing Guidance Table

<p>Portland Concrete Cement & Masonry Products (Section 27, 28, 29, 40, 41, 42, 49, 50, 51, 53, 63, 65, 72, 73, 80, 81, 83, 90, and Special Provisions)</p>	Portland Cement (PCC)	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Masonry products	No	pH	HACH pH Test Kit or pH Meter	EPA 150.1 (pH)
			Alkalinity	HACH Alkalinity Test Kit	SM 2320 (Alkalinity)
	Sealant (Methyl Methacrylate - MMA)	No	Methyl Methacrylate	None	EPA 625 (SVOC)
			Cobalt		EPA 200.8 (Metal)
			Zinc		
	Incinerator Bottom Ash Bottom Ash Steel Slag Foundry Sand Fly Ash Municipal Solid Waste Ash	No	Aluminum Calcium Vanadium Zinc	HACH Calcium Test Kit	EPA 200.8 (Metal) EPA 200.7 (Calcium)
	Mortar	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Concrete Rinse Water	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Non-Pigmented Curing Compounds	No	Acidity	HACH Acidity Test Kit or pH Meter HACH Alkalinity Test Kit	SM 2310B (Acidity)
Alkalinity			SM 2320 (Alkalinity)		
pH			EPA 150.1 (pH)		
VOC			EPA 601/602 or EPA 624 (VOC)		
SVOC			EPA 625		



Pollutant Testing Guidance Tables-

Pollutant Testing Guidance Table

Landscaping and Other Products (Section 20, 24, and Special Provisions)	Aluminum Sulfate	No	Aluminum	TDS Meter HACH Sulfate Test Kit	EPA 200.8 (Metal)
			TDS		EPA 160.1 (TDS)
			Sulfate		EPA 300.0 (Sulfate)
	Sulfur-Elemental	No	Sulfate	HACH Sulfate Test Kit	EPA 300.0 (Sulfate)
	Fertilizers-Inorganic ⁴	No	Nitrate	HACH Nitrate Test Kit	EPA 300.0 (Nitrate)
			Phosphate	HACH Phosphate Test Kit	EPA 365.3 (Phosphate)
			Organic Nitrogen	None	EPA 351.3 (TKN)
			Potassium	None	EPA 200.8 (Metal)
	Fertilizers-Organic	No	TOC	HACH Nitrate Test Kit	EPA 415.1 (TOC)
			Nitrate		EPA 300.0 (Nitrate)
			Organic Nitrogen		EPA 351.3 (TKN)
			COD		EPA 410.4 (COD)
	Natural Earth (Sand, Gravel, and Topsoil)	Yes - Cloudiness and turbidity	Visually Observable - No Testing Required		
	Herbicide	No	Herbicide	None	Check lab for specific herbicide
	Pesticide		Pesticide		Check lab for specific pesticide
Lime	Alkalinity		HACH pH Test Kit or pH Meter	SM 2320 (Alkalinity)	
		pH	HACH Alkalinity Test Kit	EPA 150.1 (pH)	



Field Test Kit Summary

POLLUTANT	TEST KIT
Alkalinity	HACH Alkalinity Test Kit
Aluminum	HACH Sulfate Test Kit
COD	HACH Nitrate Test Kit
Nitrate	HACH Nitrate Test Kit
Organic Nitrogen	HACH Nitrate Test Kit
pH	HACH pH Test Kit or pH Meter
Phosphate	HACH Phosphate Test Kit
Potassium	None
Sulfate	HACH Sulfate Test Kit
TDS	TDS Meter
TOC	HACH Nitrate Test Kit
Turbidity	Visually Observable - No Testing Required

Non-Visible Pollutants

■ Sampling and Analysis required if...

- ◆ 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

Non-Visible Pollutants

- You don't have to sample if.....
 - ◆ Spilled materials or waste are completely removed prior to a rain event
 - ◆ Including contaminated soil
 - ◆ Materials and wastes are properly stored (in a watertight condition), disposed of or incorporated into the work prior to a rain event



Quick Fact Review

- **What non-visible pollutants does the contractor sample or analyze for?**



Non-Visible Pollutants

■ Sample Collection

- ◆ Sampling locations – per approved plan
 - ◆ Down-stream from discharge location, which drains the area of the observed breach, malfunction, leakage, spill, or suspected contamination
 - ◆ Uncontaminated up-stream reference sample

Non-Visible Pollutants

■ 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

Non-Visible Pollutants

■ Sample Collection

- ◆ Sample analysis parameters include but not limited to
 - ◆ pH
 - ◆ Specific conductance
 - ◆ Dissolved oxygen
 - ◆ Conductivity
 - ◆ Salinity
 - ◆ Total Dissolved Solid (TDS)
 - ◆ Metals



Non-Visible Pollutants

■ Sample Collection

- ◆ Samples analyzed by a laboratory in accordance with 40 Code of Federal Regulations (CFR) Part 136
- ◆ Field analysis by Contractor
 - ◆ Collection, analysis, and equipment calibration in accordance with manufacturer's specifications

Non-Visible Pollutants

- **Non-visible pollutants sample collection triggers**
 - ◆ Materials or waste containing non-visible pollutants are not stored under watertight conditions
 - ◆ By visual observation of any breach, malfunction, leak, or spill which may result in discharge of pollutants to surface waters or storm sewer system
 - ◆ Before or during rain events

Non-Visible Pollutants

- **Non-visible pollutants sample collection triggers**
 - ◆ Construction activities such as application of fertilizer, pesticide, herbicide, methyl methacrylate concrete sealant, or non-pigmented curing compound have occurred during a rain event or within 24 hours preceding a rain event, and there is the potential for discharge of pollutants to surface waters or drainage system.

Non-Visible Pollutants

- **Non-visible pollutants sample collection triggers**
 - ◆ Project use of soil amendments with the potential to elevate pH level
 - ◆ Pre-existing contaminated sites

Non-Visible Sampling Triggers

■ Assume:

➤ Discharge off the R of W and into waters of the US has occurred for 40 minutes

➤ Stockpile is cold mix asphalt on the R of W

➤ Gutter is active and drains off the R of W

➤ Project has a SWPPP



NO...this is a **visible** pollutant...refer to Pollutant Guidance Table

What should be done?

Non-Visible Sampling Triggers

Will sampling be required ?

- Assume:
- Rain event forecasted
- Project has a SWPPP
- Project has the potential to discharge to waters of the US



No...materials are stored in a watertight condition

Non-Visible Sampling Triggers

Will sampling be required ?

- Assume:
 - Discharge off the R of W and into waters of the US has occurred for 20 minutes
 - Slope was stabilized with a copolymer
 - Project has a SWPPP



Yes....let's refer to Pollutant Guidance Table

Non-Visible Sampling Triggers

Where will the sample be collected?

Upgradient of discharge

Downgradient of discharge



Quick Fact Review

- **For Non-visible pollutants, when does the contractor sample?**



Non-Visible Pollutants

■ Sample Documentation

- ◆ Water quality sample analytical results and Quality Assurance / Quality Control (QA/QC) Data
 - ◆ Submitted to Resident Engineer
 - 5 days for field analysis
 - 30 days for laboratory
 - ◆ Evaluation of results
 - ◆ Filed with SWPPP document
 - ◆ Category 20

Evaluation of Results

■ Data Evaluation

- ◆ The contractor will submit an evaluation of the water quality sample analytical results, including figures with sample locations and QA/QC data for every sampling event.
- ◆ Should downgradient samples exceed upgradient or background levels, the WPCM will evaluate:
 - ◆ BMPs
 - ◆ Site Conditions
 - ◆ Surrounding influences/other site factors

Evaluation of Results

■ Data Evaluation

- ◆ Contractor will determine probable cause for the increase in levels downgradient
- ◆ Appropriate BMPs will be repaired or modified to mitigate increases/discharges
- ◆ Any revisions to the BMPs will be recorded as an amendment to the SWPPP

Reporting of Results

■ Sampling Data Reporting Form

- ◆ SWPPP Preparation Manual Appendix A, Attachment T
- ◆ Contractor to use form to electronically submit data to the RE or other person designated by Caltrans
- ◆ Contractor to sign and certify all data reporting forms

Quick Fact Review

- **What are Non-visible pollutants?**



Quick Fact Review

- **Is Sampling and Analysis required for acids, sealants, and solvents?**



Non-Visible Sampling Triggers

- **Assume:**
 - Discharge off the R of W has occurred for 90 minutes
 - Five gallon buckets contain cleaning and petroleum products
 - Hoppers contain masonry products
 - Swale drains off the R of W



**Yes....let's refer to Pollutant Guidance Table
What should be done?**

Non-Visible Sampling Triggers

Where should samples be taken ?

Upgradient of discharge

Downgradient of discharge



Non-Visible Sampling Triggers

Will sampling be required ?

- Assume:
- Rain event forecasted

Yes...unless prior to rain event materials are stored in a watertight condition



Quick Fact Review

- **For Non-visible pollutants, where does the contractor collect samples?**



Non-Visible Pollutants

■ What if

- ◆ Data shows an increase in the pollutant
- ◆ What should the contractor do ?
 - Identify the source of the pollutant
 - Clean up spills
 - Repair or replace any BMP that has failed
 - Maintain any BMP that is not functioning properly due to lack of maintenance
 - Evaluate whether any additional or alternative BMPs should be implement
 - Resample during next rain event
 - Notify RE

Non-Visible Pollutants

■ Possible solutions

- ◆ Place materials or waste in watertight containment, under a watertight roof, or indoors
- ◆ Cleanup and/or contain spills or leaks
- ◆ Contain runoff onsite
- ◆ Avoid applying materials prior to a known rain event
- ◆ Maintain non-stormwater and waste material control BMPs
- ◆ Install additional BMPs, if necessary

Non-Visible Pollutants



- **Who Pays for Sampling and Analysis for non-visible pollutants**
 - ◆ When approved by Caltrans, Caltrans pays by Extra Work at Force Account
 - ◆ Soil amendments or stabilizers
 - ◆ Run-on
 - ◆ Historical contamination

Non-Visible Pollutants

- **Who Pays for Sampling and Analysis for non-visible pollutants**

- ◆ **Contractor** if there are

- ◆ Spills / leaks / breaches / malfunctioning
 - ◆ Improperly implemented BMPs
 - ◆ Lack of maintenance or repairs of BMPs
 - ◆ Lack of BMPs
 - ◆ Poorly scheduled work



■ Course Highlights

- ◆ Introduction
- ◆ NPDES Permit Requirements
- ◆ Caltrans Requirements
 - ◆ Caltrans Special Provisions and Handbooks
- ◆ 303(d) Sedimentation / Siltation or Turbidity
- ◆ Non-Visible Pollutants
- ◆ ***Sampling and Analysis Plan Review Guidelines***
- ◆ Contractor Sample Collection Procedures
- ◆ Inspection Tips



SAP Review Guidelines

Sampling and Analysis Templates Online as part of the SWPPP template

StormWater templates and samples - Microsoft Internet Explorer provided by AEI-CASC Engineering, Inc.

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites

Address <http://www.dot.ca.gov/hq/construc/stormwater/templates.htm> Go Links

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Welcome to California

Caltrans Home

Construction Home

Storm Water Quality Handbook Project Planning and Design Guide

Environmental Storm Water Management Program

State Water Resources Control Board Caltrans Program

State Water Resources Control Board Water Quality

California Stormwater Quality Association

CSUS Office of Water Programs StormWater

International Erosion Control Association

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Storm Water Quality Templates and Samples

SWPPP.WPCP July 2005 Instructions (Word 2000) **NEW**

Download SWPPP Template July 2005 (Word 2000 version) **addenda NEW**

SWPPP Amendment Form **addenda NEW**

SWPPP.WPCP July 2005 Instructions (Word 97) **NEW**

Download SWPPP Template July 2005 (Word 97 version) **addenda NEW**

Download WPCP Template July 2005 (Word 2000 version) **addenda NEW**

WPCP Amendment Form **addenda NEW**

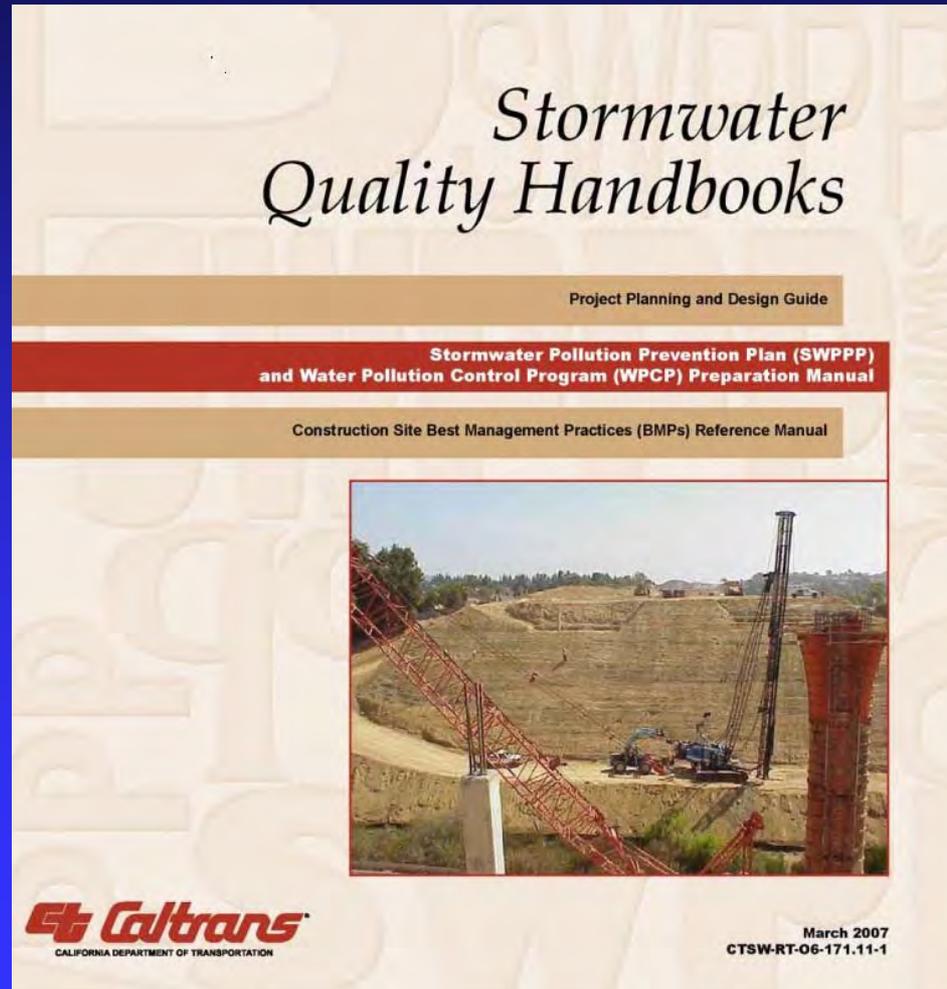
Discussions Discussions not available on <http://www.dot.ca.gov/>

Done Internet

start 2 Micr... SAP NE... Microso... Microso... \$ Inte... 4:40 PM

SAP Review Guidelines

Revised SWPPP Preparation Manual



SAP Review Guidelines

How is the Template set up?

INSTRUCTIONSTelling the contractor what is necessary in that section

REQUIRED TEXTTelling the contractor exactly what verbiage to use in the document

EXAMPLESShowing the contractor what the section might include

SAP Review Guidelines

- **SWPPP Sampling and Analysis Plan Review**
 - ◆ 600.4 Sediment
 - ◆ 600.5 Non-visible

SAP Review Guidelines

- **Water Pollution Control Drawings (WPCD)**
 - ◆ Show sampling locations

■ Course Highlights

- ◆ Introduction
- ◆ NPDES Permit Requirements
- ◆ Caltrans Requirements
 - ◆ Caltrans Special Provisions and Handbooks
- ◆ 303(d) Sedimentation / Siltation or Turbidity
- ◆ Non-visible Pollutants
- ◆ Sampling and Analysis Plan Review Guidelines
- ◆ ***Contractor Sample Collection Procedures***
- ◆ Inspection Tips



Contractor Sample Collection Procedures

- **Section highlights**
 - ◆ Sampling procedures
 - ◆ Documentation
 - ◆ Data Evaluation and Reporting

Sampling Procedures

■ Monitoring supplies

- ◆ Sample collection equipment
 - ◆ Scoops / bailers / field meters
- ◆ Sampling bottles
- ◆ Resealable storage bags / gloves / paper towels
- ◆ Ice chest or cooler
 - ◆ Ice, “Blue Ice”

Sampling Procedures

- **Monitoring supplies continued**
 - ◆ Sample identification labels
 - ◆ Sample activity log forms
 - ◆ Chain-of-Custody forms (COC)
 - ◆ Rain gear

Sampling Procedures

■ Preparations

- ◆ Inspect general condition of site
 - ◆ Note any unsafe areas
 - ◆ Think safety first
- ◆ Locate sampling points
- ◆ Complete field forms
- ◆ Complete sampling bottle labels



Sampling Procedures

- **Collection Device Decontamination**
 - ◆ Decontaminate sampling equipment
 - ◆ If not using clean equipment, the Contractor should decontaminate by washing equipment using Tri-Sodium Phosphate detergent
 - ◆ Decontamination Procedure
 - Soapy water wash,
 - Distilled water rinse, and
 - Final rinse with distilled water

Sampling Procedures

- **Reduce potential contamination of samples by:**
 - ◆ Donning a pair of latex or nitrile gloves prior to the collection and handling of each sample at each location
 - ◆ Not contaminating the inside of the sample bottle by allowing it to come in contact with any material other than the water sample
 - ◆ Discarding sample bottles or lids that have dropped onto the ground

Sampling Procedures

- **Reduce potential contamination of samples by:**
 - ◆ Not allowing falling or dripping rain water to enter sample collection containers or sample bottles
 - ◆ Not allowing sample preservatives to spill out of sample bottles
 - ◆ Not eating, drinking, or smoking during sample collection

Sampling Procedures

■ Sample Collection

- ◆ Once sufficient flow is observed collect sample
- ◆ Pour collected water into sampling bottle
- ◆ Tightly cap bottle
- ◆ Complete labels and apply to bottles



Sampling Procedures

- **Sample Collection (continued)**
 - ◆ Collect reference sample first
 - ◆ Collect reference sample up-stream from where sampler is standing
 - ◆ Prevent sampling device from touching soil



Sampling Procedures

■ Sample Labeling

- ◆ Project name
- ◆ Project number
- ◆ Sample identification number and location
- ◆ Collection date/time
- ◆ Analytical parameter
- ◆ Sampler's initials



Sampling Procedures

■ Sample Packaging

- ◆ Seal bottles in plastic bags
- ◆ Place into ice chest or cooler
- ◆ Pack ice around each sample
- ◆ Seal storage container
- ◆ Complete Chain of Custody form



Sampling Procedures

■ Field Analysis

- ◆ Conductivity
- ◆ pH
- ◆ Turbidity
- ◆ Total Dissolved solids



- All field equipment should be calibrated per manufactures specifications
- Sample from separate container
- Note analytical result

Sampling Procedures

- **Sample Documentation (continued)**
 - ◆ **Sample activity log**
 - ◆ **Date**
 - ◆ **Sampling time**
 - ◆ **Site location**
 - ◆ **Analytical constituent**
 - ◆ **Name of sampling personnel**
 - ◆ **Weather conditions**
 - ◆ **Field analysis result**
 - ◆ **Other pertinent information**

Data Management

- **Sample event and sampling procedures data management**
 - ◆ Site inspection form
 - ◆ Field analysis results
 - ◆ Analytical results
 - ◆ Keep data in SWPPP document
 - ◆ Submit all results to the R.E. within 5 days of sampling for field analyses and 30 day for laboratory analysis

■ Course Highlights

- ◆ Introduction
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 - ◆ Caltrans Special Provisions and Handbooks
- ◆ 303(d) Sedimentation / Siltation or Turbidity
- ◆ Non-visible Pollutants
- ◆ Sampling and Analysis Plan Review Guidelines
- ◆ Contractor Sample Collection Procedures
- ◆ *Inspection Tips*



Inspection Tips

Sedimentation / Siltation or Turbidity

- Monitor weather reports
- When to Inspect BMPs
 - ◆ Prior to a storm event
 - ◆ Every 24 hours during extended storm events
 - ◆ After storm event
- Identify site conditions
- If applicable notify RE and contractor
- Sampling by contractor is mandatory



Inspection Tips

Non-Visible Pollutants

- Monitor weather reports

- When to Inspect

- ◆ Prior to a storm event
- ◆ Every 24 hours during extended storm events
- ◆ After storm events



- Identify site conditions

- ◆ Spills, leaks, Malfunction or breaches of BMPs



Inspection Tips

Non-Visible Pollutants, continued

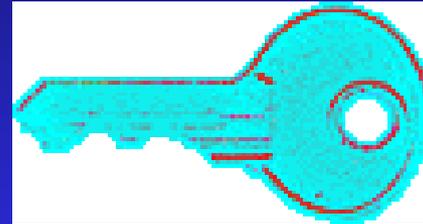
- Contractor to institute correction procedures
- If applicable notify contractor and RE
- Contractor to sample if pollutants are not covered, contained or disposed of properly



Inspection Tips

- **Make sure potential non-visible pollutants are:**

- ◆ **Cleaned-up**
- ◆ **Covered**
- ◆ **Contained**



- **C³**

Inspection Tips

■ Inspection Checklist

- ◆ Revised Stormwater Quality Inspection Checklist available in 2007 version of SWPPP Preparation Manual

<http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm>

Laboratory Test Cost

Approximate cost as of January 2007*

■ VOCs - Volatile Organic Compounds	\$150 - 250
■ SVOCs – Semi-Volatile Organic Compounds	\$250 - 400
■ Pesticides	\$110 - 175
■ Herbicides	\$150 - 200
■ BOD – Biological Oxygen Demand	\$35 - 50
■ DO - Dissolved Oxygen	\$10 - 20
■ pH	\$5 - 10
■ Alkalinity	\$10 - 22
■ Metals	\$12 - 20/Metal
■ Metals (Chromium VI)	\$60 – 100



Closing Comments

■ What we learned

- ◆ What the pollutants of concern are
 - ◆ How they can harm the environment
- ◆ The requirements of Resolution 2001-046
- ◆ Caltrans Requirements
 - ◆ Caltrans Special Provision
- ◆ How to use the Pollutant Testing Guidance Table
- ◆ How to review a SAP
- ◆ An overview of how to sample stormwater runoff

Closing Comments

- **Please take these final thoughts with you**
 - ◆ Document sampling activities
 - ◆ **C³**
 - ◆ **C**over pollutants and waste
 - ◆ **C**ontain pollutants and waste
 - ◆ **C**lean up spills and leaks
 - ◆ Inspect regularly
 - ◆ Properly schedule work activities
 - ◆ Monitor and maintain all BMPs
 - ◆ Communicate with contractor's personnel

Information

■ Online Information/Documents

◆ General Construction Permit

- ◆ <http://www.waterboards.ca.gov/stormwtr/construction.html>
- ◆ The permit has been updated to include the 2001 and 2003 modifications

◆ Caltrans NPDES Permit

- ◆ <http://www.waterboards.ca.gov/stormwtr/caltrans.html>

◆ State Water Resources Control Board

- ◆ <http://www.waterboards.ca.gov/stormwtr/index.html>

Information

■ Online Information/Documents

- ◆ Construction Site Stormwater Quality Sampling: Guidance Manual
 - ◆ <http://www.dot.ca.gov/hq/construc/stormwater/SamplingGuidanceManual.pdf>
- ◆ Storm Water Quality Handbooks
 - ◆ <http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm>
- ◆ List of State Certified Laboratories
 - ◆ <http://www.dhs.ca.gov/ps/ls/ELAP/html/lablist.htm>

Assistance / Contacts



- ◆ **Caltrans**

- ◆ Construction Stormwater Coordinator
- ◆ Your Resident Engineer