

Water Quality Sampling and Analysis on Construction Sites



Level 2 Pre & Post Assessment

- ➔ **This is not a test**
- ➔ **It's an assessment of the effectiveness of the course material**

Who Are We

➔ AEI-CASC Engineering

⇒ Development Industry

- Since 1990

⇒ Assisting Highway Contractors

- SWPPPs since 1993

⇒ Caltrans Programs

- Testing, Sampling, Monitoring, GIS, BMP Design, Inspections
- 5,000+ Compliance Inspections
- 2,000+ Trained – Inspection and RE class
- 500+ SWPPPs Prepared/Reviewed

➔ Your Facilitator

➔ Audience Introductions



Why Are You Here?

- ➔ To Review Regulations and Permits
- ➔ 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**
- ➔ **WPCP projects are not subject to these requirements**

Glossary

- ⇒ **BMP** - Best Management Practice
- ⇒ **CPD** – Construction Procedure Directive
- ⇒ **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

- Construction Procedure Directive – CPD
- 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

➔ Resolution 2001-046

- ⇒ San Francisco Bay Keepers lawsuit
- ⇒ Modification to California's General Construction Permit Monitoring and Reporting Section
- ⇒ Requires that permittees implement specific sampling and analytical procedures
- ⇒ Determine whether BMPs implemented on construction site are
 - Preventing further impairment of water bodies by sediment
 - Preventing other pollutants from causing or contributing to exceedances of water quality objectives



Introduction

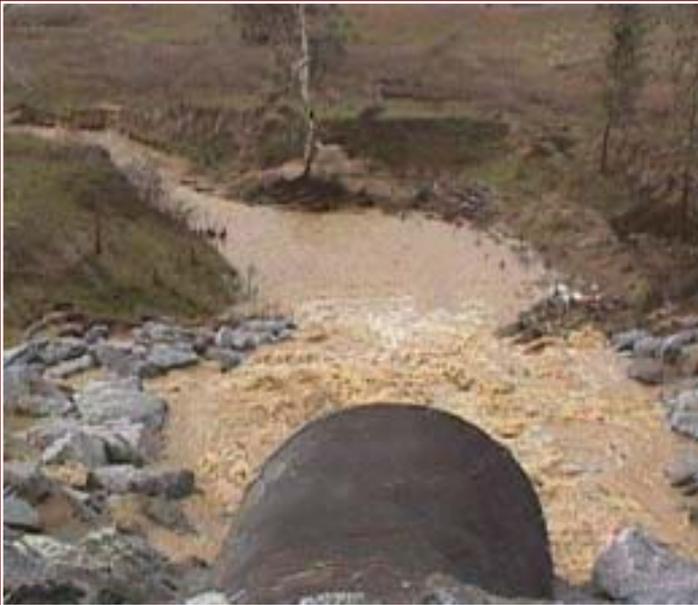
- ➔ What are these new Sampling and Analysis requirements intended to do?
 - ⇒ The new requirements are intended to determine if BMPs implemented on the construction site are effective for preventing sediment/silt and other non-visible pollutants from impacting water quality objectives.



Introduction

What are the Pollutants

Sediment



Construction Materials



Introduction

⇒ How do they Affect Your Site?

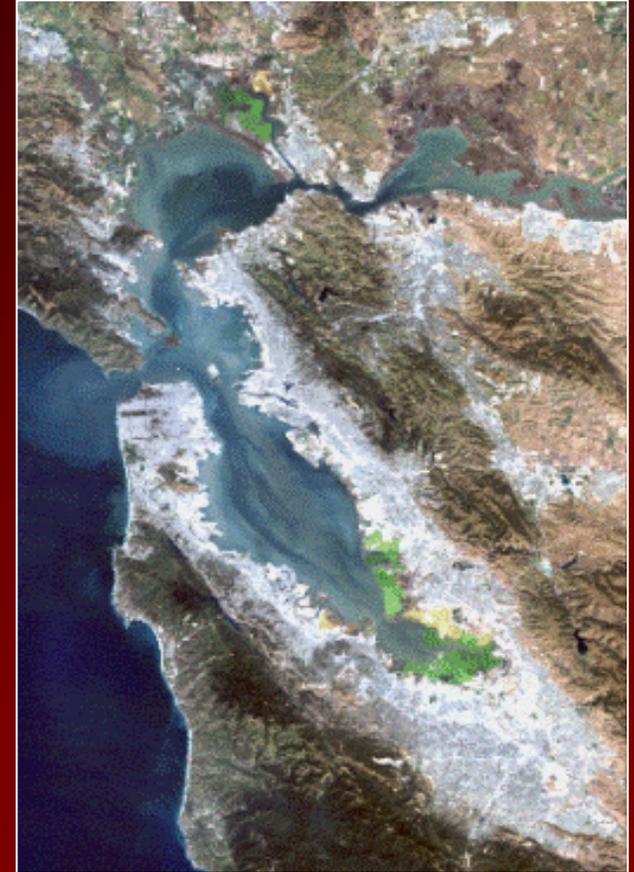
⇒ Almost every job site has the potential to contribute pollutants to storm water runoff such as;

- 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 1998 509 water bodies where listed as impaired in the State of California, most of them for multiple pollutants.
 - ⇒ 99 of the 509 water bodies are listed as impaired for sediment / siltation and turbidity
 - ⇒ Local 303(d) water bodies: Big Bear Lake, Lake Elsinore, San Diego Creek



➔ 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



➔ Non-Visible Pollutants

⇒ They are not visually detectable in storm water discharges

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



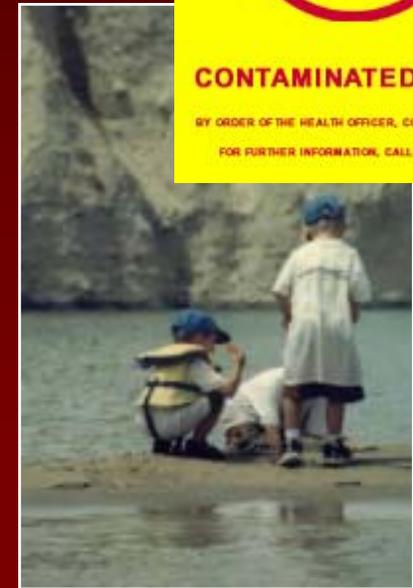
➔ How do Non-Visible Pollutants effect water bodies

- ⇒ 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

- Construction Procedure Directive – CPD
- 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



The Law

- ⇒ 1948 Federal Clean Water Act (CWA)
 - ⇒ Enacted to protect water bodies within the United States
- ⇒ 1967 Porter Cologne Water Quality Control Act
 - ⇒ Protecting water bodies within the state of California
- ⇒ 1992 California's General Permit
 - ⇒ Established Requirements for Discharges Associated with Construction Activities



Permits

➔ **General Construction Permit CAS000002 - The '02 permit**

- ⇒ Requires all construction projects that disturb 5 acres or more to gain coverage
- ⇒ Requires all SWPPPs as of August 1, 2001 to include monitoring for BMP assessment
- ⇒ List 303d Water Bodies for Sediment/Siltation and Turbidity
 - <http://www.swrcb.ca.gov/stormwtr/construction.html>

Resolution 2001-046

- ⇒ 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.

Resolution 2001-046

➔ Exceptions Listed in Permit (02)

⇒ Discharges from Tribal Lands

- Construction on Tribal Lands is regulated by an USEPA 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

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- **Caltrans Special Provisions and Handbooks**

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CPD

- ➔ Construction Procedure Directive (CPD 01-7) – July 2001
 - Caltrans mechanism for implementing a new requirement on existing projects
 - Contract Change Order (CCO)
 - Procedures for RE to follow to have Contractor:
 - Update SWPPP
 - Implement new changes

CPD 01-7

➔ Directive issued to:

⇒ Comply with the State Water Resources Control Board Modification of General Permit (CAS 000002) - Resolution 2001-046

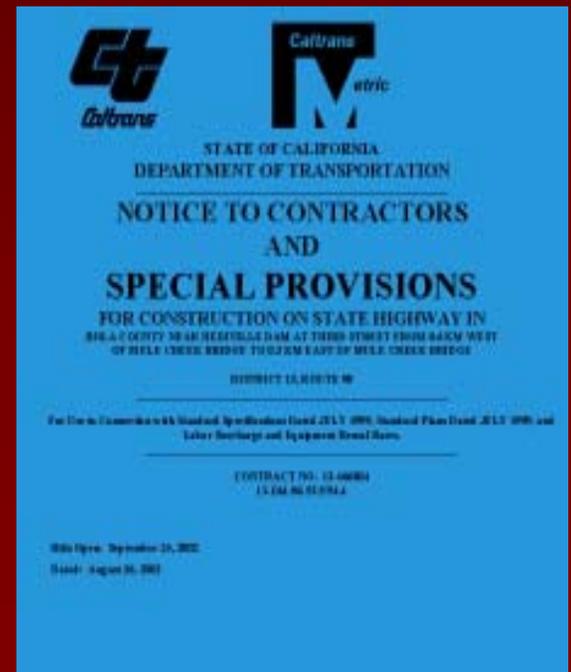
⇒ Include Sampling and Analytical Requirements for SWPPP projects

- Water Pollution Control Programs (WPCPs) are exempt at this time

➔ If your project SWPPP has not been updated to include Sampling and Analysis requirements do so ASAP

Contract Special Provisions

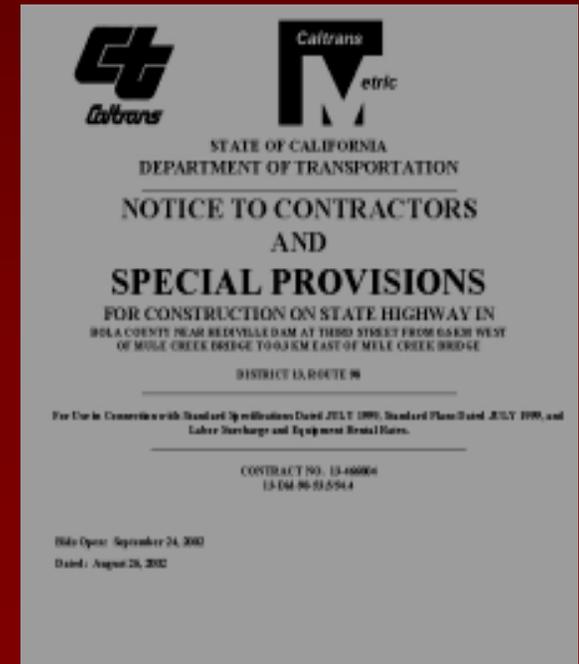
- ➔ Section 10-1.02 Water Pollution Control
 - ⇒ Issued to satisfy the NPDES Permit requirements
 - ⇒ Defines water pollution control requirements



Contract Special Provisions

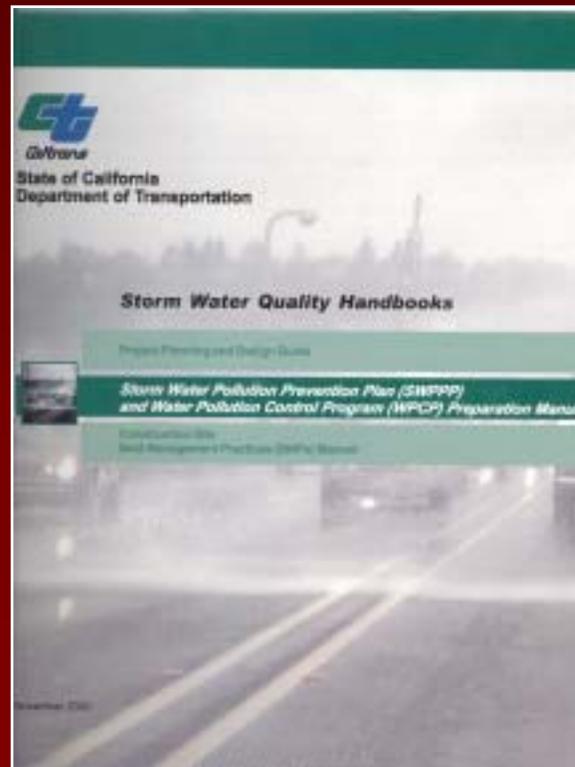
➔ Water Pollution Control Requirements (cont)

⇒ Sampling and Analytical Requirements



Construction Handbook

- ➔ SWPPP and WPCP Preparation Manual
 - ⇒ Updated version



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303(d) Water Bodies

➔ Sediment / Silt / Turbidity

⇒ Projects that discharge directly into a 303d water body listed for Sediment / Silt / Turbidity require a SAP

- List of 303d water bodies available from SWRCB

www.swrcb.ca.gov/stormwtr/construction.htm

⇒ 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 303d 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

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

Break

