Annual Report for Permit Year 5,
Reporting Year 11

October 2005

2004-05 Annual Report

Ventura Countywide Stormwater Quality Management Program

A cooperative project of the County of Ventura, the cities of Ventura County and the Ventura County Watershed Protection District

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EXECUTIVE SUMMARY

The purpose of this document is to comply with the Second Term Permit, Regional Water Quality Control Board Order No. 00-108 which requires submittal by October 1, 2005 of an Annual Storm Water Report and Assessment. This Report discusses the Co-permittees' Second Term Permit compliance activities for the period of July 1, 2004 to June 30, 2005 and includes a description of all activities that were conducted during the reporting period and an assessment of program effectiveness.

The organization of the report reflects the organization of the 2001 Stormwater Management Plan (SMP). The implementation portion of the SMP consists of the following elements:

- Program Management
- Program for Residents
- Programs for Industrial/Commercial Businesses
- Programs for Planning and Land Development
- Programs for Construction Sites
- Programs for Public Agency Activities
- Programs for Illicit Discharges/Illegal Connections
- Stormwater Monitoring Program

Notable accomplishments that occurred during the reporting period include:

- Countywide resident telephone survey
- New countywide stormwater public outreach program logo
- Implementation of a new public education strategy
- Co-permittee Coastal Cleanup Participation
- Countywide post-construction BMP Database development and coordination
- Countywide SQUIMP Training
- Research and analysis of potential funding sources
- Development and submittal of Report of Waste Discharge (ROWD)
- Stormwater Quality Monitoring (6 sampling events)
- Ventura River Macroinvertebrate Bioassessment Monitoring
- July 2005 Water Quality Monitoring Report
- TMDL participation
- CASQA participation
- Santa Clara River Enhancement and Management Plan (SCREMP) participation
- Calleguas Creek Watershed Management Plan participation
- Southern California Coastal Water Research Project (SCCWRP) participation
- Renewal of the Hillside Erosion Control Ordinance (HECO Program)

In realizing these notable accomplishments, the Co-permittees consider the comprehensive program development and requirements of the permit to have been met in the reporting period.

To provide a basis for annual Program Effectiveness Assessment (PEA), the Co-permittees have selected a series of measures (both *direct* and *indirect*) to respectively verify program implementation and ultimately validate achievement of program goals. The identified measures necessarily recognize that scientifically robust evidence of improved water quality

will follow confirmation of program implementation and should not be expected to be evident initially.

While evidence of the connection between programmatic activities and changing environmental conditions remains elusive, the Co-permittees believe that there is strong evidence of increasing program effectiveness. Indeed, compared to the previous reporting period this year's PEA shows:

- Significantly increased participation by the Co-permittees in the Management Committee and supporting program framework
- An increase of 347 tons to 961 tons in the amount of solid material recovered from the Co-permittees' catch basin inlet system
- Better coordination between stormwater program and the countywide Household Hazardous Waste program
- The achievement of 5,603,234 impressions in the countywide public outreach effort
- Decrease in the number of complaints (thus decreased illegal activity) investigated by the Co-permittees
- Decreased need for enforcement tools provided by the Co-permittees' local Water Quality Ordinances due to increased compliance and public awareness

In addition, key baseline data has been compiled on a jurisdictional, watershed and countywide basis for future comparative assessment in the areas of municipal activities, new development, construction and existing development.

With respect to water quality monitoring, the Co-permittees continued to implement their aggressive and comprehensive monitoring program. For the 2004/05 monitoring season, several key points have been identified and are highlighted below.

- The Ventura Countywide Stormwater Monitoring Program met the monitoring requirements of its NPDES permit

- Water quality monitoring data were successfully collected during four wet weather and two dry weather events monitored by the Stormwater Monitoring Program

- The heavy rains experienced during the 2004/05 monitoring season produced larger runoff events than are typically observed in Ventura County

- The Ventura River NPDES Mass Emission Monitoring Station (ME-VR), formerly located on Casitas Vista Road at Foster Park, was determined to be unsafe due to land slides that occurred during the heavy rainfalls of January and February 2005

- VCWPD employed the services of CRG Marine Laboratories, Inc. in order to achieve lower detection limits

- VCWPD used its water quality database to store and analyze stormwater quality data

- VCWPD is investigating the installation of an additional flow meter at ME-SCR to provide complete flow measurements at the site during wet weather events

- Acute toxicity was observed during one wet weather event at R-1, W-3 and W-4

- Chronic toxicity on *Haliotus rufescens* (Red Abalone) was observed during two wet weather events at Mass Emission station ME-VR

- Elevated pollutant concentrations were observed at all monitoring sites during one or more monitored wet weather storm events, as well as at all Mass Emission sites during one or more dry weather events

1.0 INTRODUCTION

1.1 Annual Reports

The Watershed Protection District (subsequently referred to as the Principal Co-permittee), the County of Ventura and the incorporated cities of Ventura County (Co-permittees) operate municipal storm drain systems and discharge stormwater and urban runoff pursuant to the countywide NPDES permit. This permit administrated by the Los Angeles Regional Water Quality Control Board (RWQCB), requires an Annual Storm Water Report and Assessment. The first term permit was adopted in 1994 and subsequently renewed in 2000. This Annual Report discusses the Co-permittees' NPDES permit compliance activities over the period July 1, 2004 to June 30, 2005.

1.2 Purpose and Organization of Report

In accordance with the requirements of the permit, the primary purpose of the report is to document:

- The status of the general program and individual tasks contained in the Stormwater Management Plan (SMP)
- Results of the monitoring and reporting program CI 7388; and
- Compliance status and effectiveness of the implementation of permit requirements on storm water quality

The organization of the report reflects the organization of the 2001 SMP. With respect to the Principal Co-permittee activities, the following information is presented:

- A review of the program management framework (committee and subcommittee structure) and a fiscal analysis report (**Section 2.0**)
- A review of the stormwater and watershed management process and associated technical studies (**Section 5.0**)
- A review of the status of the program implementation and compliance with the schedules established in the permit (**Sections 3.0 – 10**)
- A review of the status and effectiveness of the Public Outreach program (**Section 3.0**)
- A review of the status of the control measures established under the Illicit Discharge/Illegal Connections elimination program (**Section 8.0**)
- A summary and analysis of the monitoring results from the Water Quality Monitoring program (**Section 9.0**) and
- An overall evaluation of the Co-permittees efforts to meet SMP Performance Criteria and a discussion of future program goals (**Section 10.0**)

1.3 Background

1.3.1 Clean Water Act

The 1972 Federal Water Pollution Control Act, subsequently known as the Clean Water Act (CWA) established the National Pollutant Discharge Elimination System (NPDES) permitting program. As a result of court decisions and the overriding need to clarify the stormwater permitting requirements, the CWA required the United States Environmental Protection Agency (USEPA) to issue regulations to be effective by 1983 that included stormwater runoff from rainfall. Congress passed a Clean Water Act Amendment in 1987, the Water Quality Act, which brought stormwater discharges into the NPDES program. USEPA promulgated stormwater regulations (40 CFR Parts 122, 123 and 124) on November 16, 1990.

1.3.2 Municipal NPDES Stormwater Permits

In response to stormwater regulations, the Co-permittees have obtained, renewed and complied with NPDES Stormwater Permits issued by the Los Angeles Regional Water Quality Control Board (See **Table 1.1 Permit History**). Each permit renewal has required the Co-permittees to coordinate the development and implementation of a stormwater quality management plan (SMP) to:

- Prohibit illicit/illegal discharges from entering into the municipal stormwater conveyance systems; and
- Develop and implement Best Management Practices (BMPs) to control/reduce the discharge of pollutants to waters of the United States to the maximum extent practicable (MEP)

The permits have also required the preparation of an Annual Storm Water Report and Assessment no later than October 1 of each year.

1.3.3 Stormwater Quality Management Plan (SMP)

The specific water pollutant control elements of the Ventura Countywide NPDES Stormwater Program were initially documented in the 1994 SMP, which served as the Co-Permittees' primary policy and implementation document for municipal NPDES Stormwater Permit compliance. The main objective of the SMP is to fulfill the commitment of the Co-permittees to develop and implement a program that satisfies NPDES permit requirements. The 1994 SMP was prepared using a consensus building process that involved public and private sector input.

The Second Term Permit required the Co-permittees to further enhance existing program elements as well as develop additional ones. One of the major challenges for the Co-permittees in updating the SMP was the inclusion of fiscal analysis requirements, educational site visits to state permitted industrial facilities, the development of a Technical Guidance Manual for stormwater quality control measures and identify environmentally sensitive areas (ESAs) in Ventura County for the application of Stormwater Quality Urban Impact Plan (SQUIMP) requirements.

In addition, the SMP was modified to include major changes to the water quality monitoring program. These changes included mass emission monitoring along the Ventura River and the Santa Clara River, and Macro-invertebrate Bioassessment monitoring in the Ventura River watershed.

1.4 Major Program Accomplishments

The activities undertaken during the reporting period occurred during a challenging time for the Co-permittees. Permit Year 5, Reporting Year 11(July 1, 2004 to June 30, 2005) included the initiation of redefining the relationship between the Co-permittees and the Principal Co-permittees in conjunction with a revision of responsibilities and accountability. Thi also included the Co-permittees researching and analyzing potential funding sources and/or reporting period mechanisms to counter balance ongoing program financial deficits. Notable accomplishments that occurred during the reporting period include:

- Survey of county residents on their awareness of stormwater quality issues
- New countywide stormwater public outreach program logo
- Implementation of a new public education strategy
- Countywide post-construction BMP Database development and coordination
- Countywide SQUIMP Training

- Development and submittal of Report of Waste Discharge (ROWD)
- Stormwater Quality Monitoring (6 events)
- Ventura River Macro-invertebrate Bioassessment Monitoring
- TMDL participation
- CASQA participation
- Santa Clara River Enhancement and Management Plan (SCREMP) participation
- Calleguas Creek Watershed Management Plan participation
- Southern California Coastal Water Research Project (SCCWRP) participation
- Renewal of the Hillside Erosion Control Ordinance (HECO Program)

1.5 Effectiveness Assessment Strategy

The SMP recognizes a number of separate but nonetheless related water quality planning processes. These processes are countywide, jurisdictional and watershed based water quality management. Each process is iterative and incorporates phases of assessment to determine whether programmatic goals are being achieved.

1.5.1 Measurable Goals

Measurable goals are a primary SMP implementation tool. They are described by USEPA as BMP design objectives or goals that quantify the progress of program implementation and the performance of BMPs. They are objective markers or milestones that track the progress of BMPs in reducing pollutants to the MEP.

Measurable goals may be categorized in a variety of ways. In this instance, two categories are acknowledged: (1) the shorter-term confirmation of BMP implementation (Implementation or Process Measures, also termed Programmatic Indicators) and (2) the longer-term verification of environmental improvement (Validation or Results Measures, typically actual indicators of environmental change). In essence, the categorization of measures reflects two basic assessment questions.

- Are program elements being implemented correctly?
- Are desired outcomes (i.e. environmental improvements) being achieved?

Programmatic and environmental indicators may be constructed into a hierarchical relationship (See **Table 1.2 Hierarchy of Indicators**). This relationship helps to illustrate the fact that environmental outcomes rest on, or follow from, jurisdictional program implementation. Moreover, it points to the reality that scientifically robust evidence of changing ecosystem quality will follow program implementation and should not be expected to be evident concurrently.

In the context of evaluating stormwater management program implementation, the distinction is also often made between *direct* and *indirect* measures. Direct measures are typically environmental indicators such as determinations of water quality. Indirect measures are essentially non-water quality indicators, such as reductions in pesticide use, from which improvements in water quality can be inferred.

A number of Performance Measures have been identified based upon the following selection criteria:

- Relevance: It has demonstrable relation to the strategy and objectives
- Reliability: The measure will help identify the strengths and weakness of the program area/process

- Clarity of Naming System: It is readily understandable by its name; and
- Availability of Data: The data are available at reasonable cost

These Performance Measures comprise process and result (direct and indirect) measures that will be used to highlight the progress of the Co-permittees in implementing water quality management, protection and enhancement requirements of the Permit. The Performance Measures are presented in **Table 1.3 Performance Measures**.

1.5.2 Effectiveness Assessment

A program of effectiveness assessment requires the initial establishment of a set of baseline conditions. Thereafter effectiveness can be evaluated by comparisons of successive years of indicator information against the baseline data. Where the period of evaluation is characterized by the implementation of new program requirements, determinations of program effectiveness will initially be limited to confirmation of program implementation. Indeed, it must be recognized that direct measures of program effectiveness may not be available within the terms of the Second Term Permit. This challenge arises because:

- Baseline water quality conditions are not readily established
- Water quality changes in response to program implementation are likely to be slow
- Establishing a link between receiving water condition and program activities is difficult at the watershed scale when program elements are being implemented incrementally with the development/redevelopment cycle

The evaluation of stormwater program effectiveness assessment is also conducted at two levels. At the jurisdictional or Co-permittee level, the assessment is conducted annually and focuses on program implementation. Inferences about the connection of management program elements to water quality improvements made in these assessments will be drawn from the assessment of programmatic indicators and indirect measures of progress. Further, the outcome of the assessment will be proposed revisions to the SMP. As noted earlier, the Co-permittees' assessments are presented in **Sections 3.0 – 9.0**.

At the countywide program level, the major assessment is done principally on a five-year basis with an emphasis on using direct measures of progress. This assessment is used to update the review and revision of the SMP using information from the water quality-monitoring program. In the intervening periods, it is anticipated that this information will be used to direct SMP revision in intervening years as such information becomes available.

The Annual Progress Report strategy is illustrated in **Figure 1.1**

Table 1.1 Permit History

Permit Term	Order No.	NPDES No.	Date Adopted
First (1994-2000)	94-082	CAS063339	August 22, 1994
Second (2000-present)	00-108	CAS004002	July 27, 2000

Table 1.2 Hierarchy of Indicators (USEPA, 1998)

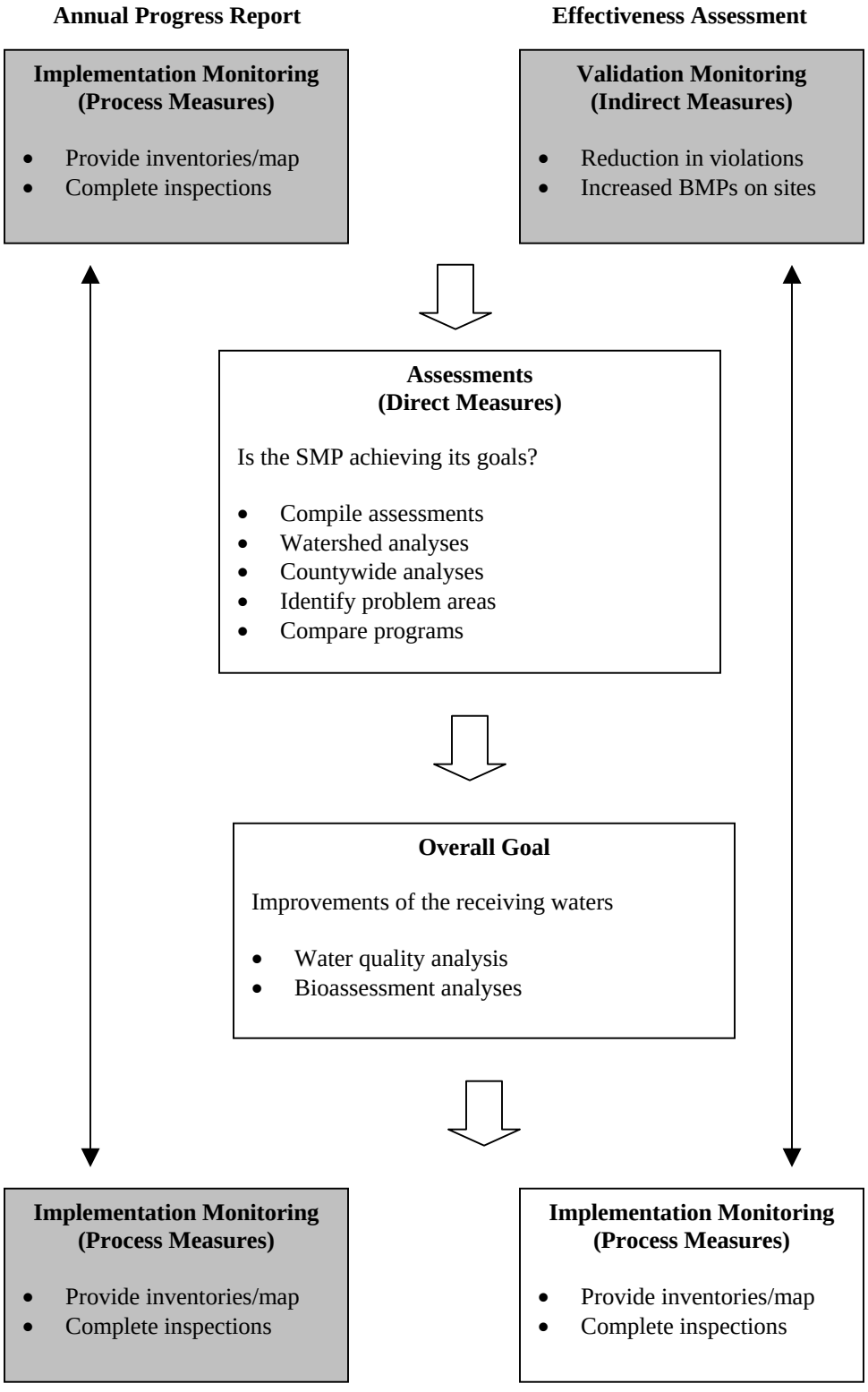
Environmental Indicators (Direct Measures)	6	Ultimate Impacts: Ecological Health Welfare
	5	Body Burden/Uptake
	4	Ambient Conditions
	3	Discharge/Emission
Programmatic Indicators (Indirect Measures)	2	Actions by Regulated Community
	1	Actions by Regulators

Table 1.3 Performance Measures

Program Element	Performance Measure	Process Measure	Result Measure	
			Indirect	Direct
Program Management	Participation in Management Committee	X		
	Participation in subcommittee meetings	X		
	Submittal of Co-permittee Self-Audit	X		
	Submittal of the Annual Report	X		
	Annually submittal of Co-permittee program evaluation results	X		
	Stormwater program budget updates	X		
	Review and adopt or amend legal authority to implement stormwater management plan	X		
Public Outreach	Identify program contact person(s)	X		
	Catch basin stenciling	X		
	Signs prohibiting illegal dumping at designated public access points to creeks and channels		X	
	Educational activities and participation in countywide events		X	
	Household Hazardous Waste Collected		X	
	Used Oil Collected		X	
	Educational material distribution			
	No. of outreach contacts	X		
Industrial/Commercial Businesses	No. of site education/inspections to automotive, food service and other targeted businesses	X		
	No. of follow up inspections	X		
	No. of additional businesses targeted based on Pollutants of Concern (POCs) as appropriate	X		
	No. of facilities identified as potentially subject to the General Industrial Permit given educational materials	X		
	No. of targeted employees trained	X		
Planning & Land Development	No. of Projects reviewed and conditioned for stormwater	X		
	Area to which BMPs have been applied		X	
	No. of BMPs implemented		X	

Program Element	Performance Measure	Process Measure	Result Measure	
			Indirect	Direct
Planning & Land Development con't.	Stormwater quality conditions included in environmental checklists, initial studies or EIRs required by CEQA and/or NEPA	X		
	Watershed and stormwater management considerations in Co-permittees' General Plan	X		
	Technical Guidance Manual	X		
	Environmentally Sensitive Areas	X		
	Development Community Outreach		X	
	No. of targeted employees trained	X		
Construction Sites	No. of SWPCPs/SWPPPs developed and implemented		X	
	No. of NOIs filed with the State		X	
	No. of sites inspected	X		
	No. of follow up inspections	X		
	No. of enforcement actions	X		
	Construction Community Outreach		X	
	No. of targeted employees trained	X		
Municipal Activities	Co-permittee corporate yard SWPCP		X	
	Drainage System Operation and Maintenance		X	
	Roadway Operation and Maintenance		X	
	No. of Facilities Inspected	X		
	Solid Waste Collected		X	
	Pesticide, Herbicide and Fertilizer Protocols		X	
	Reduction in Total Pesticide Application		X	
	Reduction in Total Fertilizer (Nitrogen) Application		X	
	Reduction in Total Fertilizer (Phosphorus) Application		X	
	No. of targeted employees trained	X		
Illicit Discharge/Illegal Connections	No. of complaints		X	
	No. of enforcement actions	X		
	Educational material distribution		X	
	No. of targeted employees trained	X		
Water Quality	Monitoring			X

Figure 1.1 Program Effectiveness Assessment Flow Chart



Shaded boxes are explicitly within the Co-permittee program effectiveness assessments.
Un-shaded boxes are within the Principal Co-permittees program effectiveness assessments.

SECTION 2.0 PROGRAM MANAGEMENT

2.0 Program Description

2.1 Introduction

At the inception of the Ventura Countywide Stormwater Program, the Co-permittees agreed that the Watershed Protection District (VCWPD) would be the Principal Co-permittee and the cities and the County of Ventura would be Co-permittees of the permit. Principal Co-permittee and Co-permittee responsibilities are specified in the Permit and reiterated in the National Pollutant Discharge Elimination System Implementation Agreement (Implementation Agreement), which additionally provides a funding mechanism for both the individual Co-permittee stormwater program and the shared costs of the countywide program. To further support the development and implementation of a coordinated countywide program, a management framework was created during the First permit term. This framework has evolved into a two-tier structure as described in **Section 2.3**.

2.2 Co-permittee Responsibilities

2.2.1 NPDES Permit Responsibilities

The responsibilities of the Principal Co-permittee and Co-permittees are defined within the Permit, Implementation Agreement or as otherwise identified within separate funding agreements.

Principal Co-permittee

The role of the Principal Co-permittee is similar to the other Co-permittees with the addition of certain overall programmatic and management responsibilities. These responsibilities include the following:

- Coordinate Permit activities;
- Establish uniform data submittal format;
- Set time schedules;
- Prepare regulatory reports;
- Forward information to the Co-permittees;
- Arrange for public review;
- Secure services of consultants as necessary;
- Implement activities of common interest;
- Develop/prepare/generate all materials and data common to all Co-permittees;
- Update Co-permittees on RWQCB and US Environmental Protection Agency (USEPA) regulations;
- Convene all Management Committee and Subcommittee meetings;
- Manage the countywide educational program; and
- Manage the countywide stormwater quality monitoring program

The Principal Co-permittee has no regulatory authority over the Co-permittees.

Co-permittees

Each Co-permittee is responsible for implementing the NPDES Stormwater Program within their jurisdiction. The main responsibility of each Co-permittee includes:

- Review, approve and comment on budgets, plans, strategies, management programs and monitoring programs developed by the Principal Co-permittee or any subcommittee;

- Implement the various stormwater management programs outlined in the Permit and the Stormwater Management Plan (SMP) within its jurisdiction;
- Establish and maintain adequate legal authority;
- Coordinate among internal department and agencies, as appropriate, to facilitate the implementation of the Permit and the SMP;
- Respond to/or arrange for response to emergency situations, such as accidental spills, leaks, illicit discharges/illegal connections, etc., to prevent or reduce the discharge of pollutants to the storm drain systems and waters of the U.S. within its jurisdiction;
- Conduct inspections of and perform maintenance on municipal infrastructure within its jurisdiction;
- Take appropriate enforcement actions as necessary within its jurisdictions to ensure compliance with applicable ordinances;
- Conduct and coordinate any surveys and source identification studies necessary to identify pollutant sources and drainage areas;
- Participate in the Management Committee meetings and any subcommittee meetings as outlined in the SMP; and
- Prepare and submit all reports or requests of information to the Principal Co-permittee in a timely fashion

2.2.2 Agreement for Program Implementation

The agreement supporting VCWPD, County and city cooperation is the Implementation Agreement, which established the responsibilities of the Co-permittees with respect to compliance with the Permit. The Implementation Agreement also establishes a funding mechanism for individual and shared costs of the NPDES Stormwater Program.

2.2.3 NPDES Permit Reporting Requirements

All NPDES submittals are produced under the auspices of the Management Committee and subcommittees before submission to the RWQCB.

2.3 Management Activities

2.3.1 Management Framework

USEPA defines a management framework as a *lasting process for partners working together. It's a support structure making it easier to coordinate efforts – a structure made of agreed upon standard operating procedures, timeliness and for a communicating with each other* (UESPA, 2002). In response to additional permit requirements and growing program complexity, the Co-permittees began meeting on a more frequent basis. These discussions are ongoing with the intent of reaching consensus on the best Program structure and better define roles and responsibilities of the participating agencies.

NPDES Management Committee

The NPDES Management Committee is the Principal forum for directing the Program's development and implementation. This Committee is attended by senior staff from all Co-permittee agencies and meets monthly to assure Program continuity. In addition, this committee periodically evaluates the need to create ad hoc committees or workgroups as required in order to accomplish the objectives of the NPDES Stormwater Program. Participation in the NPDES Management Committee is a specific requirement of the Permit.

Co-permittee participation in the NPDES Management Committee is noted in **Figure 2.1**.

Subcommittees/Work Groups

The Subcommittee/Work Groups, which are tasked principally with program material responsibilities, are:

- Residential/Public Outreach Subcommittee
  Purpose: To help provide regional consistency and oversight for the stormwater public education program efforts

- Business and Illicit Discharge Control Subcommittee
  Purpose: To oversee the development of the model industrial/commercial and illicit discharge/illegal connections programs

- Planning and Land Development Subcommittee
  Purpose: To help provide regional consistency and oversight for the review and conditioning of new development and redevelopment projects.

- Construction Subcommittee
  Purpose: To oversee the development of model new development and construction programs

- Public Infrastructure Subcommittee
  Purpose: To oversee the development of the model municipal activities program and integrate pesticide management, pesticide and fertilizer programs

Co-permittee participation in Subcommittees is noted in **Figure 2.2**.

Other Regional Committees/Work Groups

Many of the Co-permittees additionally participate in various watershed management advisory groups. These groups include: the Santa Clara River Enhancement and Management Committee, the Calleguas Creek Watershed Management Committee, the Matilija Dam Ecosystem Restoration Study, the Channel Islands Beach Park Action Plan for Improving Water Quality, the Malibu Creek Watershed Management Committee, and the Steelhead Restoration and Recovery Plan. These watershed groups focus their activities and discussions on watershed specific concerns such as water quality, habitat restoration and flood control, as well as short, medium and long-term solutions.

2.3.2 Management Framework – Program Implementation

In addition to the countywide and watershed management framework for program development, the Co-permittees at a jurisdiction level have formally identified which departments have responsibility for implementation of each program elements within their jurisdictions.

2.4 Legal Authority

2.4.1 Introduction

The second term Permit required implementation of programs to address runoff from commercial, industrial and residential areas to reduce the amount of pollutants to the municipal storm drain system. Central to these programs is the establishment, by each Co-permittee, of adequate legal authority to control the contribution of pollutants to the municipal storm drain system.

With the adoption of the second term Permit in 2000, the Co-permittees reviewed and revised all applicable ordinances as necessary, verified their legal authority and developed a long-term strategy for assessing this program element. The specific tasks necessary to complete this included the following:

- Review the legal authority to enforce permit requirements;
- Review and revise the grading and erosion control ordinances as needed;
- Review and revise the water quality ordinances as needed;
- Review the effectiveness of water quality ordinances on prohibiting discharges;
- Review and revise litter/trash control ordinances as needed;
- Develop a long-term strategy for assessing the effectiveness of the legal authority program component

2.4.2 Authority to Control Pollutant Discharges

Although adequate legal authority existed for most potential pollutant discharges at the inception of the stormwater program, in 1994, the Co-permittees determined that a Model Stormwater Quality Ordinance should be developed to provide a more uniform countywide approach and to provide a legal underpinning to the entire Ventura Countywide NPDES Stormwater Program.

Subsequently, all of the Co-permittees adopted largely similar versions of the model Stormwater Quality Ordinance. In addition, each Co-permittee has designated Authorized Inspector(s) responsible for enforcing the Ordinance. The Authorized Inspector(s) is the person designated to investigate compliance with, detect violations of and/or take actions pursuant to the Ordinance.

The detection, elimination and enforcement activities undertaken by the Co-permittees during 2004/05 are described further in **Section 8**. In addition to prohibiting non-permitted discharges, the Stormwater Quality Ordinance in conjunction with the SQUIMP also provides for requiring BMPs in new development and significant redevelopment.

A Stormwater Quality Ordinance has been adopted in each Co-permittees' jurisdictions as indicated in **Table 2.1 Ordinance Adoption Dates**.

2.5 Watershed Protection Stormwater Program Representation

2.5.1 Coordination with Regulatory Agencies

The Principal Co-permittee represents the Co-permittees on the California Association of Stormwater Quality Agencies (CASQA), the Southern California Coastal Water Research Project (SCCWRP), and the California Coalition for Clean Water (CCCW).

California Association for Stormwater Quality Agencies (CASQA)

The California Association of Stormwater Quality Agencies (previously California Storm Water Quality Task Force) serves as advisory body to the State Water Resources Control Board (SWRCB) on stormwater quality program issues. CASQA is primarily comprised of agencies, organizations, businesses and individuals responsible for and/or interested in the implementation of municipal stormwater management programs in California. Since its inception in 1989, CASQA has evolved into the leading organization in California dealing with stormwater quality issues.

Southern California Coastal Water Research Project (SCCWRP)

The Southern California Coastal Water Research Project (SCCWRP) is a joint powers agency focusing on marine environmental research. SCCWRP's mission is to gather the necessary scientific information so that member agencies can effectively and cost-efficiently protect the Southern California marine environment. In addition, SCCWRP's mission is to ensure that the data it collects and synthesizes effectively reaches decision-makers, scientists and the public.

California Coalition for Clean Water (CCCW)

The California Coalition for Clean Water (CCCW) is an alliance of local governments and public agencies, labor, agriculture, business, housing and development interests working together towards the development and implementation of water quality standards that protect water quality while balancing economic and social needs of local communities and the State. CCCW's mission is to assist the California Regional Water Quality Control Boards and SWRCB to adopt and implement sound water quality standards that reflect the intent and spirit of state and federal clean water laws.

2.5.2 Coordination with Other Agencies

State and Federal Organizations

During the second term permit period (2000-2005), the Watershed Protection District (VCWPD) participated jointly with sixty five other organizations including state and federal regulatory agencies in the SCCWRP coordinated *Bight '03* regional monitoring program. The program has three components: Coastal Ecology, Water Quality and Shoreline Microbiology. In addition to a financial contribution to the Bight '03 program, the District is sponsoring the "*Quantification of Natural Contributions During Wet and Dry Weather for Derivation of Load Allocations and Numeric Targets*." This two-year project intends to evaluate the water quality contributions and properties of stream reaches in undeveloped catchments throughout southern California in order to assist environmental managers with load allocations and setting appropriate numeric targets. Of the fourteen study sites, four sampling locations are located in Ventura County.

Southern California Agencies

Beginning in 2003, VCWPD began participating in the Storm Water Advisory Team (SWAT) meetings. SWAT was created by stormwater-regulated agencies who believed that coordination amongst the regulated community would be beneficial to not only providing an unified voice to the RWQCB but would also encourage regional consistency in pollution prevention efforts. Meetings are held quarterly and discussions include TMDL development and progress, permit negotiations, and regional monitoring opportunities.

2.6 Fiscal Analysis

This Section presents a summary of the costs incurred by the Co-permittees in developing, implementing and maintaining programs in order to comply with permit requirements and includes information on the funding sources used by the Co-permittees. The total cost to each Co-permittee is the sum of *shared* costs and *individual* costs.

2.6.1 Shared Costs

Shared costs are those that fund activities performed by the Principal Co-permittee under the stormwater program's Implementation Agreement. Each municipality's contribution to the shared costs is determined by a formula established in the Implementation Agreement.

The program management activities handled by the Principal Co-permittee include development of model compliance program elements, development and execution of intergovernmental agreements, representation of Co-permittees at meetings with other organizations, preparation of compliance reports, budgets and program documentation, representation of the program before appropriate agencies such as the RWQCB and the SWRCB, procurement and subsequent coordination of consultant studies and coordination with Co-permittee representatives.

2004-05 Reporting Period

The actual-shared cost expenditures for the 2004/05 reporting period were $205,300. This amount represents the monies spent on a consultant contract to investigate alternative funding mechanisms, etc.

2.6.2 Individual Costs

Individual costs are those incurred by each Co-permittees arising from its jurisdictional program implementation and include capital and operation and maintenance costs:

- Capital Costs - Costs for design and construction of stormwater capital projects, including conveyance facilities, structural BMPs, large SW system rehabilitation projects as well as equipment purchases that qualify as capital purchases; and
- Operations and Maintenance Costs - Portion of salary and overhead costs for personnel assigned to provide stormwater vehicle maintenance as well as development of a corporate yard SWPCP, inspection of corporate yards, tracking the prohibition of untreated stormwater for hazardous material storage and vehicle fueling, repair, and maintenance areas, equipment costs, fuel, equipment maintenance, and disposal costs.

The sum of the capital and operation and maintenance costs is the total cost that each Co-permittee has incurred individually to meet the permit requirements.

2004-05 Reporting Period

In 2004/05 the total cost of the activities undertaken by the Co-permittees implementing the stormwater program within their jurisdictions are reported to be:

- Total Individual Co-permittee Costs $14,205,276

This total compares to $10,215,825 in the 2003/04 reporting period.

2005-06 Reporting Period

In 2005/06, the total cost of the activities to be undertaken by the Co-permittees implementing the countywide stormwater program within their jurisdictions is estimated to be (see **Table 2.2 Agency Annual Budget Update for Stormwater Management Program – Fiscal Year 2005-06**):

- Total Individual Co-permittee Costs $15,429,018

2.6.3 Fiscal Resources

Each Co-permittee prepares a stormwater budget annually and allocates resources to be applied to the stormwater program. **Table 2.2 Agency Annual Budget Update for Stormwater Management Program – Fiscal Year 2005-06** presents the projected

stormwater budget for each Co-permittee for Fiscal Year 2005/06 and **Figure 2.3** presents the countywide budget obtained through the Benefit Assessment Program and other sources for the stormwater budget.

As expected, there is some variability between the stormwater program budgets reported by the Co-permittees. This variability is due in part to the accounting practices utilized by each Co-permittee and the allocation of activity costs amongst programs implemented by each Co-permittee.

In addition, the Co-permittees vary significantly in their jurisdictional area and population (see **Table 2.3 Ventura County Statistics**), which may explain some differences in resources dedicated to various program areas. Yet, a review of the annual budgets produces some nominal findings. In general, Co-permittees with the largest populations tend to have budgets greater than the budgets reported by Co-permittees with the smallest populations. However, within the group of cities with the largest populations and within the group with the smallest populations, there is still variation in program budgets.

2.6.4 Funding Sources

Funding sources to implement the stormwater program, including existing programs that meet permit objectives, include both general and specific funds, taxes, maintenance and user fees and grants. Volunteer groups like Surfrider implement some stormwater program elements and thus no fiscal value was attributed to these contributions.

The funding sources used by the Co-permittees include: Watershed Protection District Benefit Assessment Program, General Fund, Utility Tax, Separate Tax, Gas Tax, Special District Fund, and Others (Sanitation Fee, Fleet Maintenance, Community Services District, Water Fund, Grants and Used Oil Recycling Grants).

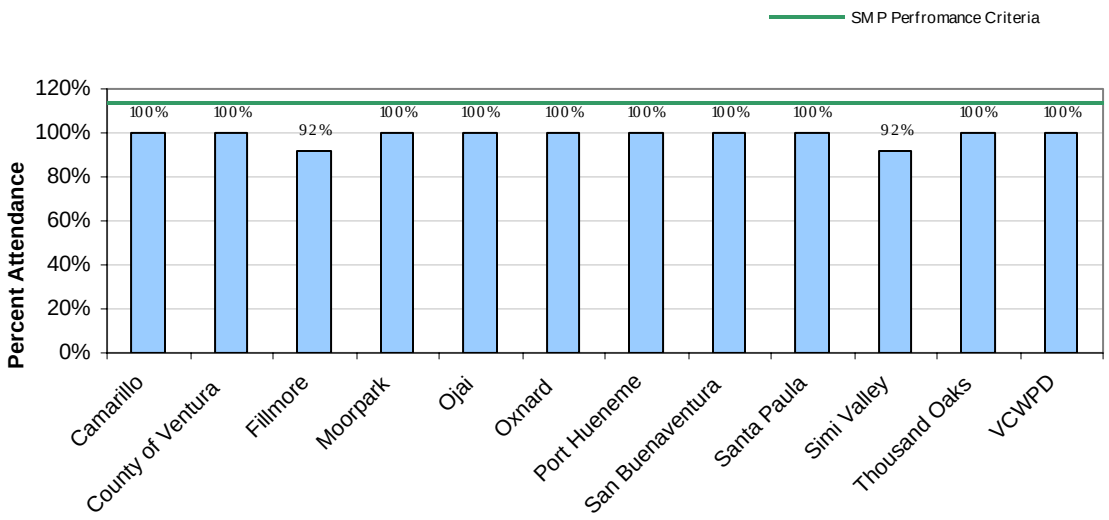


Figure 2-1 Co-Permittee Management Committee Meeting Attendance

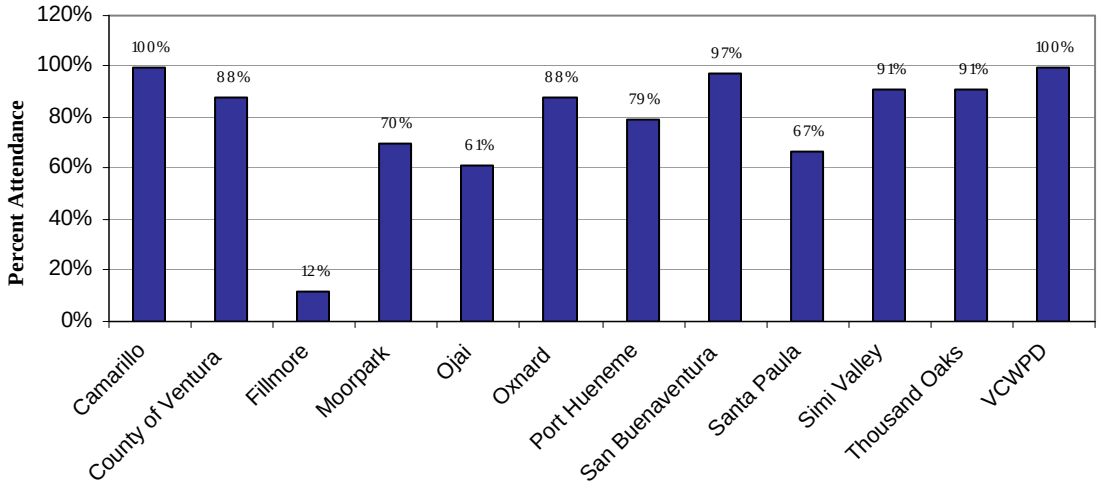


Figure 2-2 Co-Permittee Subcommittee Meeting Attendance

Table 2.1 Ordinance Adoption Dates

Co-permittees	Adopted Date	Amendment Date
Camarillo	3/25/98	
County of Ventura	7/22/97	
Fillmore	12/27/98	
Moorpark	12/3/97	
Ojai	2/9/99	
Oxnard	3/24/98	
Port Hueneme	4/1/98	2/1/01
San Buenaventura	1/11/99	
Santa Paula	11/16/98	
Simi Valley	7/23/01	4/22/02
Thousand Oaks	9/14/99	

Table 2.3 Ventura County Statistics

Co-permittees	Population	Area (Sq. Mi.)
Camarillo	61,746	19.6
County of Ventura	46,328	10.7
Fillmore	15,128	2.7
Moorpark	34,887	19.2
Ojai	8,097	4.4
Oxnard	186,122	25.3
Port Hueneme	22,137	4.3
San Buenaventura	104,952	21.7
Santa Paula	29,121	4.6
Simi Valley	118,793	39.4
Thousand Oaks	126,081	57.2

Table 2.2 Agency Annual Budget Update for Stormwater Management Program - Fiscal Year 2005-2006

	Item	*Co-Permittee*												
		Camarillo	County of Ventura	Fillmore	Moorpark	Ojai	Oxnard	Port Hueneme	San Buenaventura	Santa Paula*	Simi Valley	Thousand Oaks	VCWPD	Principal Co-Permittee
I.	Program Management	$149,456	$66,096	$26,000	$45,965	$12,000	$260,523	$25,400	$79,633		$190,200	$139,288	$84,304	$752,387
II.	Illicit Connections/Illicit Discharge	$39,241	$140,293	$5,000	$20,000	$3,000	$85,058	$8,900	$83,838		$234,900	$92,009	$4,337	
III.	Development Planning/Development Construction	$30,754	$83,977	$26,000	$150,000	$3,000	$91,404	$5,000	$68,487		$20,300	$53,630	$5,308	$22,935
IV.	Construction Inspection Activities	$64,311	$228,765	$32,000	$100,000	$5,000	$180,894	$5,000	$165,535		$210,900	$110,212	$13,363	$1,427
V.	Public Agency Activities (PA)													
V.a.	PA Operations and Maintenance	$114,128	$113,459	$25,000	$26,000	$40,800	$467,809	$30,000	$149,079		$305,400	$177,672	$2,759,202	
V.b.	PA Municipal Street Sweeping	$227,000	$49,107	$72,000	$110,000	$48,000	$525,000	$63,000	$481,178		$396,900	$571,923	NA[1]	NA[2]
V.c.	PA Fleet and Public Agency Facilities (Corporate Yards)	$4,310	$37,343	$21,000	$2,000	$2,000	$33,581	$3,500	$9,786		$214,600	$2,925	$53,243	
V.d.	PA Landscape and Recreational Facilities	$12,158	$6,619	$95,000	$1,000	$35,000	$8,179	$167,600			$1,200	$1,500	NA[1]	NA[2]
VI.	Capital Costs	$107,500	$204	$30,000	$25,000		$390,000	$5,000			$2,693,000			
VII.	Public Information and Participation	$13,420	$4,854		$7,100	$2,000	$17,294	$5,000	$52,667		$49,000	$42,540		$266,049
VIII.	Monitoring Program	$0					$29,144		$8,000		$6,600			$591,183
IX.	Other	$35,499					$185,998		$18,516		$786,200			$4,012
	Totals	$797,777	$730,717	$332,000	$487,065	$150,800	$2,274,884	$318,400	$1,116,719		$5,109,200	$1,191,699	$2,919,757	$1,637,993
	Percent Benefit Assessment	18%	8%	5%	0%	22%	24%	5%	21%		3%	35%	0%	87%

* Note that Santa Paula did not submit Budget annual report data this reporting year.

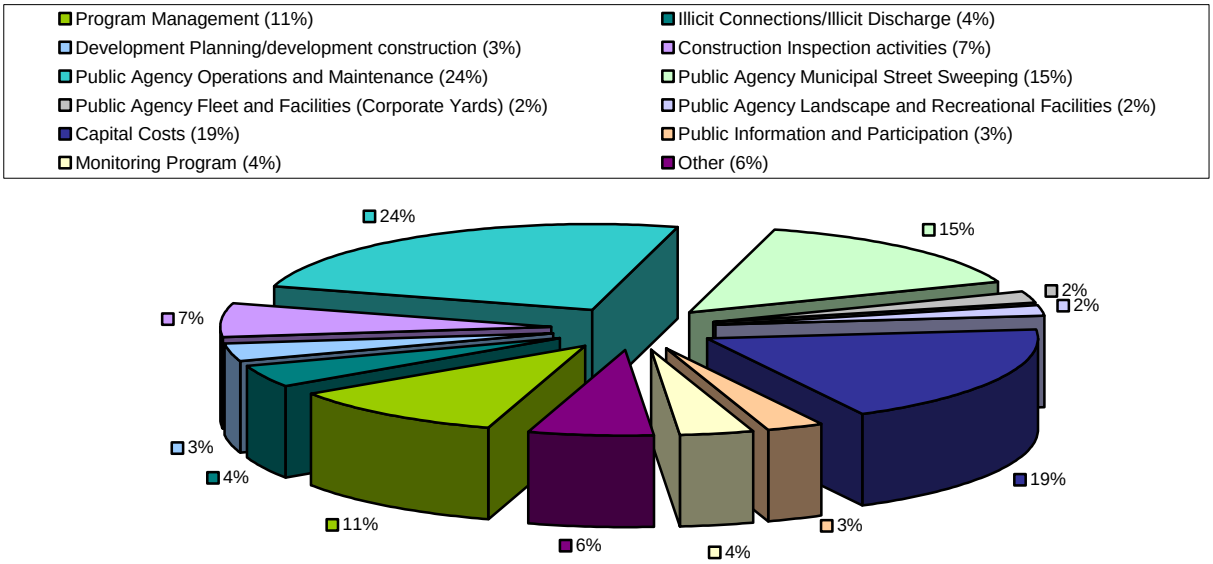


Figure 2-3 Countywide FY 2005-2006 Stormwater Program Budget

SECTION 3.0 PROGRAM FOR RESIDENTS

3.0 Program Description

3.1 Introduction

Public Education is an essential part of a municipal stormwater program. Developing programs to increase the awareness of and involve the public can be an effective method for controlling non-point source pollution. Emphasizing the relevant impact of stormwater pollution to each particular target audience increases the likelihood that the messages will be noticed and that the audience will support and participate in program implementation. When a community has a clear idea where the pollution comes from, how it can affect them and what they can do to prevent those affects, it will be more likely to support and participate in program implementation.

3.2 Program Development

During the first and second term permits, the public education program mainly consisted on: the development and distribution of public education materials; participation in community outreach events such as the Ventura County Fair; school demonstrations; speaking engagements; the development of water pollution problem reporting hotline; and coordination with other agencies running public information programs such as water districts, sanitation districts, fire departments and environmental groups.

The Co-permittees, in an effort to both gear up for anticipated additional public education permit requirements (third term permit due to be re-issued summer 2005) and in appreciation that effective educational outreach requires periodic re-tooling, began to evaluate past years' outreach efforts. The Co-permittees hoped to build upon the many successes of the current program and to refine those portions having little impact or utility. As a starting point of discussion, the Co-permittees identified those key elements crucial to establishing a successful outreach campaign. These elements included:

- Public Awareness Surveys
- Identification of general and specific goals of the program
- Identification of target audiences and key messages for those audiences
- Development of program strategies and plan overview
- Pollution prevention program "brand name"
- Development of a model watershed program; and
- Development of key website materials

In early 2004, the Co-permittees hired a consultant to perform a telephone survey of county residents on their awareness of stormwater issues (**Section 3.5**). Based on the survey results, the consultant prepared a long-term NPDES public education strategy that aimed to effectively educate the public and target subgroups about the effects of stormwater pollution and encourage their participation in the protection of surface waters. The Final Report entitled, "Ventura Countywide Stormwater Outreach Implementation Strategy" included a comprehensive approach and "tool box" of educational elements to be implemented based upon the desired direction of the program.

In late 2004 the Co-permittees selected a public relations and marketing firm to help the Co-permittees integrate the telephone survey results and apply its findings into a comprehensive countywide outreach message and direction. The Co-permittees' plan is to not only impact immediate awareness of stormwater pollution, but to lay a foundation that, over time, can help establish an environmental ethic in Ventura County residents that will prevent stormwater pollution at its source.

SECTION 3.0 PROGRAM FOR RESIDENTS

A scope of work was developed that included:

- Creation of new logo and slogan to market the stormwater program
- Audit, revision and development of public education materials
- Translation of all new countywide outreach materials into Spanish
- Purchase of high potential, cost effective media and non-media
- Identification of opportunities to coordinate individual Co-permittee efforts with the countywide educational goals and messages
- Implementation of model watershed education program

Future efforts may include:

- Identification of opportunities to reach out to regulatory agencies
- Development of a methodology for public awareness surveys
- Development of a model public education/public participation strategy for localization at the Co-permittee level
- Development and implementation of a school education outreach program
- Development and implementation of restaurant/food facilities outreach program materials
- Development and implementation of automotive facilities outreach program materials
- Development and implementation of industrial facilities outreach program materials

The above elements will be implemented as needed.

3.3 Program Focus

The public education program serves as an integral planning tool and presents an overall universal formula for developing and implementing various outreach campaigns. The formula can be applied to multi-year comprehensive outreach programs or short-targeted outreach activities and will be utilized in the following areas in the upcoming years.

Following are the four main elements of the stormwater public education program:

a. Countywide Public Education Program
   This element addresses the sources, pathways and impacts of stormwater pollution and provides common-sense BMPs that can be implemented to reduce pollutant discharges
b. Focus on watershed specific water quality problems
   This element enhances regional information to address specific urban water quality problems within a watershed such as bacteria levels in Ventura River and nutrients in the Santa Clara River watershed.
c. Focus on particular constituents causing water quality problems countywide
   This element addresses urban chemicals/materials of concern such as pesticides, fertilizers, automotive fluids, trash and debris, cleaners, solvents, paints, pool chemicals, household hazardous waste, sediment, etc. and provides BMP guidance for proper use, clean up and disposal.

3.4 Program Implementation

To ensure that a consistent, coordinated effort is disseminated countywide, the Co-permittees are relying on the countywide program to serve as the umbrella campaign, which they will augment and reinforce with local efforts to address their specific needs, issues and requirements. This synergist program is designed to move the public education program from

a scattered approach of sporadic, disconnected efforts, to a consistent, comprehensive and coordinated approach that increases the odds of achieving program objectives.

3.4.1 Countywide Efforts

The Co-permittees continue to implement their long-term coordinated, multi-media countywide municipal NPDES public education outreach campaign. The year's efforts included the following elements:

Revision/Development of Countywide Public Education Materials

The first goal was to review the current public countywide public education materials that have been developed and create a plan to identify and develop the additional materials necessary to communicate an effective overall pollution prevention message. Based on this review a prioritized list of materials to develop was created. The prioritization was based significantly on the materials already produced and in anticipation of potential future third term permit requirements.

The materials developed during the reporting period include

- Homeowner Brochure
- Watershed Focus/Illicit Discharge

Other educational materials created include a public service announcement, advertising artwork, posters and four new print advertisements.

All materials contain a common look and theme and are recognizable as consistent stormwater education materials. At a minimum, all of the developed and revised program materials:

- Explain the difference between the storm drain and sanitary sewer system and describe how water in the storm drain does not receive treatment before entering our waterways
- Focus on specific pollution-causing behaviors and addressed them directly and individually, to increase the likelihood of changing those behaviors and reducing pollution
- Emphasize the relevant impact of stormwater pollution to the target audience
- Include a positive alternative to pollution-causing behaviors
- Tailor the personality, focus and depth or program messages appropriately for each audience and venue
- Facilitate a local and regional stormwater theme and look
- Include the countywide stormwater public outreach logo

During the reporting period, the public education consultant worked on translating the materials into Spanish. Drafts of the translated materials will be available in the upcoming year (2005-06).

Development of a Media Outreach Plan

In order to support the countywide public education program, the Co-permittees developed and implemented a strategic media relations campaign to reach a selected target groups with sufficient frequency to measurably increase their knowledge and measurably change their behavior.

The media plan included the following criteria:

- Use targeted ad placement. Place print ads in sections or features that have a high probability of being read by the target audience
- Take advantage of seasonal behaviors and activities. Schedule paid media and non-media activities to coincide with the seasonal nature of certain behaviors and activities associated with stormwater pollution
- Use geographic targeting. Focus paid media and non-media activity in areas that have a particular relevance
- Take advantage of media spill from neighboring programs. Plan and schedule paid media to take advantage of media reaching Ventura County from neighboring programs, particularly Los Angeles, Orange and Santa Barbara counties. Coordinate paid media and non-media activities to maximize their impact and effectiveness
- Identify the expected number of impressions that may be achieved for each event

1. Print Advertising

During the reporting period, the Co-permittees purchased 3 full-page advertisements in local newspapers and magazines. The print ads show a storm drain clearly marked with a "Drains to Ocean" and depicts a variety of sea life that are impacted by anything discharged down the storm drain. The following is a list of the publications in which the ad appeared:

- Two full-page, full-color advertisement in the *Sunday* Ventura County Star
- A full-page ad in the Living Here Magazine

Table 3.1 Print Advertising Impressions provides a summary of the impressions created by the countywide print advertising campaign. Impressions for all print advertising are provided and total over 350,000.

In order to be effective, a media outreach campaign must reach a majority of the selected target groups with sufficient frequency to measurably increase their knowledge and measurably change their behavior. **Table 3.2 Radio Advertising Impressions** shows that the countywide radio advertising campaign created a total of 857,100 impressions during the reporting period. **Figure 3-3** shows the impressions created by the Co-permittees, in addition, to the countywide advertising campaign, they total 3,909,036 impressions during the reporting period. **Figure 3-4** shows the impressions created by both the advertising campaign and the Co-permittees, they total 5,603,234 impressions during the reporting period.

Since the media outreach campaign targeted the general public and Ventura County has a population of approximately 750,000 people it was estimated that in order to be successful the campaign should make approximately 2.25 million impressions. This also correlates with the permit requirement to deliver a minimum of 2.1 million impressions within Ventura County. The campaign delivered more than 2.6 times the required amount and therefore, it can be concluded that the media outreach campaign was indeed effective.

Development of a Non-Media Outreach Plan

A cost effective and strategic non-media outreach plan was developed and implemented in order to support the Ventura Countywide NPDES Stormwater Program's public education efforts and compliment the advertising media outreach. As defined here, "non-media outreach" refers to activities that are free or low cost media advertisements. Combined with paid advertising, the free or low cost outreach efforts will reach selected target audiences with

sufficient frequency to increase their awareness and motivate them to change their polluting behaviors.

Program development consisted of:

- Survey of free media – The Co-permittees identified what types of media outlets they have available for the countywide public education campaign such as cable access channels or bus shelter advertising space
- Development and Implementation of a Countywide Non-Media Outreach Plan

The key non-media outreach opportunities identified for implementation include:

1. Outreach through Co-permittees

Based on the results and analysis of the 2004 telephone survey of County residents, the following non-media outreach elements were identified for implementation:

a. Billing Inserts
Billing inserts provide an excellent means of communication with customers and pollution prevention messages are very pertinent to water, trash and sanitation activities. Many Co-permittees bill residents and businesses for utility services such as water and trash.

For example, the City of Thousand Oaks included a billing insert in over 30,000 municipal trash bills to promote several programs that reduce stormwater pollution: Coastal Cleanup Day; Free Landfill Disposal Day; Household Hazardous Waste Collection Days; and Free Electronic Recycling.

b. Newsletter Articles
The majority of the Co-permittees have a newsletter and/or website that provide information to residents and businesses. Several Co-permittees (cities of Camarillo, Moorpark and Port Hueneme) have included stormwater quality issues in their city newsletters and/or websites. In addition, some Co-permittees (City of Thousand Oaks and the County of Ventura) have published articles in the Ventura County Star's Eye on the Environment. The articles appeared in the Sunday edition that boasts a readership of 256,000. Some of the articles addressed specific events such as Coastal Cleanup Day, and all of them taught the reader how to prevent stormwater pollution.

c. Artwork
All artwork developed by the consultant has been made available to the Co-permittees for their use. Co-permittees are encouraged to use the artwork on outdoor locations such as bus shelters, streetlight banners or as decals for municipal vehicles.

d. Video PSAs
The City of Ventura has begun work on stormwater educational videos targeting their residents to be aired on local cable television. The City has offered to make these videos available to the other Co-permittees for use on their local television stations, if applicable.

2. Outreach through Utilities

Major utilities that are separate from city-run utilities were contacted. These companies include, but are not limited to, Southern California Edison, The Gas Company and various water districts.

a. Billing inserts and newsletter articles
Independent utilities, including water districts, trash haulers, gas companies and electric companies were contacted to explain the importance of this program and to ask for their assistance in including information with their billings. Some utilities also have newsletters for customers, in which information could be included. The placement of billing inserts and newsletters is in the process of being secured.

3. Outreach through Businesses

Companies are often willing to reduce rates of offer free services to public agencies promoting public service announcements.

a. Theater PSAs
In addition to providing discounted rates, Century theaters displayed an on-screen stormwater slide at the downtown Ventura theater. This slide was created as part of an environmental awareness series that runs prior to the previews at the movie theater. Other Co-permittees plan to use this slide in their local theaters next permit year.
b. Cable PSAs
All of the cable systems in Ventura County offered in-kind value for the Ventura Countywide NPDES Stormwater Program. The PSA will run for six weeks during the next reporting period on Cox, Time Warner, ComCast on A&E, TLC, ESPN and Galavision.
c. Newspaper PSAs
The Ventura County Star offered space at a reduced price for the Ventura Countywide NPDES Stormwater Program.
d. Point-of-purchase
Working with businesses such as pet stores, home improvement stores and auto supply stores is a highly effective and cost-efficient means of communicating with the program's pollution prevention messages to its target audiences. Partnerships with PetSmart, PETCO, Home Depot, Lowe's, Orchard Supply Hardware, Pep Boys and Kragen are under development.

In addition, the City of Oxnard developed and implemented their highly successful public outreach program in coordination with Home Depot. The City continues to supply Home Depot with Pollution Prevention Fact Sheets that are placed in the paint aisles and garden center. These fact sheets detail basic techniques and methods that homeowners can incorporate in their home improvement projects to prevent stormwater pollution. The fact sheets include tear sheets that local residents could remove and take home as friendly reminders of how easily they can help to better their environment. This proactive outreach by the City of Oxnard is to be commended.

All brochures, fact sheets, billing inserts, newsletter articles and other information produced for the non-media outreach program will include an illicit discharge reporting phone number, the Program's web address (www.vcstormwater.org) and the countywide stormwater public outreach logo to increase awareness and fit into the look and theme of the overall program.

Unlike the media plan, the non-media plan does not allow the opportunity to anticipate impressions before they occur. Because the non-media activities rely on cooperation from other entities (cities, businesses, etc.) rather than paying for a known service, there is no guarantee what will occur. For example, giving a newsletter article to the several utilities does not guarantee that they will all use it. Therefore, the number of impressions will not be known until after an event has occurred. Impressions made will be tracked based on distribution numbers, attendance figures and other information where applicable (i.e., traffic statistics for streetlight banners). This information will be reported as available.

School Education Outreach Program

Educating schoolchildren about stormwater and urban runoff pollution is critical to the long-term success of the Ventura Countywide NPDES Stormwater Program. Today's children are tomorrow's adults, and the earlier they learn about protecting the environment, the less likely they will be as adults to engage in pollution causing behaviors. Children can also share information they learn in school with their parents and other relatives. Children are excellent "watchdogs" when it comes to their parents' activities and they are likely to try to correct a parent's polluting behavior.

In order to facilitate the acceptance of the public education program materials in schools throughout Ventura County, partnerships with existing school programs and organizations were sought. The first task in developing these partnerships was to identify and prioritize the existing school education programs within Ventura County. The prioritization was based on meeting California's educational standards while reaching out to the largest number of students in a cost-effective manner.

Over the five-year permit term various meetings took place with representatives from various educational programs and agencies throughout Ventura County.

The Countywide Program has provided stormwater and pollution prevention information through the following programs:

- CREEC Network
- Los Angeles Times in Education Program
- Water Education for Teachers (Project WET)

1. CREEC Network

The California Regional Environmental Education Community (CREEC) Network is an educational project whose mission is: To develop a communication network, which provides educators with access to high quality environmental education resources to enhance environmental literacy of California students.

In May 2003, CREEC published the *Ventura County Strategic Plan for Environmental Education*. The Plan seeks to create a transportable model for a strategic plan to identify opportunities and needs for both youth and general public environmental education. It identifies the needs of changing population, assesses the current condition of environmental education in the County, and proposes strategic recommendations and action steps toward meeting identified needs and gaps in service.

The Plan is based on both qualitative fieldwork and quantitative analysis. The recommendations generated in the Plan are derived from multiple research methods including, a survey of 72 environmental education providers in Ventura County, a literature review of the 'inputs' of successful environmental education programs, focus groups with members of the Latino community, community non-environmental leaders, youth and environmental education providers, teach interviews, and a demographics analysis.

VCWPD from 2002-04 participated in CREEC's Strategic Committee meetings and assisted its efforts through financial support. The Co-permittees hope to continue to foster CREEC's mission and find avenues where its products can be applied in Ventura County schools.

2. Los Angeles Times in Education Program

Since 1996, the Ventura Countywide Stormwater Quality Management Program has worked in concert with the Los Angeles Times to target school age children for education on

stormwater water quality through the *Times in Education* (TIE) program. This cooperative program incorporates California State Science Framework concepts and activities, which support goals outlined in the National Geography Standards. The program includes stormwater educational materials that are used in conjunction with the Los Angeles Times newspaper to educate grades 5-12 on water quality issues and their impact on the local environmental and human health.

One of the added benefits of this kind of real-world study unit is that students easily find ways to apply new knowledge in their everyday lives and will gain increased interest in recycling, conservation and preservation of the environment. In addition, this program provides students the opportunity to work together as a team to design and implement an environmental project that will demonstrate their understanding and extend their learning.

Beginning with fifty classrooms in 1996, this program has expanded to reach over 20,000 students countywide. The Co-permittees should be commended for implementing such an innovative and cost-efficient program targeting the next generation of county residents.

3. Water Education for Teachers (Project WET)

Project WET is an international, interdisciplinary water science and education program for formal and non-formal educators of K-12 students. Each state has a coordinating agency and in California, the Water Education Foundation organizes the network of formal and non-formal educators who use the program as part of their professional responsibilities. The goal of the Project WET program is to facilitate and promote the awareness, appreciation, knowledge and stewardship of water resources through the development and dissemination of classroom-ready teaching aids and the establishment of state-sponsored Project WET programs.

Over the past six years, the Water Education Foundation (WEF) has provided more than 350 workshops to approximately 4,000 educators, who estimate that they have contact with close to three million students. Project WET was one of the top-rated programs by the State Department of Education and the State Department of Water Resources. In addition, all Project WET lessons are correlated to the State Department of Education's Curriculum Standards, increasing its ease of use by teachers.

The Project WET Curriculum and Activity Guide is a collection of innovative, interdisciplinary activities that are hands-on, easy to use and fun. Project WET includes many activities on pollution prevention including, "Amazing Water," "Macro invertebrate Mayhem," "A Rainy Day Hike," and "Sum of the Parts." Based on the goals and objectives of the Public Education Program, Project WET has developed curriculum specific to non-point source pollution and stormwater pollution.

Project WET is a cost-effective way for the Co-permittees to access high water quality education and meet educational outreach goals. WET uses the "train the trainer" model of education to magnify outreach efforts. WET can assist the Co-permittees in organizing educator workshops, which can be run either by Project WET facilitators or Ventura County teachers who have been trained by WET.

VCWPD has begun to explore integrating this impressive program into the Co-permittees educational efforts. Future efforts could include Co-permittee training, as well as, qualified teachers and interested parties by Project WET facilitators. The Co-permittees are excited with this approach, which can introduce additional curriculum to classrooms on important stormwater pollution prevention and watershed management specific to Ventura County.

3.4.2 Principal Co-permittee Efforts

The Principal Co-permittee conducted a number of countywide public education efforts on behalf of the Co-permittees. These efforts included:

- Providing brochures, booklets, stickers, pencils, bookmarks, and posters to Co-permittees, the general public, businesses and other agencies
- Management of the countywide stormwater website (www.vcstormwater.org) which provides general stormwater information, contact information to report illicit discharges, construction BMPs, Storm Water Pollution Prevention Plan templates, and Clean Business Fact Sheets
- Participation in various workshops and seminars addressing stormwater management issues:
  - Association of Water Agencies for Ventura County Breakfast Series
  - California Water Environment Association (CWEA)
  - Calleguas Creek Watershed Management Plan meetings
  - California Coalition for Clean Water (CCCW)
  - Malibu Creek WMC/TMDL meetings
  - Regional Water Quality Control Board Public Workshop on an Order to Conditionally Waive Waste Discharge Requirements for Discharges from Irrigated Lands
  - Southern California Coastal Water Research Project (SCCWRP)
  - State Water Resources Control Board Listening Session regarding Re-issuance of NPDES Permit for Discharges of Stormwater associated with Industrial Activities
  - State Water Resources Control Board Listening Session regarding Draft Policy for Implementation of the Stormwater Program
  - State of the Bay Progress and Challenges Conference/Santa Monica Bay Restoration Commission
  - StormCon 2004 Conference
- Coordination of Public Participation Meetings
  - Stormwater Quality Urban Impact Management Training Workshop
  - Oxnard West Drain Public Workshop
- Coordination of the Public Education Program

3.4.3 Watershed Specific Public Education

During the first and second term permit, the watershed education program element mainly consisted of the development and distribution of public and business education materials. In order to provide a more strategic direction, as well as recommendations to the Co-permittees, including watershed groups and cities, during the third term permit (expected adoption July 2005), the watershed program will be more formally developed as an element of the public education program.

The model watershed program will increase public awareness about the concept of watersheds, specific pollutants of concern (primarily bacteria and toxicity – pesticides), their sources and the solutions. The program will integrate all of the elements of the countywide program while focusing on the specific geography and water quality issues of the area and address the impacts of watershed residents on the local water quality and the benefits of implementing best management practices.

3.4.4 Pollutant Specific Public Education

During the first and second term permits, the pollutant specific education program element mainly consisted of the development and distribution of brochures and fact sheets. Pollutant specific education materials developed included the following:

1. "What's the Scoop? Tips for a healthy pet and a healthier environment" Flyer – Developed to educate pet owners on the connection between pet wastes carried down gutters and storm drains and bacterial pollution, which can contribute to beach closures. In addition the flyer emphasizes pollution prevention practices, such as carrying a pooper-scooper or plastic bag to pick up pet waste and properly dispose to the sanitary sewer or place in a designated receptacle. Co-permittees distribute these flyers at pet stores, veterinary offices and at outreach events. The flyer has been a big success and is published in both English and Spanish.

2. "Who's Keeping an Eye on Manure?" Poster and Tear Sheets – In recent years, it has become apparent that stable facilities have the potential to contribute pollutants to local waterways. The City of San Buenaventura spearheaded an effort to educate both commercial and private stable facilities on stable practices and their potential to impact water quality. The issues raised by the City of San Buenaventura were quickly recognized as important concerns countywide. Soon, after VCWPD in coordination with the City of San Buenaventura began developing a poster, which addresses stable practices for manure management and provides suggestions on how to minimize pollutants entering local waterways. VCWPD and the City of San Buenaventura with the cooperation of the Natural Resource Conservation Service, the RWQCB and the Ventura County Environmental & Energy Resources Department (EERD) finalized the language and format of the poster with a summary tear sheet that can be removed by interested parties.

   The Co-permittees have distributed countywide these posters to appropriate businesses including feed dealers, horse stables/training facilities, feed mill equipment and supplies, riding apparel and equipment, horse show locations, horse breeders, riding academies and equine veterinary offices.

3.4.5 Public Reporting

Each Co-permittee has identified staff that serves as the contact person(s) for public reporting of clogged catch basin inlets and illicit discharges/dumping. Designated contact staff was provided relevant stormwater quality information, including program activities and preventative stormwater pollution control information. Contact information is updated as necessary and published in the government pages of the local phone book and other appropriate locations. In addition, this information is posted on the Program's website at www.vcstormwater.org.

Table 3.3 Public Reporting lists the Co-permittees contacts for reporting clogged catch basin inlets and illicit discharges/dumping.

Table 3.3 Public Reporting

Principal Co-permittee **Ventura County Watershed Protection District**	**805/650-4064**
Co-permittees	
City of Camarillo	805/388-5338
County of Ventura	805/650-4064
City of Fillmore	805/217-7792
City of Moorpark	805/517-6253
City of Ojai	805/640-2560
City of Oxnard	805/488-3517
City of Port Hueneme	805/986-6556
City of San Buenaventura	805/652-4584
City of Santa Paula	805/933-4256
City of Simi Valley	805/583-6462
City of Thousand Oaks	805/449-2400

3.4.6 Stencil Program

3.4.6.a *Curb Inlet Stenciling*

As required by the Permit, most Co-permittees have completed labeling or marking the curb inlets to their entire storm drain system. During the reporting period, some Co-permittees maintained their inlet signs by reapplying stencils/markers as they wore out and applying stencils/markers to new inlets as they were installed. **Figure 3-1** depicts the progress the Co-permittees have made in their efforts to install and maintain their signs.

The percentage of inlets signed to date meets the performance criteria established in the SMP for all Co-permittees. Signs at curb inlets have varying useful lives due to the materials from which they are constructed (e.g., paint, thermoplastic), their position (e.g., on top of curb, on face of curb), and wear factors (e.g., traffic, street sweeping, sunlight). As a result, the Co-permittees have different programs to maintain curb inlet signage within their respective jurisdictions. Some Co-permittees replace a portion of their signs each year whereas others re-sign all inlets every few years. Regardless of the specific inlet signage practice, all Co-permittees understand the importance of signage to the education component of their program and are committed to installation and maintenance of signage that meets both the educational goal of the program as well as the 90% performance criteria set forth in the SMP.

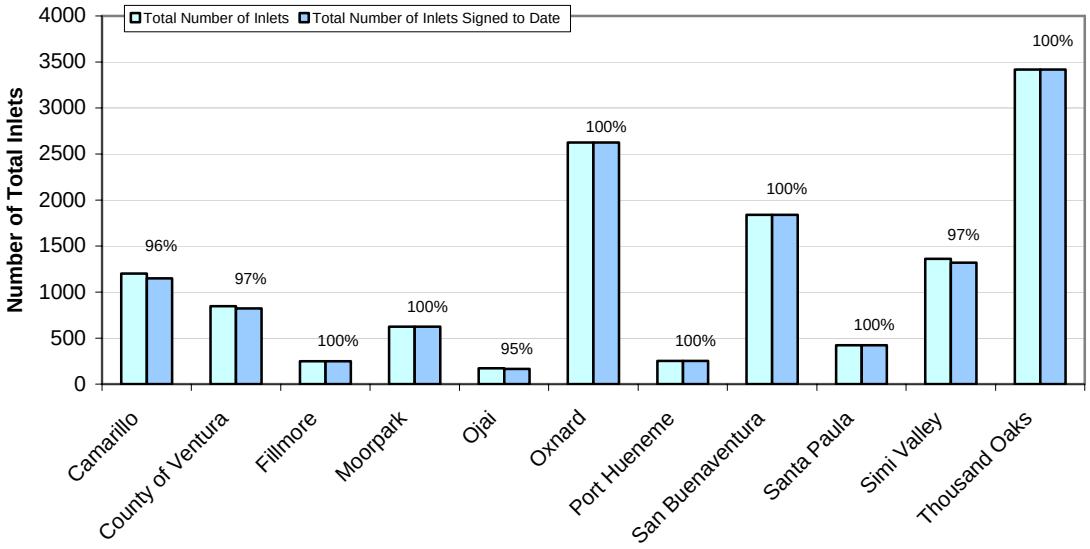


Figure 3-1 Stencil Program - Storm Drain Inlet

3.4.6.b *Access Points to Designated Creeks & other water bodies*

In addition to the Storm Drain Inlet Stenciling Program, the Co-permittees were required to designate appropriate access points to the creeks and channels within their jurisdiction for the placement of signs with prohibitive language to discourage illegal dumping. This permit requirement was a new element added to the Resident Program and required a significant commitment of time and resources. Each Co-permittee was responsible for designating the appropriate access points to creeks and channels within their jurisdiction, which required some field verification and mapping. This program element also required in some cases, the cooperation between the City and special districts outside the City's jurisdiction.

Figure 3-2 depicts the progress the Co-permittees have made in their efforts to post their signs at appropriate access points to creeks and channels. A review of **Figure 3-2** shows that all the Co-permittees met the performance criteria that 90% of the designated public access points be posted with signs regarding the prohibition of illegal dumpings.

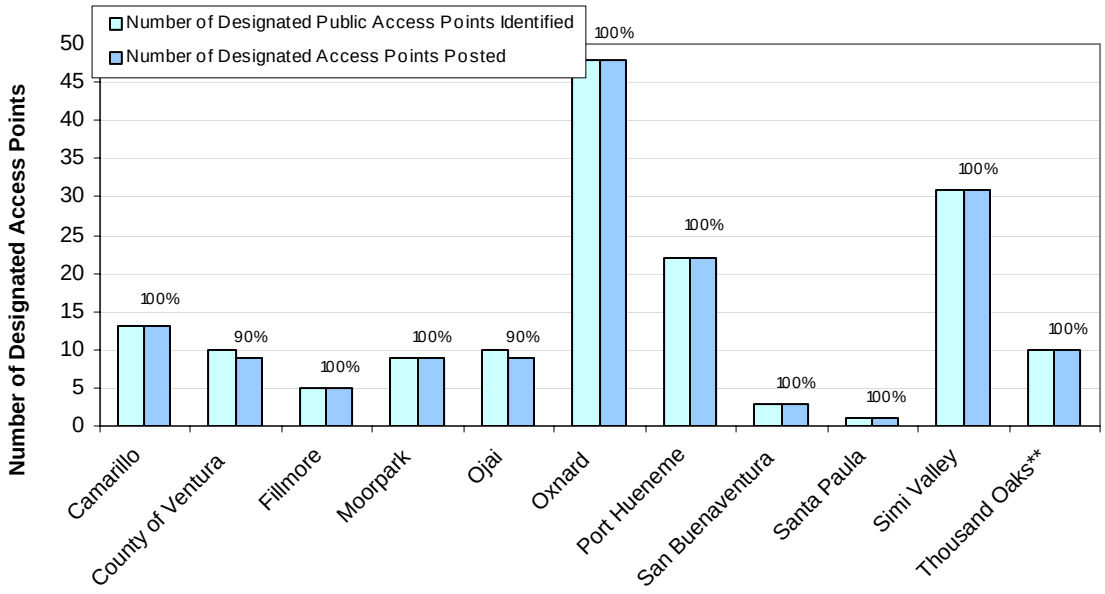


Figure 3-2 Stencil Program - Access Points to Designated Creeks and Channels

* - The designated public access areas to creeks within the City are under the jurisdiction of the Conejo Recreation and Parks District.

3.4.7 Local Community Outreach Efforts

Each of the Co-permittees organized community-oriented outreach events, training and other activities on stormwater quality within their jurisdiction. The Co-permittees emphasized the importance of using environmentally safe practices at home and work to prevent stormwater pollution. Outreach efforts included one-on-one, small group learning activities and other media to deliver a stormwater message that educates and informs the general public.

The Co-permittees utilized a variety of outreach methods, including:

- Presentations at schools, community groups or public events
- Contests for students
- Staffed and non-staffed displays at public events
- Staffed interactive display with TidePool Cruiser
- Newspaper articles/advertisements
- Brochures
- Utility bill inserts/mailers
- Stormwater websites
- Television/Radio announcements
- Mobile Satellite City Hall 101 events (City of Oxnard)
- “Hermie the Hermit Crab” Environmental Play for second graders
- Sponsored stream and beach cleanup events
- Movie Theater On-screen slides
- Promotional Give-aways

Figure 3-3 indicates the number of educational contacts made by the Co-permittees at local community outreach events/activities during this reporting period.

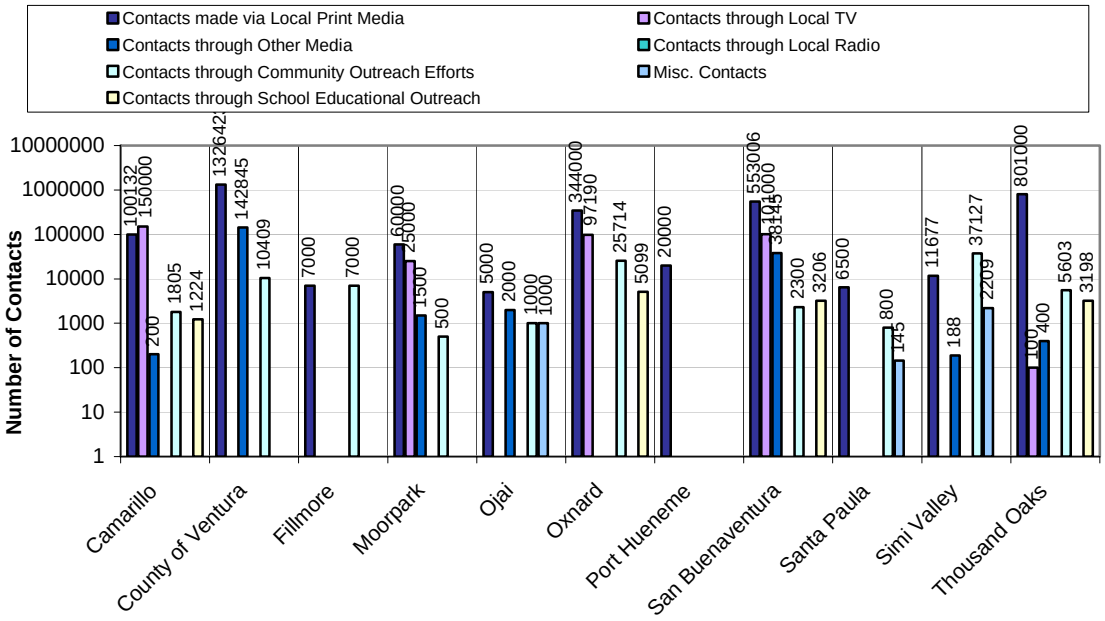


Figure 3-3 Local Community Outreach Efforts

3.5 Public Awareness Surveys

In an effort to better understand the public's awareness regarding water quality issues, the Co-permittees have conducted several surveys. The surveys incorporated a number of questions relating to pesticide, herbicide and fertilizer use, the sewer and storm drain system and the public's overall awareness of the countywide public outreach campaign. The results may assist the stormwater program managers in determining how effective the program has been and help focus future efforts and resources.

3.5.1 1996 Ventura County Stormwater Survey

In late 1996, GLS Research was contracted by VCWPD to conduct a public education survey on behalf of the Ventura Countywide NPDES Stormwater Program. The survey consisted of 26 questions seeking information on the public's perception regarding stormwater. For this telephone survey, random samples of 400 Ventura County adults were interviewed over the period December 5-8, 1996. The margin of error for the study is plus or minus five percent at a 95% confidence level. In addition, the questionnaire was translated into Spanish and bilingual interviewers were available to conduct the interview with respondents who prefer to speak in Spanish. The interview took on average about 15 minutes to complete.

FINDINGS

In general, the survey showed a population that is relatively aware of and concerned about stormwater pollution and is very willing to take additional action to help prevent stormwater pollution if it knew what to do. More than half of the population admits that it does not know what to do to prevent pollution from going down storm drains, but 81% said it would take such action if it knew what to do.

The actions that people seemed most willing to take would be to increase motor oil recycling and to keep dirt and litter out of gutters. While concern about possible harm to animal habitats or marine life is important to people, the key motivator appears to be concern about human health impacts, either from swimming in local waters or eating fish caught there.

More detail follows:

- 52% said that pollution of the ocean and local beaches was a serious problem. For comparison, recent studies in Los Angeles County showed that 74% felt that ocean pollution was a serious problem and 66% in Santa Clara County felt pollution of the San Francisco Bay was a serious problem.
- 55% say that the ocean off Ventura County is more polluted now "than it was a few years ago," with just 7% who say such pollution is improving.
- More than a third (65%) have seen or heard something lately about storm drain systems
- Only a third know that storm drains and sewers are separate
- But a majority (57%) knew that stormwater is not treated before being discharged
- Almost everyone (87%) know that it is illegal to throw anything in the storm drains
- High level of recognition of the stormwater education stencil: fully 57% said they have seen the "Don't Dump, Drains to Ocean" stencil
- 57% felt that "people littering" was a major source of ocean pollution
- 53% felt that "wastes from industry" was a major source of pollution
- 46% felt that effluent from sewage treatment plants was a major source of pollution
- 81% felt that it is a very serious problem if motor oil ends up in storm drains and 79% felt that paint in storm drains was a serious problem. These are both about 10 percentage points lower than the concern about these items found in the LA County study.
- Concern about the problem of stormwater pollution is near ubiquitous. Fully 74% said it was "very important" to them to "help prevent trash and pollution from going down storm drains."
- What concerns people the most about knowing that stormwater goes untreated into the ocean is clearly the effect upon human health. 47% said that their biggest concern was that people could get sick from swimming in polluted water.
- Fully half the population agrees that they don't know what they "personally can do to prevent pollution from going down storm drains."
- The most useful sources for information for Ventura County residents are television advertisements (56% said these were a "very useful" source) and newspaper articles (54%).

Based on these findings, the Co-permittees focused on highlighting local Household Hazardous Waste Recycling events and other activities that residents could adopt that would prevent stormwater pollution (dry cleaning methods, proper disposal of pet waste, etc.) In addition, the Co-permittees began running full color stormwater ads in local newspapers and magazines.

3.5.2 Ventura County Fair Surveys

The annual Ventura Countywide Fair presents a wonderful opportunity for the Co-permittees to interact with residents and provide information on the Countywide Stormwater Management Program. The Co-permittees have used a variety of educational tools at the Fair including the Pollution Prevention House and the TidePool Cruiser. The Pollution Prevention House is an interactive walk-through display that addresses stormwater pollution prevention, recycling, pest management and water conservation practices. The TidePool Cruiser is a mobile unit that includes an up-close view of the storm drain, a marine touch tank and a

general store that makes the connection between what is placed in the storm drain and its impact on marine life.

In addition to providing Fair attendees an opportunity to learn first hand about water quality and pollution prevention strategies, the Co-permittees distributed surveys on stormwater issues.

Event	Year	No. of people surveyed
County Fair	1997	1,318
County Fair	2001	3,000
County Fair	2002	3,243
County Fair	2003	4,897

Since these surveys do not represent a random sample of county residents, the Co-permittees could not perform a scientific analysis of the results. However, the surveys can serve as an indicator of how effective the outreach program is performing. For example, in 1997 thirty percent of those surveyed believed that stormwater runoff was treated prior to being discharged to local arroyos, creeks, lakes, rivers and ultimately the ocean. In 2003, this percent of misunderstanding dropped to 6%. This dramatic improvement in understanding (in just six years!) of the stormdrain system underscores the hard work and dedication of the Co-permittees to educate county residents.

3.5.3 LA Times in Education Survey

As part of the successful Times in Education program, teachers were surveyed on the effectiveness and usefulness of the program in their classrooms. Many teachers use this program in multiple classes reaching a larger set of school children.

In 2000, a total of 130 classrooms with approximately 6,200 students were included in this program. The following cities, with corresponding numbers of teachers and classrooms participating, were represented:

City	No. of Teachers	No. of Classrooms
Camarillo	9	12
Carpinteria	2	4
Moorpark	5	8
Oak Park	1	1
Oxnard	32	39
Port Hueneme	2	4
San Buenaventura	25	31
Simi Valley	8	12
Thousand Oaks	14	19

Although only 8 evaluations were received from the participating teachers, it conforms to the regional average of 6-8% return on evaluations for other similar programs.

A summary of the evaluations follows:

- 8 surveys returned
- Participation resulted from ad, free guide and papers
- Prior to participation, the number one reason for participating was a desire to increase student's awareness of environmental issues
- Teaching materials received high marks (with 75% of those surveyed giving the materials a rank of 4 or 5 (with five being the highest score)
- Most common remark regarding materials: tie more activities to state standards
- Most common student reaction to program: excited about the variety of activities and enjoyed searching the newspaper
- Most common parent feedback: thought it was a good idea, liked the reinforcement of the material with homework assignments
- Most useful student activities: scavenger hunts and editorials
- Project management information received good marks with 63% of those surveyed giving the materials a rank of 4 or 5 (with five being the highest score)
- 50% of those surveyed did do class environmental projects
- Most common reason for not participating: time limitation

As a result of these findings, the Co-permittees made additional modifications to the program curriculum to better address water quality issues. In addition, extra effort was made to tie the program to the California State Science Framework concepts and activities. The following year 2001-02 saw a significant increase in countywide participation with a total of 21,300 students (a 340% increase).

3.5.4 2004 Ventura County Stormwater Survey

In July 2004, VCWPD enlisted Pat Davis Design Group to conduct a study of public attitudes among residents of Ventura County regarding issues related to stormwater quality and storm drains. The goals of the study were to provide empirical data that will direct public outreach campaign efforts to reduce storm drain pollution and increase public awareness of stormwater issues. In addition, the Co-permittees designed the survey as a follow-up to the 1996 survey so that an evaluation of the program's progress could be made.

Specific objectives of the study included:

- Measure the current level of concern regarding pollution of local ocean, creek, lake and stream waters and compare with those from the 1996 survey
- Explore attitudes about and knowledge of the stormwater system, which will provide information than can be compared with similar information from 1996 and then used as a future baseline for measuring the effectiveness of stormwater education efforts in Ventura County
- Identify actions that residents would be willing to take to help reduce stormwater pollution
- Identify key messages, and means for delivering those messages, that will help encourage people to prevent stormwater pollution
- Identify particular target audiences for this public education effort

For this telephone survey, random samples of 400 Ventura County adults were interviewed over the period June 2-6, 2004. A random-digit-dial method was used to select households. Only adult respondents age 18 and over who reside in Ventura County were included. The interview took about 11 minutes. The questionnaire was translated into Spanish and bilingual

interviewers were available to conduct the interview with respondents who prefer to speak in Spanish. In total, 31 surveys were conducted in Spanish.

The margin of error was plus or minus 5% at the 95% level of confidence. The results were compared to those found in a research study conducted in December 1996. The study was conducted by a different research firm but employed a similar methodology. While similar wording was used where possible or appropriate, questions were streamlined to bring the interview down from 15 to 11 minutes.

The survey resulted in two key findings:

- Firstly, those residents who are currently performing one of the four pollution preventative measures were among the most likely to have answered at least one storm drain question incorrectly, which makes a pertinent point. While educating residents on how the storm drain system works is a good idea, understanding is not a mandatory precursor to adopting stormwater pollution prevention actions. Therefore, a two-prong approach was recommended for the outreach program. The first goal is to incite and educate residents on what pollution prevention measures are effective and how easy they are to implement. The second goal is to inform and educate residents on storm drain function and watershed terminology. The dual purposes of this campaign would function separately and simultaneously.
- Secondly, Ventura County residents appear to be unaware of what qualifies as stormwater pollution prevention. Of those residents who said that they do not know how to prevent stormwater pollution, 61% indicated that they would be willing to take more action to prevent stormwater pollution, including one of the four pollution prevention measures offered in the survey. This is significant because it indicated that many don't realize it's as simple to prevent stormwater pollution as one of the four pollution prevention measures mentioned, namely: sweeping up debris, using non-toxic substances, proper disposal of cigarettes or picking up litter. It is recommended that an outreach campaign slogan that focuses on the fact that it really is just that simple.

In total, the survey results indicated that Ventura County residents understand the importance of pollution prevention measures. In fact, the number of residents performing preventative activities has more than doubled since 1996. As such, the current existing campaign for public awareness has been effective and should be continued and expanded to ensure the number of participants grows each year.

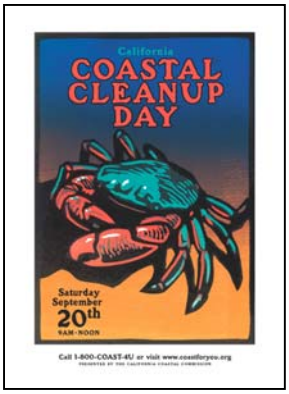
3.5.5 Future Program Effectiveness Assessments

During 2004-05, the Co-permittees obtained consultant assistance to review the approach, methodology and results of the Fair surveys, LA Times in Education survey, and the 1996 and 2004 Ventura County Stormwater Survey. It was determined that the development of an approach and methodology for future Ventura County public awareness surveys was paramount to ensure that the program's public awareness surveys are effective and able to measure changes in knowledge and behavior. As a result, the Co-permittees will develop a new survey to be implemented in the next permit term (expected to begin July 2005). This Public Awareness Survey will serve as a baseline in which changes in public knowledge, behaviors and public opinion will be measured.

3.6 Five Year Permit Summary of Program Accomplishments

3.6.1 Coastal Cleanup Day

California Coastal Cleanup Day is the premier volunteer event focused on the marine environment in the country. On this day, more than 40,000 volunteers turn out to over 700 cleanup sites statewide to conduct what has been hailed by the Guinness Book of World Records as "the largest garbage collection." Since the program started in 1985, over 552,000 Californians have removed more than 8.5 million pounds of debris from our state's shorelines and coast. When combined with the International Coastal Cleanup organized by the Ocean Conservancy and taking place on the same day, California Coastal Cleanup Day becomes part of one of the largest volunteer events of the year.



Coastal Cleanup Day Poster

Coastal Cleanup Day is the highlight of the California Coastal Commission's year round "Adopt-a-Beach" program and takes place every year on the third Saturday of September. Coming at the end of the summer beach season and right near the start of the school year, Coastal Cleanup Day is a great way for families, students, service groups and neighbors to join together, take care of our fragile marine environment, show community support for our shared natural resources, learn about the impacts of marine debris and how we can prevent them and to have fun!

Beginning in 1996, the Co-permittees have participated in this extremely successful statewide Coastal Cleanup Day. This annual event has been an excellent opportunity for volunteers to help clean and beautify local beaches and inland waterways. Over the past nine years, the Co-permittees have worked hard to encourage more volunteer participation in addition to targeting additional beach and inland areas for cleanup. **Table 3.4 Coastal Cleanup Activities** shows the Co-permittees efforts over the past five years in Ventura County.

Table 3.4 Coastal Cleanup Activities

Year	No. of Sites	No. of Volunteers	Pounds of Trash Removed	Pounds of Recyclables Removed
2000-01	12 beaches & 7 inland waterways	1,650	17,158	3,689
2001-02	12 beaches & 7 inland waterways	1,794	17,640	4,099
2002-03	12 beaches & 7 inland waterways	1,938	18,122	4,510
2003-04	12 beaches & 7 inland waterways	2,210	15,002	2,575
2004-05	12 beaches & 7 inland waterways	2220	14,632	1,919

This reporting year, Coastal Cleanup Day took place on September 18, 2004. The Co-permittees continue to expand the scope and success of the event by increasing the number of beach and inland waterways cleaned and encouraging additional volunteer turnout. The event included a total of 2220 of volunteers and the removal of a total 14,632 pounds of trash and 1,919 pounds of recyclables.

This volunteer program continues to be a huge success, not only in cleaning local sensitive environments but also in creating a heightened awareness on proper trash disposal and its benefit to stormwater quality.

3.6.2 Radio Script Campaign

Since 1999, the Co-permittees have held a radio script contest targeted to countywide middle school children. This contest has been held every other year and encouraged students to write scripts concerning stormwater pollution prevention for public service announcements. Of those scripts submitted, typically the top ten are selected based on their clarity of message and depth of information provide. These scripts are then recorded by the students for distribution on local radio stations.

Winning scripts are aired as part of the Countywide Radio Script Campaign to educate local residents on the importance of stormwater pollution prevention. The campaign is aired twice a year (Fall/Spring). In addition, some of the scripts are aired on local television stations during the same months, including local cable television channels. In an effort to reach the widest audience possible, the Co-permittees utilize six radio stations (including one Spanish language) and 15 television stations that serve a large, mixed population (including one sport network channel).

3.6.3 Pet Waste Program

The Pet Waste Program was developed and implemented in 1999 by the Co-permittees to educate pet owners on pet waste contributions of bacterial contamination to the ocean and streams. The first year of the program, the Co-permittees installed 75 dispensers and ordered 170,400 pet waste bags to dispose of pet waste in public areas. This program has been a huge success with the demand for more dispensers and pet waste bags growing annually.

This past year, VCWPD purchased an additional 482,400 pet waste bags for Co-permittee use. Due to the high demand in key locations, some Co-permittees have purchased additional pet waste bags (543,600) to keep dispensers stocked all year long for a total of 1,026,000.

As part of the Pet Waste Program, VCWPD developed and distributed a pet waste flyer, entitled “What’s the Scoop?” which provides pet owners with tips for a healthy pet and a healthier environment. Co-permittees distribute these flyers at pet stores, veterinary offices and at outreach events.

3.6.4 Ventura County Fair

The annual Ventura Countywide Fair presents a wonderful opportunity for the Co-permittees to interact with residents and provide information on the Countywide Stormwater Management Program. Since the beginning of the program, the Co-permittees have participated in this annual event. Over time the sophistication and depth of information provided to fair attendees has evolved.

In 1994, the Co-permittees designed a display and created informational materials with an eye to showing a coordinated, consistent message about stormwater pollution prevention throughout the county. The display was an 8’x8’ free-standing assembly and contained enlarged photos that show the detrimental effects of stormwater pollution. The display also

included information on how to prevent stormwater pollution, and examples of stormwater stencils used throughout the county.

In August 1994, the Co-permittees took the display to the Ventura Countywide Fair, which drew more than 247,000 people. Co-permittees took turns staffing the display and handing out materials for all 12 days of the fair. Materials contributed by the Co-permittees included bookmarks, fact sheets, and children's coloring sheets, a "Curbside Recycling" brochure, "Household Hazardous Waste Guide" and "Let's Learn about Recycling" coloring book.

In 1998, the Co-permittees in coordination with the Ventura County Solid Waste Department and a grant from the California Integrated Waste Management Board developed and constructed the "Pollution Prevention House." This interactive walk-through display was designed to teach residents how they can prevent pollution around their homes. The House was unveiled at a County Board of Supervisors meeting, and made its public debut at the County Fair.

Over the years, the House was updated and revised to reflect new permit requirements and included: the proper disposal of litter, green waste, pet waste, proper vehicle maintenance, lawn care, and water conservation practices. The Co-permittees also found the House to be a highly effective educational tool in elementary schools.

Most recently, the Co-permittees showcased the TidePool Cruiser at the Fair. This mobile unit shows an up-close view of the storm drain, a marine touch tank and a general store that makes the connection between what is placed in the storm drain and its impact on marine life. In addition solutions are provided and suggestions made on how one can reduce pollution from littering beaches and fouling local rivers, streams and the ocean.

3.6.5 Ventura County Science Fair

The Ventura County Science Fair is an annual event, where fifth through twelfth grade students can participate in a countywide competition for the best science project in their age group. As Principal Co-permittee, VCWPD coordinates the participation of the Co-permittees as judges in this event. Since 1996, the Co-permittees have selected three student projects for a special category Stormwater Quality Award. The projects are selected based on their relevancy to stormwater issues and level of understanding of stormwater on water quality.

3.6.6 TidePool Cruiser

In 2003, the Co-permittees showcased the TidePool Cruiser at the Ventura County Fair. This mobile unit shows an up-close view of the storm drain, a marine touch tank and a general store that makes the connection between what is placed in the storm drain and its impact on marine life.

TidePool Cruiser at County Fair

Due to the great success of the cruiser at the Fair, the Co-permittees began utilizing the TidePool Cruiser in their elementary school educational outreach efforts. This program is designed to teach children (and by extension their parents) about the hazards of non-point source stormwater pollution. In an innovative, hands-on and exciting manner participants learn of the connection between the introduction of pollutants through the storm drain system and their

impact on the marine environment. For this reporting period, the City of Camarillo sponsored the TidePool Cruiser at 7 elementary schools, Coastal Cleanup Day and local Community Science Day events.

3.6.7 City Corps Storm Drain Keeper Program

In an effort to improve water quality and the aesthetics of local waterways, VCWPD, the Harbor Department and the cities of Oxnard and Port Hueneme entered into an agreement with Oxnard City Corps to maintain Oxnard West Drain, "J" Street Drain and Oxnard Industrial Drain. Oxnard City Corps is a program that seeks at-risk youth within Oxnard and provides them with needed job skills. Money from Supplemental Environment Program (SEP) funds was utilized to form the Storm Drain Keeper Program.

The program's primary activities focused upon: continuous patrolling of open channel storm drains and removal of trash, excess sediment, vegetation and graffiti from the storm drains. In addition, City Corps members document and categorize the trash and debris removed from the channels.

City Corps staff also met with staff from VCWPD, the Harbor Department and the cities of Oxnard and Port Hueneme on a monthly basis for safety, technical and educational training.

On-going analysis of the amount and type of trash and debris removed has provided opportunities to develop additional source control measures and public outreach programs. The Storm Drain Keeper Program has been a huge success not only in reducing the amount of trash and debris entering receiving waters but also in educating local residents on stormwater quality issues and concerns.

3.6.8 Solid Waste Collection/Recycling

The Co-permittees have solid waste collection programs for public, residential, commercial and industrial areas. The Co-permittees recognize that the public needs encouragement to properly dispose of their trash and educated in order to understand that the storm drain is not a waste receptacle. The Co-permittees conduct education outreach through a variety of methods including community newsletters, radio and television public service announcements, brochures and utility bill inserts. Many Co-permittees have combined recycling, litter control and hazardous materials disposal messages.

3.6.9 Household Hazardous Waste Collection

Household Hazardous Waste Events

During the reporting period, the City of Simi Valley held eleven Household Hazardous Waste Collection events, where over 175,000 pounds of hazardous material was prevented from entering the environment. In addition, Simi Valley distributed 1,674 brochures on BMPs and other general stormwater pollution prevention messages to HHW participants. The City of San Buenaventura also held four citywide HHW collection events, with approximately 1,000 residents participating.

HHW Items Collected

Likewise, the City of Thousand Oaks held monthly HHW collection events, which provided a safe, legal and convenient disposal service to 3,400 residents, and resulted in the removal of 325,000 pounds of

toxic materials. For this reporting period the City also expanded their material list to accept computers and needles/syringes. Additionally, Thousand Oaks served 55 small businesses and provided a 50% discount on their disposal costs. This program gives local business owners an inexpensive and legal option for their disposal needs.

Oil Recycling

All of the Co-permittees and the County's Environmental and Energy Resources Department (EERD) currently implement used oil recycling programs. These programs involve comprehensive public outreach including television and newspaper advertising, displays at community events and the distribution, at no cost to residents, of used oil containers. In addition, some Co-permittees also conduct household hazardous round-ups or drop off events for their residents.

3.6.10 Trail Days

The Conejo Open Space Conservation Agency in a joint effort with the VCWPD coordinates a yearly hike down the Wildwood Park trail inviting fifth grade students to learn about watersheds, aquatic pollution and local habitats. Students are exposed over two days to the natural environment to learn first hand the interconnection between the health of the environment and its impact on local fauna and flora. VCWPD and City of Thousand Oaks representatives have participated as trail leaders and educational presenters during this annual event, conducting a total of 20 hikes through the park and its environs over the past four years.

3.6.11 Sea Education Adventure Program

For this reporting period, the City of Oxnard provided fifth graders tours of the City's Wetlands and Wastewater Treatment Plan as part of the Sea Education Adventure Program. The program's main emphasis is ocean preservation and environmental stewardship through awareness and education beginning at the local middle-school level. To this end, the program is committed to provide environmental educational field trips to students in an effort to make them aware of the vital role they play in safeguarding this fragile ecosystem for future generations.

3.6.12 Mobile Satellite City Hall Events

For this reporting period, the City of Oxnard held its second annual Mobile Satellite City Hall event. This event brings together city departments/divisions representatives, CWEP Staff Task Force, City Council Members, City Manager office representatives, Neighborhood Council Executive Boards, residents, the business community and County Service Providers in an effort to improve communication between local governing agencies, address areas of concern, support neighborhood efforts to create beauty and pride and expand resident's environmental involvement within their communities.

3.6.13 City Quarterly Newsletter

In an effort to further educate residents on stormwater pollution prevention, several Co-permittees have begun including stormwater related articles in their local city's newsletters. These articles highlight pollution prevention tips and local water quality projects made on their behalf to improve the local environment. The cities of Camarillo, Moorpark and Port Hueneme should be commended for this innovative endeavor to use additional tools to provide stormwater education and pollution prevention techniques.

3.6.14 Volunteer Programs

Several Co-permittees have established volunteer programs to address stormwater and water quality issues. For example, the City of Camarillo has continued their successful household hazardous waste disposal program, where residents can dispose of their waste at city collection events held one weekend a month. Additionally, the City of Port Hueneme has developed an "Adopt a Storm Drain" Program, which allows individuals to select an area of interest and help the local environment by periodically cleaning a storm drain(s).

The City of Santa Paula held its second annual Santa Paula Beautiful Event on October 23, 2004. This clean up event targets local streets, parks, parkways and public open spaces. Approximately 450 volunteers helped remove 16.27 tons of trash that left alone would have been flushed with the first winter's storms into the Santa Clara River.

The City of San Buenaventura continues to implement their "Partners in Programs for a Beautiful Ventura" program where committed volunteers work together to collect trash along the beach. This program offers the unique opportunity for one-on-one interaction between local residents and city representatives. The City continues to stress environmental stewardship and pollution prevention measures to their residents with very positive results.

The City of Simi Valley continues to implement its annual "Neighborhood Council Arroyo Cleanup Event". This cleanup event is held in addition to the City's annual participation in Coastal Cleanup and is a huge success with local volunteers demonstrating more ownership and responsibility for their local environment and waterways. For this reporting period, 250 volunteers participated to remove over 16,000 pounds of waste, including an abandoned car! Simi Valley's efforts to continuously encourage volunteer clean up events is to be commended.

In addition, the City of Thousand Oaks, through its Community Enhancement Program has awarded over $45,000 to non-profit groups for various projects including several creek cleanup events. Grantees included the Conejo Valley Botanic Garden and the Community Garden/Avenue of the Flowers who, as part of their programs, educate the public about gardening to prevent soil erosion.

This program also funded the City's participation in the Adopt-a-Highway program where more than 7 tons of litter from twelve freeway ramps was collected. This progressive and innovative program also provides free dumpsters to qualifying neighborhoods. In 2004, over 8,000 residents participated in 79 Neighborhood Clean Up events. As a result a total of 519 tons of trash and green waste was collected and kept out of the storm drain system. This program is especially noteworthy for it not only removes unsightly and offensive trash but also provides an easy way for residents to dispose of unwanted items and discourage the illicit dumping of trash.

These activities and programs underscore the Co-permittees commitment to water quality and to effect change and improvement in the streams, rivers and channels of Ventura County.

Table 3-1 Print Advertising Impressions

Newspaper	Date	Countywide Impressions
Living Here Magazine	November 7, 2004	132,000
Sunday Ventura County Star	March 20, 2005	110,239
Sunday Ventura County Star	March 27, 2005	110,239

Table 3-2 Radio Advertising Impressions

Radio	Date	Countywide Impressions
KHAY, KVEN	November 22 - 28, 2004	292,200
KCAQ, KOCP	Feb. 28 – March 6, 2005	188,300
KCAQ, KOCP	May 16 – 22, 2005	188,300
KCAQ, KOCP	June 6 –12, 2005	188,300

Total Countywide Impressions = 5,603,234

County Population = 753,392

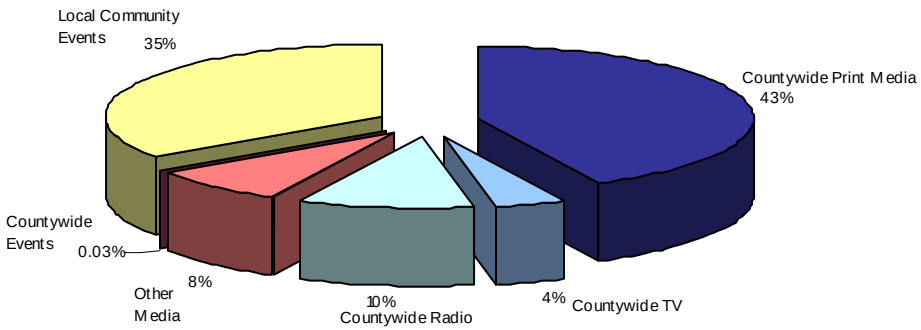


Figure 3-4 Countywide Outreach Efforts

Countywide Public Educational Materials Developed During Reporting Period

Public Education Item
Homeowner BMP Brochure
Watershed/Illicit Discharge Brochure

4.0 Program Description

4.1 Introduction

The requirement to implement an Industrial/Commercial Business Program is based on two primary objectives set forth in the Federal Clean Water Act amendments of 1987, which established the framework for regulating stormwater discharges from municipal, industrial and construction activities under the NPDES system:

- Effectively prohibit non-stormwater discharges (unless NPDES permitted, specifically exempted, or proven to not be a significant source of pollutants)
- Reduce the discharge of pollutants from storm drainage systems to the maximum extent practicable (MEP)

The permit names specific groups of facilities that must be included in the Industrial/Commercial Business Program. These groups of facilities include:

- Commercial Facilities – automotive service and food service facilities
- USEPA Phase I Facilities

In the State of California, Phase I Facilities are regulated under the State General Industrial Stormwater Permit (General Industrial Permit). The State Water Resources Control Board (SWRCB) and the nine Regional Boards are responsible for enforcing the General Industrial Permit.

4.2 Program Development

To meet this statutory objective the Co-permittees attend a Business and Illicit Discharge/Illegal Connection Subcommittee meeting to coordinate and implement a comprehensive program to control pollutants in stormwater discharges to municipal systems from targeted and commercial facilities. The Subcommittee is comprised of representatives of the Co-permittee cities and other municipal staff from various departments (Environmental Health, Environmental Services and Wastewater Services).

Each Co-permittee has implemented an Industrial/Commercial Business Program, which includes the following components to meet the goals and objectives of the program:

- Tracking Critical Sources
- Inspecting Critical Sources
- Ensuring compliance at industrial and commercial facilities that are critical sources of pollutants in stormwater

4.3 Program Implementation

The Industrial/Commercial Business Program provides a framework and a process for each Co-permittee to develop its own commercial/industrial program consistent with permit and SMP requirements. Key program components include:

- Pollution Prevention
- Source Identification and Facility Inventory
- Prioritization for Inspection
- Implementation of Best Management Practices
- Site Education/Inspections
- Enforcement
- Non-compliant Industrial Site Identification and Regional Board Notification Procedures

- Program Reporting

For this reporting period, the Co-permittees report the following data:

4.3.1 Business Community Site Education/Inspection Program

The goal of the site education/inspection program is to confirm that stormwater Best Management Practices (BMPs) are effectively implemented in compliance with State law, County and municipal ordinances and the SQUIMP. During site visits, the Co-permittees:

- Consulted with a representative of the facility to explain applicable stormwater regulations
- Distributed and discussed applicable BMP and educational materials
- Conducted a site walk-through to inspect for evidence of illicit discharges, prevention BMPs, and stormwater quality management education programs for employees

Figure 4-1 shows the total number of targeted automotive service facilities and the total number visited within each Co-permittee's jurisdiction. **Figure 4-2** shows the total number of food service facilities targeted and the total number visited within each Co-permittee's jurisdiction.

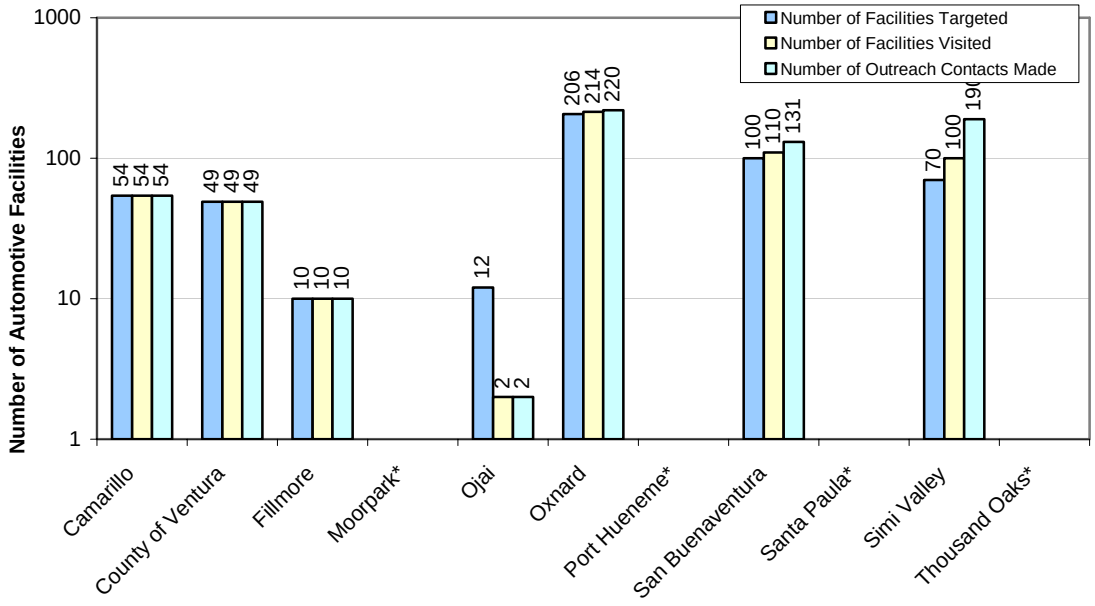


Figure 4-1 Industrial/Commercial Business Facilities Visited (Automotive)

* Note that several Co-permittees did not target Automotive Service Facilities for inspections this permit year.

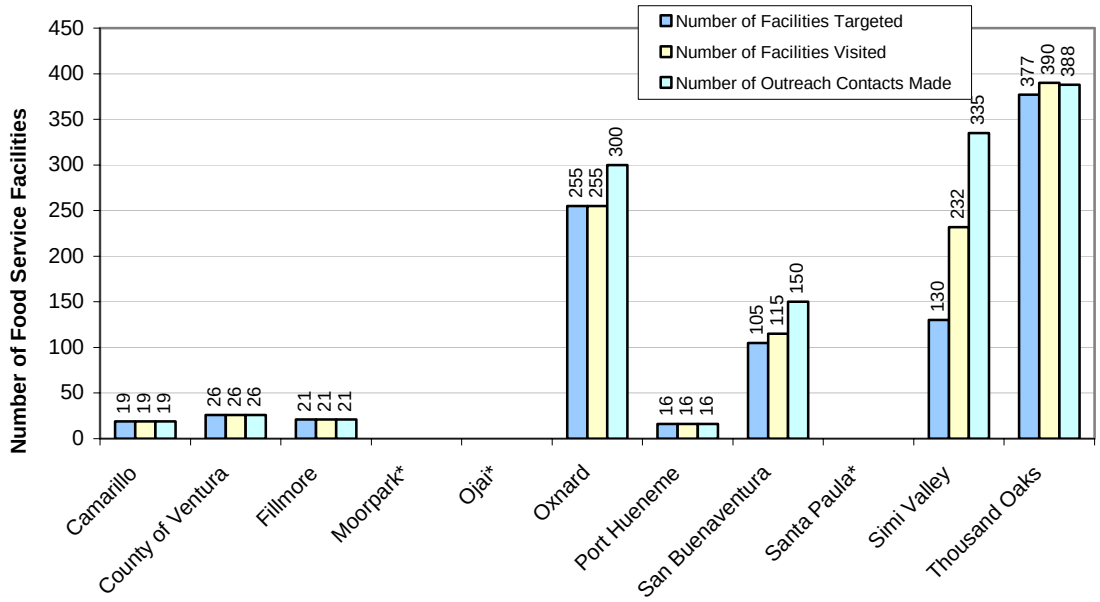


Figure 4-2 Industrial/Commercial Business Faclities Visited (Food Service)

* Note that several Co-permittees did not target Food Service Facilities for inspections this permit year.

Upon examining **Figure 4-1**, it becomes clear that in some cases the number of facilities visited exceed the number of targeted for inspection. This situation may result from multiple site visits to some facilities, which could occur for a number of reasons, such as deliberate multiple visits and multiple visits resulting from changes in facility ownership. Note that the data reflects the number of facilities visited in this reporting period only, the first year of a two-year performance criterion.

During site visits, Co-permittee inspection staff met with the business owner/manager to review the objectives of the inspection, and then performed a walk-through of the facility. Inspection results were discussed with the business owner/manager. In the event a Co-permittee determined that a facility required additional BMPs, the Co-permittee provided their recommendations to the facility owner/manager. Source control BMPs were preferred and recommended as a first step in BMP implementation before requiring the facility to implement costly structural BMPs. In addition, inspection staff informed facilities of their responsibility to prevent pollutant discharges even if the recommended BMP is unsuccessful.

Whenever evidence of an illicit discharge was found, facilities were scheduled for follow-up visits within six months of the inspection. If continued stormwater violations were found, another visit was scheduled and/or enforcement actions initiated. Enforcement actions may include any of the following: Warning Notice, Notice of Violation(s), Administrative Civil Liability actions and monetary fines.

In addition, the Co-permittees maintain a database of inspected automotive and food service facilities that includes the following information for each facility:

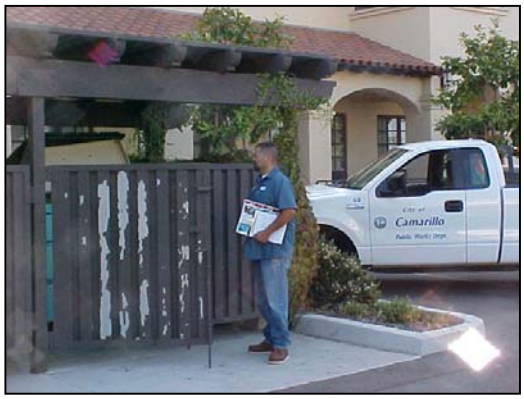
- Name of Facility
- Site Address
- Applicable SIC Code(s)
- NPDES Permit Coverage

- SWPPP Availability
- Facility Contact

A print out of the Co-permittees' database is attached in Appendix 1. The Co-permittees annually update the database with their activities for the current reporting period and provide a copy to the RWQCB in the Annual Report.

4.3.2 Targeted Business Outreach Program based on Pollutants of Concern

Individually, the Co-permittees recognize the importance of targeting potential critical sources of pollution and have concentrated their efforts on businesses with the greatest potential to contribute known Pollutants of Concern (ammonia, bacteria, etc.). Businesses that have recently been targeted for education and outreach include agriculture and agriculture-related facilities, commercial equestrian stable facilities, car washes, and mobile businesses (vehicle detailers and concrete pumpers).



Site Inspection

This year the RWQCB developed a tentative Conditional Waiver for Discharges from Irrigated Land. Several regulatory initiatives precipitated this update, including Senate Bill 390, the 2004 Policy for Implementation and Enforcement of the Non-point Source Pollution Control Program and TMDL and other watershed studies showing the impact of agricultural activities to water quality in Calleguas Creek and other water bodies in Ventura County. Conditional Waivers for Irrigated Lands have been adopted by the RWQCB, Central Coast (Region 3) and the Regional Board, Central Valley (Region 5).

The tentative Conditional Waiver for the Los Angeles Region requires dischargers to comply individually with the waiver conditions or participate in a group that complies with the waiver conditions. The key provisions for the waiver require dischargers to:

- Submit a Notice of Intent to Comply or participate in a group intending to comply with the Conditions of the Conditional Waiver
- Conduct wet and dry weather monitoring of discharge or receiving water
- Develop a water quality management plan
- Implement best management practices in accordance with approved water quality management plans
- Submit annual reports for monitoring and the water quality management plan

The Co-permittees participated in a RWQCB public workshop on March 3, 2005. The RWQCB was asked to review and provide direction to staff to make appropriate revisions to the tentative conditional waiver. Workshop participants were also provided the opportunity to present oral comments. The RWQCB will consider formal action on the conditional waiver at a later date.

In addition, the Co-permittees have established lines of communication with the agricultural community and are participating in several watershed coalitions with agricultural interest to develop and implement monitoring programs. The Co-permittees look forward to participating in any future workshops and/or educational outreach efforts aimed at the agriculture community.

The City of Camarillo in a continuation of its efforts with mobile cleaners enlisted fourteen new mobile detail businesses to sign "stormwater regulation acknowledgements". The City of Thousand Oaks also educated and inspected mobile businesses as time permitted during their normal inspection duties. In addition, the City of Oxnard used their city business license database to identify potential pollutant sources not previously targeted and performed detailed inspections where appropriate.

The City of Simi Valley concentrated on car washes (fixed facilities), equestrian waste education, and required Stormwater Pollution Control Plan (SWPCP) from various facilities in an effort to control POCs. During this reporting period, Simi Valley performed over 800 commercial and industrial inspections/contacts addressing stormwater issues and POCs. In addition, the City required SWPCPs from all auto and food service facilities and designated industrial facilities.

4.3.3 General Industrial Permit Facility Site Visit Program

The Permit requires each Co-permittee to identify industrial/commercial facilities potentially subject to the General Industrial Permit and target these facilities for education and outreach. Targeted facilities include wastewater treatment plants, landfills, large transportation yards and airports that may be publicly-owned by Co-permittees, but does not include public facilities such as municipal maintenance yards that may contain industrial types of activity. Co-permittee-owned facilities are not subject to the Industrial/Commercial Business Program. Requirements for these public facilities are discussed in the Program for Public Agency Activities. Inspection and enforcement of the General Industrial Permit is accomplished by the permitting agency, the State or RWQCB.

Site Inspection

Co-permittees use a variety of methods to create their lists of facilities subject to this program element. Some of the resources used to facilitate identifying facilities included:

- State Water Resources Control Board (SWRCB) database of facilities covered by the General Industrial Permit
- Hazardous materials inventories maintained by fire or environmental health departments
- List of facilities subject to local wastewater utility's industrial pretreatment programs
- City business license records
- Commercially available business listings (e.g., the Dun & Bradstreet database)
- Telephone book business listings
- Non-filers database
- Letters/Use surveys/Mailer with response requested/checklist, etc.

Once the list of facilities was compiled, the Co-permittees implemented an education outreach effort that provided an introduction of stormwater pollution prevention to these business owners/operators.

The Co-permittees continue to strongly believe that most business representatives are conscientious and want to do the right thing environmentally, once they are made aware of what they need to do and how easy compliance can be achieved with simple changes. An

informational site visit, in which an agency representative walks the site with the facility owner/operator and provides information about stormwater requirements and BMPs, has proven to be an effective approach for education and outreach.

In addition to the Co-permittees' efforts, the RWQCB has performed a number of industrial site inspections in Ventura County and this has greatly increased the number of facilities that were exposed to stormwater regulations and requirements. The RWQCB has also indicated an interest in coordinating with VCWPD to host an educational training workshop on the General Industrial Permit and its requirements in the near future. The Co-permittees look forward to this opportunity to work with RWQCB staff and provide additional stormwater education to the business community.

Due to the efforts of the Co-permittees last reporting period, many of the facilities targeted through this program have applied for permit coverage and have developed and implemented Storm Water Pollution Prevention Plans (SWPPPs).

Figure 4-3 shows the total number of facilities targeted for an outreach contact and how many were provided educational materials within each Co-permittee's jurisdiction. Note that the data reflect the number of facilities contacted in this reporting period only, the first year of a two-year performance criterion.

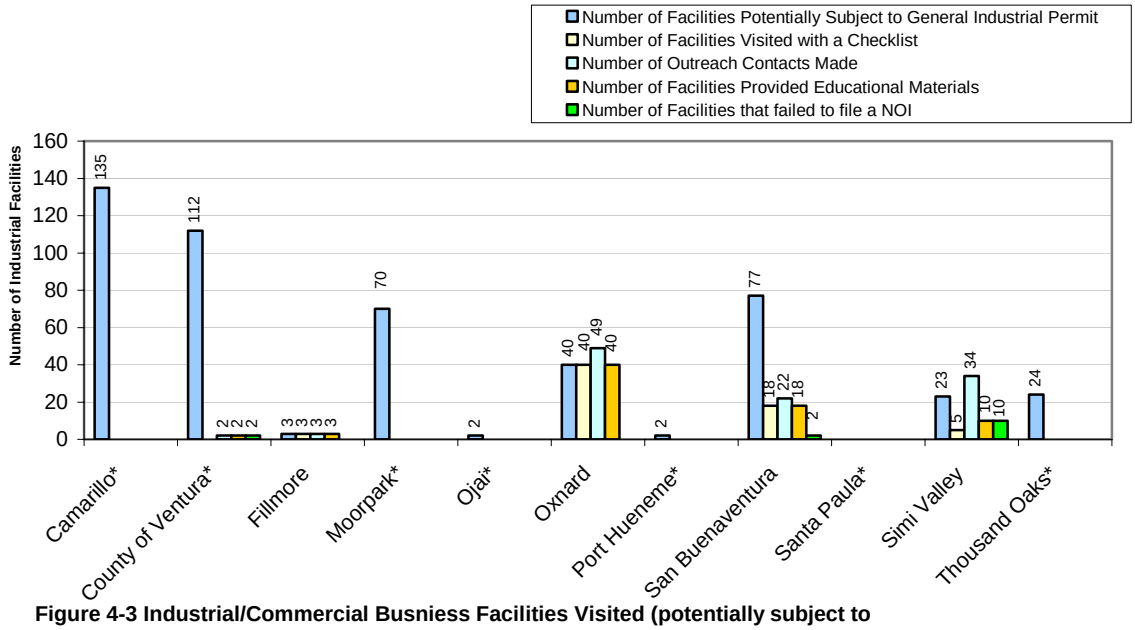


Figure 4-3 Industrial/Commercial Busniess Facilities Visited (potentially subject to General Industrial Permit)

* Note that several Co-permittees did not target Industrial Facilities for inspections this permit year.

In addition, the Co-permittees maintain a database of targeted industrial facilities potentially subject to the General Industrial Permit. This database includes the following information for each facility:

- Name of Facility
- Site Address
- Applicable SIC Code(s)

- NPDES Permit Coverage
- SWPPP Availability
- Facility Contact

A print out of the Co-permittees' database is attached in Appendix 1. The Co-permittees annually update the database with their activities for the current reporting year and provide a copy to the RWQCB in the Annual Report.

4.3.4 Stormwater Quality Staff Training

Each Co-permittee identified inspection staff and other personnel for training based on the type of stormwater quality management and pollution issues that they might encounter during the performance of their regular inspections or daily activities. Targeted staff may include those who perform inspection activities as part of the HAZMAT, Environmental Health and Wastewater Pretreatment Programs as well as staff who may respond to questions from the public or industrial/commercial businesses.

Staff was trained in a manner that provided adequate knowledge for effective business inspections, enforcement, and answering questions from the public or industrial/commercial operators. Training included a variety of forums, from informal "tailgate" meetings, to formal classroom training, and self-guided training methods. In addition, Co-permittee industrial/commercial staff training included appropriate information on the prevention, detection and investigation of illicit discharges and illegal connections (ID/IC). See **Section 8** for more information regarding ID/IC training.

During this reporting period, the Co-permittees trained 57 inspection staff in stormwater pollution prevention. **Figure 4-4** depicts the number of staff trained in the program area for each Co-permittee. All of the Co-permittees exceeded the performance criterion established in the SMP and trained more than the required 90% of targeted employees.

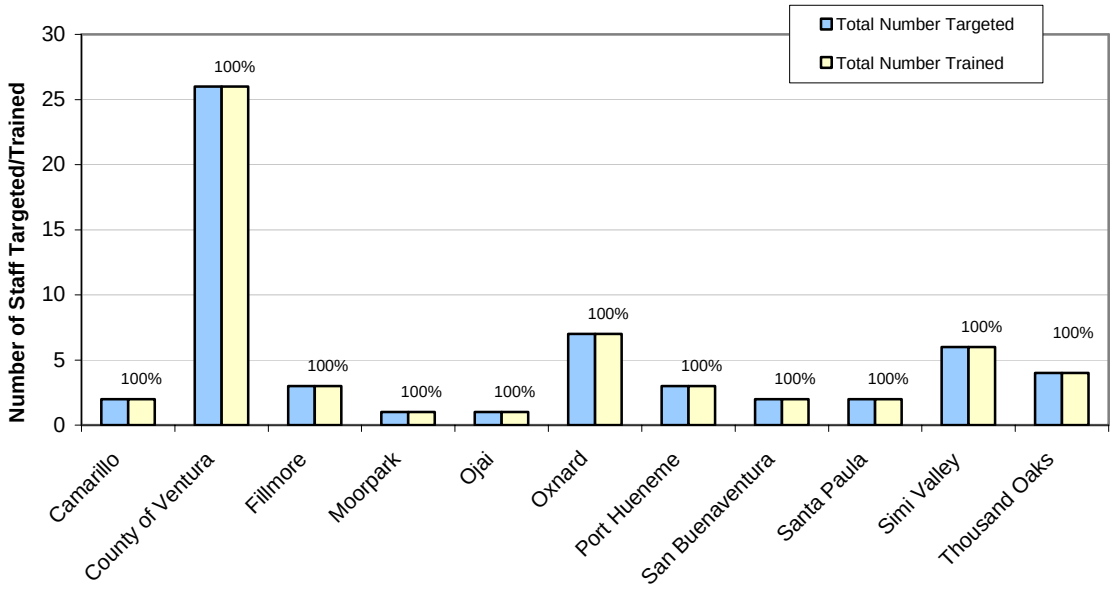


Figure 4-4 Industrial/Commercial Business Inspection Staff Trained

4.4 Five Year Permit Summary of Program Accomplishments

4.4.1 Development of Clean Business Fact Sheets

During the 2002-03 reporting period, the Co-permittees focused on maximizing their stormwater message by targeting those business activities that have the highest potential to contribute pollutants to the storm drain system. The Co-permittees sought to provide additional information and guidance to the business community on practical solutions for stormwater pollution prevention in those areas/activities that can be most problematic.

The Co-permittees developed a series of Clean Business Program Fact Sheets, which addressed the following topics and activities:

- Building & Grounds Maintenance
- Building Repair, Remodeling & Construction
- Maintenance & Cleaning of Floors and Outside Impervious Surfaces
- Materials Loading, Unloading & Storage
- Vehicle & Equipment Fueling
- Vehicle & Equipment Washing and Cleaning
- Waste Management & Disposal
- Waste Recycling & Disposal Reference Guide

These fact sheets have been posted on the Program's website (www.vcstormwater.org).

4.4.2 Coordination with EHD for countywide consistency

The Co-permittees continued to emphasize consistency among inspection programs, both in terms of requirements and procedures countywide. The Co-permittees appreciate the importance of providing a "level playing field" for the business community and of requiring compliance in a similar, and clear manner. In order to facilitate countywide consistency, the Co-permittees met regularly to discuss coordination of efforts and strategies for the inspection program at the Business & Illicit Discharge/Illegal Connection Subcommittee. As a part of this effort the Co-permittees encouraged the participation of the County of Ventura Environmental Health Department (EHD) in these discussions and to provide comments and guidance in the development of educational materials.

EHD plays an important role in the Co-permittees' efforts to inspect and assure compliance with stormwater regulations in the business community countywide. EHD conducts stormwater inspections of automotive service facilities on the behalf of several Co-permittees, and also performs the County unincorporated program for food service inspections. Implementation of these program elements required the Co-permittees to spend significant time and resources on communication, coordination and comprehensive training, both for Co-permittee staff as well as EHD inspection staff.

Although the Co-permittees need the flexibility to develop inspection programs that are appropriate for local conditions, the Co-permittees have worked hard to incorporate similar baseline elements in their individual programs. To define these baseline elements, the Co-permittees will continue to discuss standards and approaches for conducting inspection activities. The Co-permittees will continue to work on coordination and providing the business community of Ventura County a fair and congruent inspection program.

4.4.3 Joint Industrial Site Inspections

Beginning in the 2003-04 reporting period, VCWPD in coordination with the RWQCB, targeted several state permitted industrial sites for a joint inspection program. With recent regulatory changes that require Co-permittees to visit and educate industrial operators these

facilities are now subject to several layers of regulation. The Co-permittees recognize the potential for problems with these facilities being subjected to different inspection agencies and the likelihood of industrial operators receiving different direction and feedback on how to best implement stormwater pollution prevention measures and meet state permit compliance. In order to avoid this situation and ensure continued countywide consistency with respect to BMP selection and implementation, VCWPD staff with RWQCB inspectors visited several state permitted industrial facilities for joint inspections. These inspections provided both VCWPD and the RWQCB an opportunity to see the other in action and the chance to discuss at length their style, method and primary concerns at industrial facilities.

The results of these joint inspections were discussed in detail at Business & Illicit Discharge/Illegal Connection Subcommittee meetings where the Co-permittees were able to evaluate the best way to not only ensure a consistent countywide approach but also the best method for streamlining the regulatory process for the industrial community. These discussions are on-going with the Co-permittees committed to protecting stormwater quality in Ventura County and implementing an inspection program that is efficient and responsive to the industrial business community.

4.4.4 Automotive BMP Poster

The Co-permittees have long recognized that automotive service facilities have the potential to be a critical likely source of pollutants. During the 2001-02 reporting period, the Co-permittees developed a BMP poster targeting automobile service facilities and other businesses that perform similar activities. The poster provides guidance on material storage, treatment requirements, operating procedures and structural controls that prevent or reduce water pollution. During stormwater inspections, the Co-permittees distributed the new posters as an educational tool for the automotive service facilities to post in their work bays.

4.4.5 Educational Brochure for Industrial Facilities

During the 2001-02 reporting period, the Business & Illicit Discharge/Illegal Connection Subcommittee formed a small work group to develop an educational brochure for the General Industrial Permit Facility Site Visit Program. The work group spent considerable time and effort collecting information on the state's permit and closely examined what other municipalities has done to educate industrial facilities.

The work group consolidated this information and developed a tri-fold brochure that included the following specific requirements of the General Industrial Permit:

- Facilities subject to the General Industrial Permit must file a Notice of Intent (NOI) with the SWRCB
- A Storm Water Pollution Prevention Plan (SWPPP) must be developed and available on site

In addition, the Co-permittees provided information on prohibited discharges, illicit discharges, preventative methods for controlling illicit discharges, what to do in the event of an illicit discharge and penalties that can be assessed for non-compliance. These brochures were distributed during site visits and all total the Co-permittees provided educational material to 946 industrial facilities countywide that first year of the General Industrial Permit Facility Site Visit Program.

4.4.6 Pool Maintenance Guidance Fact Sheet

During the 2002-03 reporting period, the Co-permittees in coordination with the Ventura County Environmental Health Department (EHD), revised the Pool Maintenance Guidance Fact Sheet to reflect recent changes in Health Codes and more appropriate Best Management

Practices (BMPs). The fact sheet provides pollution prevention tips for both the homeowner and pool service professional. The fact sheets were made available at the EHD public counter, Co-permittee offices and other appropriate venues.

4.4.7 City of Oxnard Outreach to Carpet Cleaners

As a follow up to prior annual reports identifying carpet-cleaning businesses as frequent illicit dischargers, the City of Oxnard engaged in educational outreach activities that were designed to promote environmental awareness and sound stormwater pollution prevention practices to this business community. A list of carpet cleaning businesses was created using the City database. During the 2003-04 reporting period, these businesses were contacted by phone, and then sent a letter inviting them to attend a water quality workshop. Of the twenty-eight businesses contacted, ten attended, bringing much of their staff. The workshop consisted of a comprehensive PowerPoint presentation designed to educate the business owners and employees on their potential to generate waste and the impact on surface water quality and biota. The training focused on the implementation of effective best management practices (BMPs) to prevent the discharge of non-storm water pollutants into the City's storm drain system and receiving water bodies.

5.0 Program Description

5.1 Introduction

The Co-permittees have developed and implemented a Program for Planning and Land Development that addresses the planning of development projects. This program describes the minimum standards that the Co-permittees are to follow to implement their own development planning programs in compliance with the Permit. The term "development project" as used in this Program encompasses those projects that are subject to a planning and permitting review/process by a Co-permittee. A development project includes any construction, rehabilitation, redevelopment or reconstruction of any public and private residential project, industrial, commercial, retail and other non-residential projects, including public agency projects.

5.2 Program Development

In an effort to assure that appropriate post-construction BMPs are included in priority planning development and redevelopment project plans and designs, the Co-permittees have identified the following objectives:

- Minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code §13369, SWA §402(p), CWA §404, CZARA §6217(g), ESA §7 and local government ordinances
- Maximize the percentage of pervious surfaces to allow percolation of stormwater into the ground
- Minimize the quantity of stormwater directed to impervious surfaces and the MS4
- Properly design and maintain treatment control BMPs in a manner that does not promote the breeding of vectors
- Provide for appropriate permanent measures to reduce stormwater pollutant loads in stormwater from development sites

To meet the goals and objectives of the Program, the Co-permittees attend a Planning and Land Development Subcommittee meeting to coordinate and implement a comprehensive program to mitigate impacts on water quality from development projects to the maximum extent practicable (MEP). However, the Co-permittees may modify their programs to address particular issues, concerns or constraints that are unique to a particular watershed or to an individual municipality. The subcommittee is comprised of representatives of the Co-permittee cities, other municipal staff from various departments (Engineering Services, Planning and Source Control) and the Resource Conservation District (RCD).

5.3 Program Implementation

5.3.1 Project Review and Conditioning

Development and redevelopment projects can potentially discharge pollutants to stormwater. Recognizing this potential and addressing it throughout the development process can control these impacts. The Co-permittees approach stormwater concerns early in the project development process when the options for pollution control are greatest and the cost to incorporate these controls into new development and redevelopment projects is least.

Predevelopment Meeting

In planning and reviewing a development project, the Co-permittees consider three key questions with respect to stormwater quality control: (1) what kind of water quality controls are needed?; (2) where should controls be implemented?; (3) what level of control is appropriate? During the planning and review process, the Co-permittees document the method used to identify potential stormwater quality problems, develop design objectives, and evaluate the plan for the most appropriate alternatives and design.

5.3.2 Stormwater Quality Urban Impact Mitigation Plan (SQUIMP)

The Permit requires the implementation of the Stormwater Quality Urban Impact Mitigation Plan (SQUIMP) for new development projects that fall into one or more of the following categories:

- Single-family hillside residences
- 100,000 square foot commercial development
- Automotive repair shops
- Retail gasoline outlets
- Restaurants
- Home subdivisions with 10 or more housing units
- Locations within, or directly adjacent to or discharging to an identified Environmentally Sensitive Area (ESA)
- Parking lots of 5,000 square feet or more with 25 or more parking spaces and potentially exposed to stormwater runoff

In addition, redevelopment projects of one of the SQUIMP categories that result in the creation or addition of 5,000 square feet or more of impervious surfaces are subject to SQUIMP requirements. If a redevelopment project creates or adds 50% or more impervious surface area to the existing impervious surfaces, then stormwater runoff from the entire area (existing and additions) must be conditioned for stormwater quality mitigation. Otherwise, only the additional area of the redevelopment project requires mitigation.

The SQUIMP lists the minimum required BMPs that must be implemented for new development and redevelopment projects subject to the SQUIMP. The minimum requirements include the following BMPs:

- Control peak stormwater runoff discharge rates
- Conserve natural areas
- Minimize stormwater pollutants of concern
- Protect slopes and channels
- Provide storm drain stenciling and signage
- Properly design outdoor material storage areas
- Properly design trash storage areas
- Provide proof of ongoing BMP maintenance
- Meet design standards for structural or treatment control BMPs
- Comply with provisions applicable to individual priority project categories, which include the following: 100,000 square foot commercial development; restaurants; retail gasoline outlets; automotive repair shops; and parking lots

BMP Evaluation

The Co-permittees consider site-specific conditions of development projects when determining which BMPs are most appropriate for a site. Prior to selecting BMPs, the Co-permittees evaluate post-construction activities and potential sources of stormwater pollutants. The Co-permittees consider BMPs that would address the potential pollutants reasonably

expected to be present at the site once occupied or operational. BMPs for the project during the construction phase are addressed in the Construction Program.

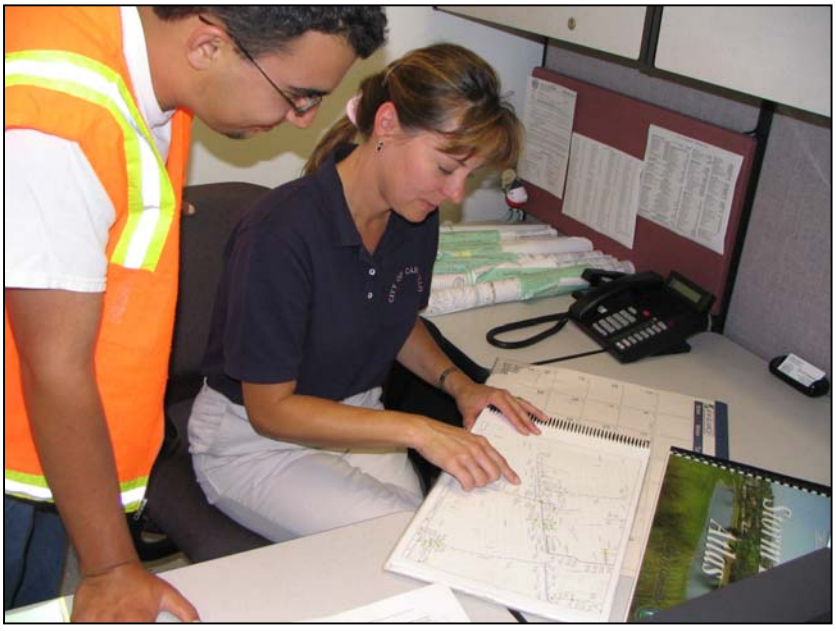
In order to fulfill these goals and objectives, the Co-permittees use the following common criteria in screening and selecting BMPs during the planning stage:

- Project characteristics (e.g., potential sources of stormwater pollutants after construction is completed)
- Site factors (e.g., slope, high water table, soils, etc.)
- Pollutant removal capability
- Short term and long term costs
- Responsibility for maintenance
- Contributing watershed area
- Environmental impact and enhancement

The BMP selection criteria listed above is applied by the Co-permittees in accordance with the overall objective of the Planning and Land Development Program, i.e., to reduce pollutants in discharges to the MEP. Some BMPs will clearly be more appropriate and effective in some site-specific situations that others and BMP selections reflect this variability.

SQUIMP Implementation

Figure 5-1 indicates the number of SQUIMP category projects that were reviewed and conditioned to meet stormwater and SQUIMP requirements by each Co-permittee. These results exceed the performance criterion established in the SMP. Besides the projects subject to SQUIMP requirements, the Co-permittees reviewed and condition additional development projects for stormwater quality. These projects included structural improvement projects that did not qualify for one of the SQUIMP categories. A review of **Figure 5-1** demonstrates that all of the Co-permittees met the performance criteria of reviewing 90% of all private development subject to SQUIMP requirements.



Plan Review

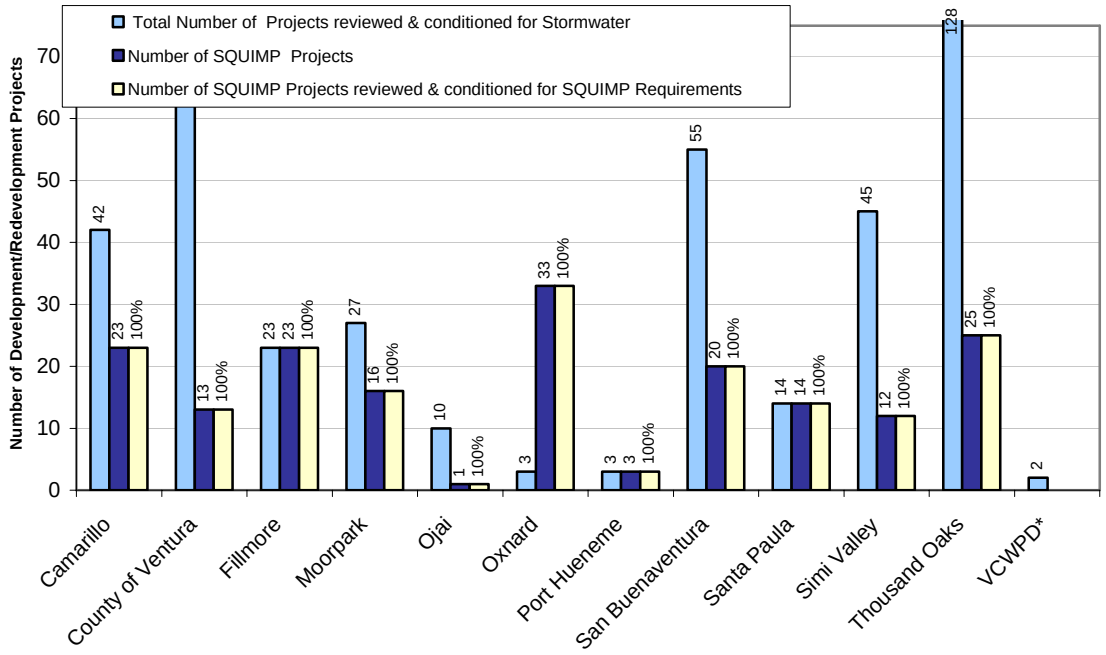


Figure 5-1 Land Development and Conditioning

* Note that VCWPD did not have any SQUIMP projects this permit year.

5.3.3 Environmental Review

The California Environmental Quality Act (CEQA) sets forth requirements for the processing and environmental review of many projects. The Co-permittees view CEQA processing and review as an excellent opportunity to address stormwater quality issues related to proposed projects early in the planning stages. The National Environmental Quality Act (NEPA) comes into play less often than CEQA, but may be included on projects involving Federal funding. Like CEQA, NEPA processing and review provide excellent opportunities to address stormwater quality issues related to proposed projects early in the planning stages.

Each Co-permittee has reviewed their internal planning procedures for preparing and reviewing CEQA (and NEPA when applicable) documents and has linked stormwater quality mitigation conditions to legal discretionary project approvals. In addition, when appropriate, the Co-permittees consider stormwater quality issues when processing environmental checklists, initial studies and environmental impact reports.

5.3.4 General Plan Revisions

The Co-permittees' General Plans provide the foundation and the framework for land use planning and development. Therefore, the General Plans reflect overall policies for protection of stormwater quality. The Co-permittees will include watershed and stormwater management considerations in the appropriate elements of their General Plans whenever these elements are significantly rewritten. **Table 5-1 Co-permittees General Plan** indicates the scheduled date of a significant rewrite to the Co-permittees' General Plan. Note that some Co-permittees have already modified their General Plan to include stormwater requirements and thus no date is provided.

Table 5.1 Co-permittees General Plan

Co-permittee	Date of General Plan	Schedule Date for significant rewrite
City of Camarillo	October 2003	Plan already updated to include stormwater
County of Ventura	October 1997	2006
City of Fillmore	April 2003	Plan already updated to include stormwater
City of Moorpark	January 1984	2005
City of Ojai	May 1997	Plan already updated to include stormwater
City of Oxnard	January 1990	on-going
City of Port Hueneme	August 1997	2015
City of San Buenaventura	August 1989	2005
City of Santa Paula	January 1998	2012
City of Simi Valley	October 1988	2007
City of Thousand Oaks	July 1996	Plan already updated to include stormwater

5.3.5 Development Community Outreach

During the reporting period, the Co-permittees made over 3,000 contacts to development community representatives through public communication efforts (counter assistance, phone conservations/discussions, etc.), professional society presentations, community group presentations, workshops/seminars, and educational outreach materials. These numbers are reflected in **Figure 5-2** which indicates the percentage of outreach methods used, and **Figure 5-3** shows the number of contacts made by each Co-permittee.

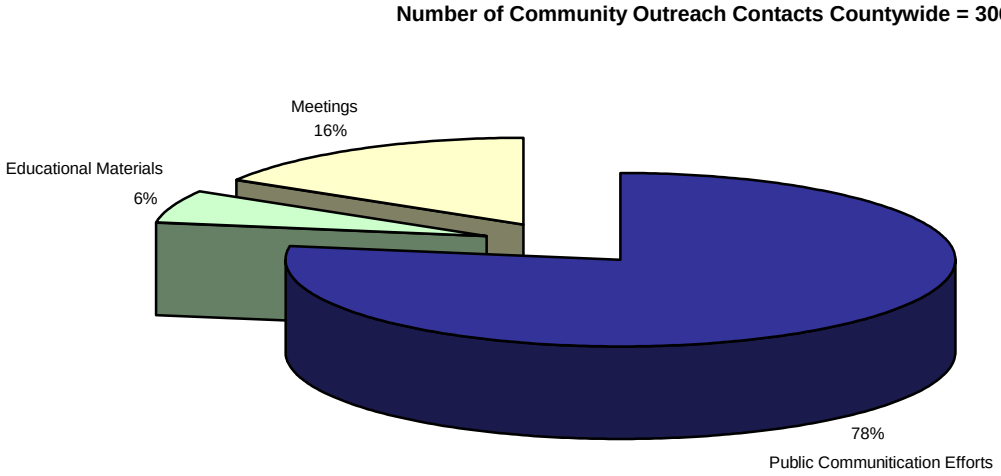


Figure 5-2 Land Development Outreach Activities Used Countywide

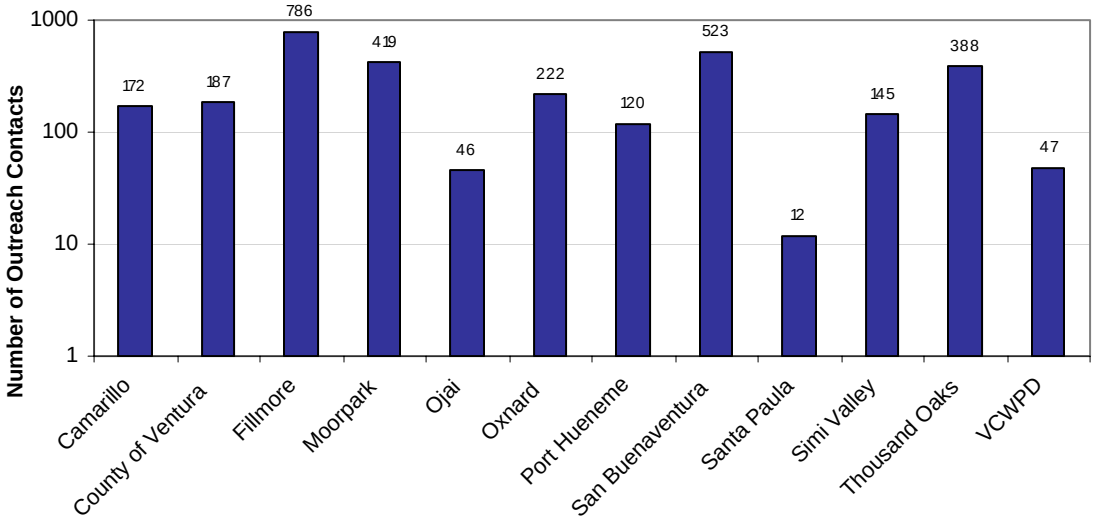


Figure 5-3 Land Development Outreach Contacts

5.3.6 Stormwater Quality Staff Training

The Co-permittees identified employees for training regarding the requirements of the Planning and Land Development Program and SQUIMP requirements. Targeted employees include staff involved with planning, review, conditioning, permitting of development projects and administration of departments that conduct these activities.

Training methods varied amongst the Co-permittees and ranged from informal meetings to formal classroom training or self-guided training. During the reporting period, the Co-permittees trained 65 planning staff in stormwater management, plan review and SQUIMP requirements. **Figure 5-4** depicts the number of staff trained in the program area for each Co-permittee. The majority of the Co-permittees exceeded the performance criterion established in the SMP and trained more than the required 90% of targeted employees.

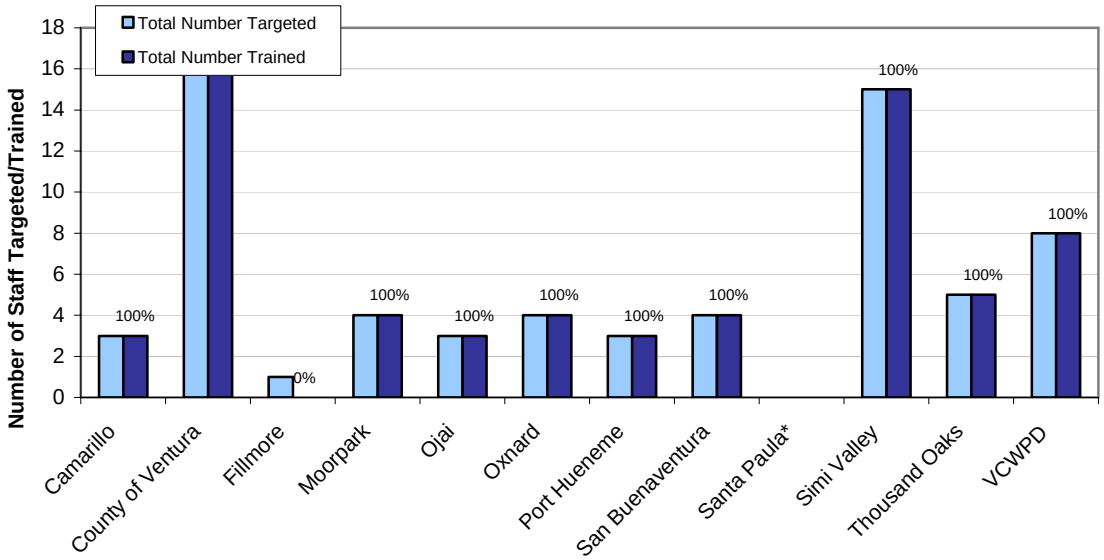


Figure 5-4 Land Development Staff Trained

* Note that Santa Paul did not target any staff for training this permit year.

5.4 Five Year Permit Summary of Program Accomplishments

5.4.1 Urban Stream Erosion Prevention Model (USEP) Study

As areas undergo urban development, surfaces that allow stormwater to percolate into the ground are usually made less pervious and alterations to natural drainage systems are constructed to convey stormwater runoff from urbanized areas. These alterations result in increases of both runoff volume and runoff rates in natural streams and rivers. Several reports and case studies on mostly perennial streams suggest that increased runoff volume and velocity from urbanization in watersheds with natural channels may contribute to channel enlargement (stream erosion) either through widening of the stream banks, down cutting of the streambed or a combination of both. This change of the natural channel morphology may trigger instream habitat degradation.

In order to better understand how urbanization and development impacts streams in Ventura County, the Co-permittees developed and implemented a study "to control the post-development peak stormwater runoff discharge rates to maintain or reduce pre-development downstream erosion." The Urban Stream Erosion Prevention Model (USEP) aimed to setup, calibrate and validate the USEPA Hydrologic Simulation Program in a small watershed (upper reaches of Arroyo Simi) for 'current/recent' hydrologic conditions. Due to some initial grant funding delays, the USEP study was temporarily slowed. However, the Co-permittees did have some preliminary data to establish design criteria for controlling post-development erosion. This interim peak flow criteria was included in the Technical Guidance Manual and submitted to the RWQCB.

After two years of study the Co-permittees finalized the USEP Report. The study's results allowed the Co-permittees to re-evaluate the use of the information available from the model on flow-duration, flow velocity distributions, bed/bank shear stress calculations, etc. for assessing flood control facilities, streambank/bank protection efforts and urbanization impacts. Most significantly, the study assisted the Co-permittees in determining that the interim peak flow criteria for designing BMPs for projects subject to SQUIMP requirements originally included in the Technical Guidance Manual is the most appropriate.

This project illustrates the commitment and dedication the Co-permittees have in addressing real stormwater issues and implementing sound scientifically proven methods for resolving those issues. In addition, this project is the first of its kind in southern California and therefore will benefit many other regions in California, with potential application in other states.

5.4.2 ESA Identification and Mapping

Some areas, due to their plant or animal life or their habitats, are at risk to water quality degradation caused by human activities and may require special consideration. The Permit requires identification of these areas [referred to as Environmentally Sensitive Areas (ESAs)] for the purpose of conditioning development projects planned in these vulnerable areas.

The Permit required the identification of ESAs by January 27, 2001. The Co-permittees submitted a list of criteria for the purpose of defining ESAs in Ventura County to the RWQCB by the permit deadline. This definition was rejected by the RWQCB and deemed insufficient. In November 2001, the Co-permittees submitted a revised definition of ESAs with the modified SMP. Again, the RWQCB deemed the definition incomplete and requested further refinements.

On July 1, 2002, the Co-permittees again submitted a revised approach for ESA designations. This approach required the implementation of SQUIMP provisions for all projects located in or directly adjacent to or directly discharging to an ESA, where development would:

- Discharge stormwater and urban runoff that is likely to impact a sensitive biological species or habitat; and
- Create 2,500 square feet or more of impervious surface area
- Redevelopment of single-family homes are exempt

ESAs were defined as 303(d) listed water bodies in all reaches that are unimproved and soft-bottom and all California Costal Commission's *Environmentally Sensitive Habitat Areas* as delineated on maps in Local Coastal Plans and Regional Water Quality Control Board's Basin Plan Rare, Threatened or Endangered Species (RARE) sites. The California Department of Fish and Game's *Significant Natural Areas* map would be considered for inclusion as the department field verifies the designated locations. The Co-permittees and the RWQCB have now finalized the ESA designations. In addition, the Co-permittees have created a countywide map depicting these areas and have made it available to all interested parties.

5.4.3 Technical Manual for Stormwater Quality Control Measures

In July 2002, the Co-permittees developed the Technical Guidance Manual for Stormwater Quality Control Measures. The Manual addressed the SQUIMP requirements of the NPDES permit. The Manual specified design storm volumes and flows and identified various site, source and treatment control BMPs applicable to Ventura County and the SQUIMP project categories (e.g. automobile repair shops, restaurants, commercial development, etc.). A stakeholder group was formed and met regularly with the Planning and Land Development

Subcommittee throughout the development of the Manual to receive input and direction. Ultimately the Manual provided design guidance for site design (e.g. reduction of impervious areas), source and treatment control BMPs. Fact sheets were developed for each BMP and provided detail descriptions of the BMPs and where applicable design criteria. For the treatment control BMPs a step-by-step design process (including electronic design worksheets) was developed and typical design details provided.

In addition guidance was provided regarding the effectiveness of the BMPs, operation and maintenance requirements and design examples. Revisions to the Manual were provided in November 2002 and February 2003. This manual is applied Countywide and provides for a consistent and equitable approach to land development within Ventura County.

5.4.4 BMP Evaluation Study/Compliance Database

Protection of water quality requires that BMPs be designed in accordance with criteria sufficient to meet the requirements of the stormwater quality management program, without causing collateral, negative impacts elsewhere in the environment. In addition, science and technology of stormwater quality management continues to evolve. Therefore, it is necessary to develop appropriate BMP design criteria and then periodically monitor BMP effectiveness.

In the 2002-03 reporting period, the Co-permittees implemented an In-Situ BMP Evaluation Study. Many new and redevelopment projects have been conditioned by the Co-permittees to mitigate stormwater impacts with the use of a variety of Best Management Practices (BMPs). The Co-permittees realized that in order to assess the effectiveness of these measures to protect water quality an evaluation of BMPs was needed. In October 2002, the Co-permittees hired a consultant to evaluate a series of BMPs in different locations throughout the County. Unlike other BMP studies, this evaluation went beyond simply verifying the appropriateness of the BMP for a given situation. Rather, this study evaluated whether the BMP was installed properly, if it was properly maintained and if the BMP had the desired results.

The study's findings included design, construction and operation and maintenance recommendations. Ultimately, study results were used by the Co-permittees to evaluate the need for modifying BMP design criteria for increasing BMP effectiveness and mitigation of stormwater impacts.

In addition to providing an evaluation of BMP design and function, the study highlighted the need for the Co-permittees to develop a mechanism to better account the number of BMPs within their jurisdiction and their proper maintenance. The Co-permittees during the 2003-04 reporting period began the process of developing a database to track BMPs, their maintenance and performance. This database contains a number of fields (i.e. location, ownership, maintenance records) that each Co-permittee maintains in an effort to have countywide consistency. An individual Co-permittee database may vary due to a particular Co-permittee's needs but the Co-permittees routinely discuss database management issues and developments in the Planning and Land Development Subcommittee. The Co-permittees continue to better refine their data collection and management of this important component of assuring the protection for water quality.

5.4.5 SQUIMP Workshops

On behalf of the Co-permittees, VCWPD hosted two half-day SQUIMP Workshops on January 30, 2002. The workshops targeted civil engineers, planners and municipal staff routinely involved with land development project design and review. Presentations by the RWQCB, VCWPD, Larry Walker and Associates (LWA) and Camp, Dresser and McKee (CDM) were given. The presentation topics included the SQUIMP from a regulatory perspective, a general overview of the SQUIMP in Ventura County, making the connection

between BMPs and Pollutants of Concern (POCs) and BMP Design using SQUIMP criteria. Total attendance was 150 people.

Due to the great success of the 2002 Workshop, the Co-permittees agreed to hold another SQUIMP training seminar. In March 2004, VCWPD contracted with Camp, Dresser and McKee (CDM) to coordinate a one-day SQUIMP training workshop. The Co-permittees met on a regular basis with CDM to discuss the goals and objectives of the workshop. On June 8, 2005 CDM lead the SQUIMP Requirements & Design Guidance Manual Workshop held at the Ventura County Government Center. This workshop was a huge success with representatives from the design community, RWQCB, academia and regulatory agencies presenting an overview of SQUIMP requirements. Topics covered included: water quality and SQUIMP goals; site design techniques; Pollutants of Concern (POCs) and selection of proper BMPS; Countywide Design Guidance Manual for BMP Design; and operation and maintenance of BMPs. The event was well attended with over 120 participants. The Co-permittees should be commended for their continued efforts to continuously educate the design community on water quality issues, SQUIMP requirements and BMP operation and maintenance concerns.

SQUIMP Training – June 2005

SECTION 6.0 PROGRAM FOR CONSTRUCTION SITES

6.0 Program Description

6.1 Introduction

The Co-permittees regulate construction activities and have responsibility for the construction and reconstruction of municipal facilities and infrastructure. Water quality concerns relating to construction pollutants have been a focus of the Co-permittees' compliance program since the permit's inception.

With adoption of the second term permit, the construction element of the program has been further developed. Major components of this program include:

- Inspect sites with SWPCPs/SWPPPs for storm water quality requirements a minimum of once during the wet season
- Develop and implement a checklist for inspecting storm water quality control measures at construction sites
- Require proof of filing a Notice of Intent (NOI) for coverage under the State General Construction Permit prior to issuing a grading permit for all projects requiring coverage

The Construction Program includes requirements and guidelines for pollution prevention/BMP methods that must be used by construction site owners, developers, contractors and other responsible parties, in order to protect water quality. To ensure that the Program is implemented, each jurisdiction conducts inspections during the rainy season to verify the appropriateness and implementation of BMPs and takes enforcement action as necessary. Training and outreach is regularly scheduled to make certain that implementation occurs consistently throughout Ventura County.

6.2 Program Development

The Co-permittees have developed a Program for Construction Sites that addresses the implementation of BMPs to control pollution of runoff from construction activities. The goals of the program are to provide the Co-permittees with

- A program framework for reducing the adverse impacts that public and private construction may have on water quality
- An iterative process by which Co-permittees can effectively monitor and respond to problems as they are discovered; and
- Methodologies to meet NPDES permit requirements

The Co-permittees enforce grading codes on private construction projects in order to protect slopes from erosion and failure. These codes are also designed to protect watercourses and adjacent property from the effects of erosion.

6.3 Program Implementation

To meet the goals and objectives of the Program, the Co-permittees attend a Construction Subcommittee meeting to coordinate and implement a comprehensive program to mitigate impacts on water quality from construction sites to the maximum extent practicable (MEP). However, the Co-permittees may modify their programs to address particular issues, concerns or constraints that are unique to a particular watershed or to an individual municipality. The Subcommittee is comprised of representatives of the Co-permittees cities and other municipal staff from various departments (Engineering Services, Planning and Land Development and Inspection Services).

In order to facilitate effective inspections and to document compliance with this requirement, VCWPD developed a Stormwater Quality Checklist for Construction Inspections for Co-permittee use. In addition, VCWPD hosted several training workshops on performing construction site inspections (for more information see **Section 6.4.2**). These workshops focused on how field personnel should conduct site inspections and things that they should look for (proper implementation and maintenance of erosion sediment control BMPs, the prevention of non-stormwater discharges, etc).

6.3.1 SWPCP/SWPPP Preparation, Certification and Implementation

Prior to receiving a grading permit, the Co-permittees require a Storm Water Pollution Control Plan (SWPCP) to be submitted for projects that are located in a hillside area, or will result in soil disturbance of one acre or more, or is within or discharging directly to or directly adjacent to an ESA. The SWPCP remains in effect until the construction site is stabilized and all construction activity is completed. The SWPCP includes identification of potential pollutant sources and the design, placement and maintenance of BMPs to effectively prevent the entry of pollutants from the construction site to the storm drain system. In addition, the Co-permittees require that construction projects include the following requirements:

Example of Inlet Protection

- Sediments generated on the project site shall be retained using structural drainage controls
- No construction-related materials, wastes, spills or residues shall be discharged from the project site to streets, drainage facilities or adjacent properties by wind or runoff
- Non-stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the project site
- Erosion from slopes and channels will be eliminated by implementing BMPs, including but not limited to, limiting grading during the wet season, inspecting graded areas during rain events, planting and maintaining vegetation on slopes and covering erosion susceptible slopes

Storm Water Pollution Prevention Plans (SWPPPs) prepared for projects subject to the General Construction Permit may be accepted as the SWPCP for a project if the SWPPP meets the requirements of the General Construction Permit.

In addition, the Co-permittees have incorporated SWPCP provisions in Co-permittee construction projects, which result in soil disturbance of one acre or more, or located in a hillside areas, or is directly discharging to an ESA. The Co-permittees also include provisions that delineate contractor responsibilities for SWPCP preparation, implementation and for performance of the work and ancillary activities in accordance with the SWPCP approved by the Co-permittee for the project.

Figure 6-1 indicates the number of construction projects that were required to submit a SWPCP and the number of projects that submitted a SWPCP for each Co-permittee.

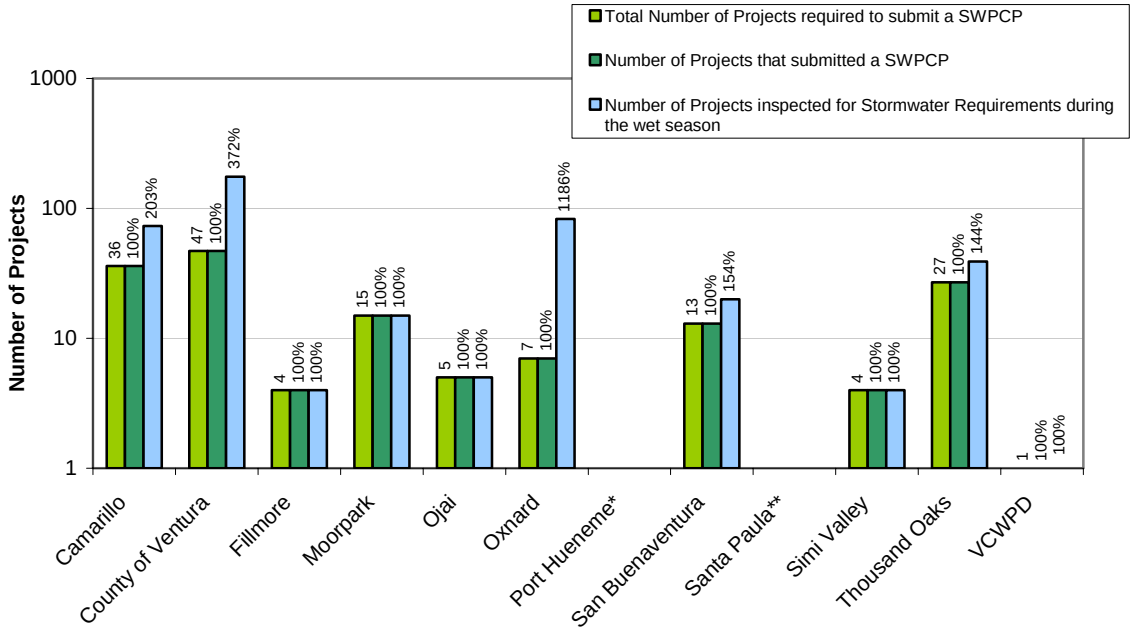


Figure 6-1 Construction Projects Required to Submit a SWPCP

* Note that Port Hueneme did not have any projects that required a NOI this permit year.

** Note that Santa Paula did not submit any Construction Program annual report data this permit year.

Figure 6-1 reflects the number of grading permits issued during this reporting period and does not necessarily reflect the number of active construction projects. The Co-permittees have consistently required projects to submit SWPCPs (and SWPPPs when required) with all Co-permittees exceeding the 90% performance criteria established in the SMP. In some jurisdictions, SWPCPs were required and submitted for nearly all projects including those that do not exceed Permit thresholds. This conservative approach underlines the importance the Co-permittees place on ensuring implementation of stormwater controls at construction sites.

In addition, **Figure 6-1** details the number of inspections conducted at construction sites with a SWPCP during the wet season. Most of the Co-permittees met or exceeded the 90% performance criterion established in the SMP. A review of **Figure 6-1** also indicates that some Co-permittees inspected more construction sites than were required to submit a SWPCP this reporting period. This is due to Co-permittees performing inspections at sites that were issued a grading permit the previous year and are still active and thus require continue monitoring for stormwater quality.

6.3.2 General Construction Permit

The Co-permittees require all construction projects subject to the General Construction Permit to submit proof of filing a Notice of Intent (NOI) prior to issuing a grading permit. Proof of filing a NOI may include a copy of the completed NOI form and a copy of the check sent to the State Water Resources Control Board (SWRCB) or a copy of the letter from the SWRCB with the Waste Discharge Identification Number (WDID) for the project.

In addition, the Co-permittees file NOIs with the SWRCB and pay the appropriate fees whenever Co-permittee construction projects qualify for coverage under the General Construction Permit. The NOIs and appropriate fees are filed prior to the commencement of any construction activity covered by the General Construction Permit. A copy of the NOI filed is kept with the project files and in the SWPPP for the project.

Projects subject to the requirements of the General Construction Permit currently include those that involve clearing, grading, or excavation resulting in soil disturbances of at least one acre or construction activity that results in soil disturbances of less than five acres if it is part of a larger common plan of development or sale. Co-permittee emergency work and routine Co-permittee maintenance projects do not require preparation of a SWPCP/SWPPP, but are instead performed in accordance with the Program for Public Agency Activities.

Figure 6-2 presents the number of construction projects that prepared a SWPPP. Most of the Co-permittees met or exceeded the 90% performance criterion for verifying the filing of a NOI established in the SMP.

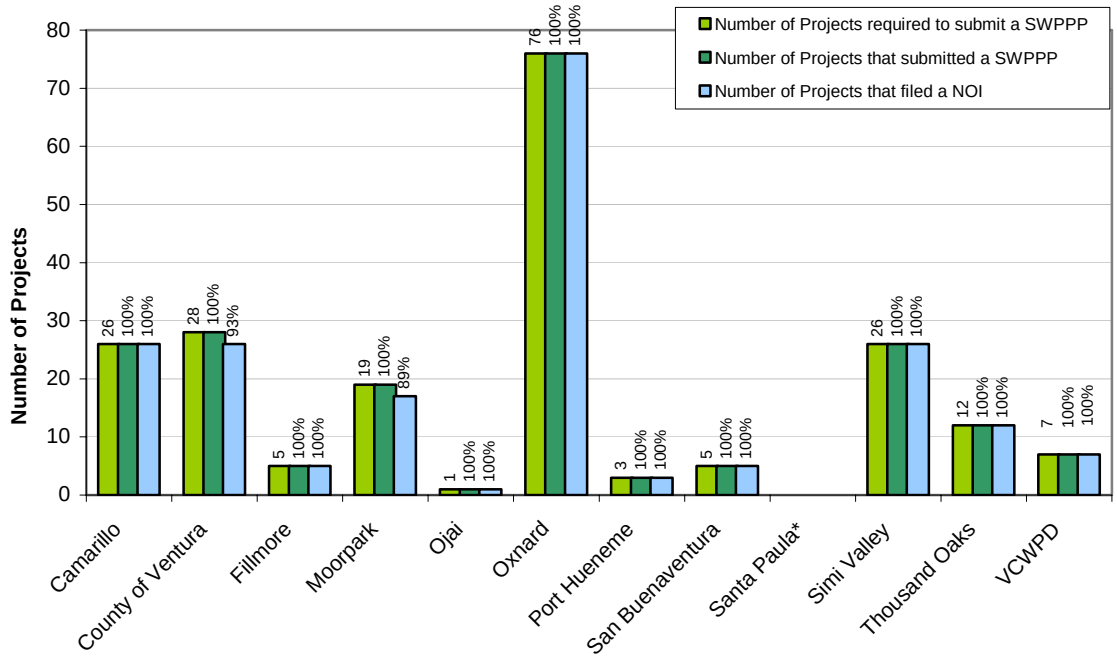


Figure 6-2 Construction Projects Required to Submit a SWPPP

* Note that Santa Paula did not submit any Construction Program annual report data this permit year.

6.3.3 Construction Site Inspection Program

The Co-permittees inspect all construction sites with SWPCPs, a minimum of once during the wet season to determine if the SWPCP is adequately implemented. During this SWPCP inspection, a stormwater quality control site inspection checklist is completed to document inspection results. If it is determined that the SWPCP is not adequately implemented or when there is evidence of a reasonable potential for sediment, construction materials, wastes, or non-stormwater runoff to be discharged from the project site, the Co-permittees will conduct a follow-up inspection within two weeks.

Example of Concrete Washout

When construction sites fail to comply with the SWPCP/SWPPP, Co-permittee inspection staff implements appropriate notification and enforcement procedures. The five general levels of notification and enforcement for most

stormwater related problems for construction projects are Verbal Notification, Job Memorandum, Notice of Violation, Administrative Compliance Order, Stop Work Order, and RWQCB referrals. The decision to use any level of control is based upon the severity of the violation(s).

Figure 6-3 indicates the number and types of enforcement actions taken by the Co-permittees countywide. Note that a single construction project can be issued multiple violations, ranging from written notices to RWQCB referrals. While job memorandums increased over last reporting period, reducing the percentage of the other more serious enforcement actions, there was an increase in total enforcement actions from 498 last reporting year to 807 this year.

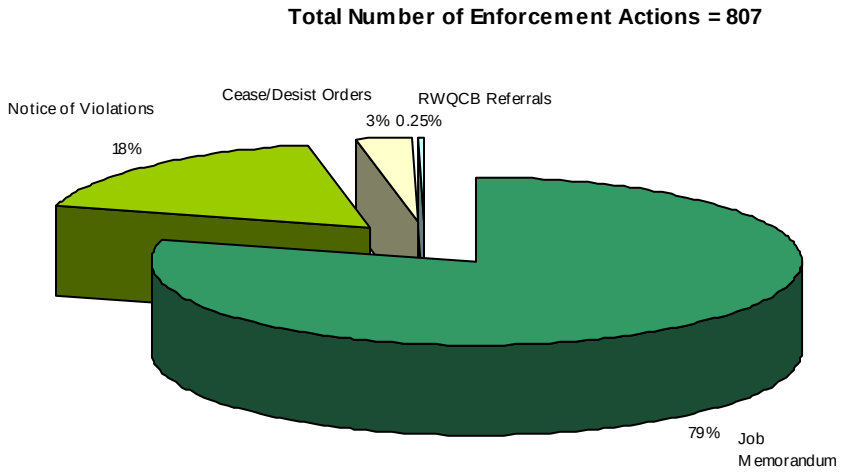


Figure 6-3 Construction Site Stormwater Violations

6.3.4 Construction Community Outreach

The Co-permittees discuss stormwater quality requirements and concerns with developers and contractors during pre-construction meetings and inspections. During these meetings, the Co-permittees emphasize compliance with stormwater quality requirements and proper implementation of the project's SWPCP. The Co-permittees continue to stress that the developer is responsible for all discharges from the project site, including discharges from streets and storm drains until final acceptance of the project. The Co-permittees point out that this responsibility includes discharges that result from activities at owner occupied facilities (e.g., landscaping, block wall construction, etc.) conducted by new homeowners and/or individuals or companies hired by the new owner.

In addition, the Co-permittees have made educational material available to the construction community via the Program's website (www.vcstormwater.org). Co-permittees have posted guidance on SWPCP requirements, a checklist for SWPCP preparation, the SWPCP form, a SWPPP template with attachments, guidance on BMPs, and presentations on stormwater regulations and General Construction Permit compliance.

During the reporting period, the Co-permittees made over 4,900 contacts to construction community representatives through meetings, community outreach efforts, public

communication efforts, print media, and other outreach methods. This effort is consistent with last year's effort. These numbers are reflected in **Figure 6-4**, which shows the percentage of outreach methods used countywide.

Total Number of Outreach Contacts = 4,931

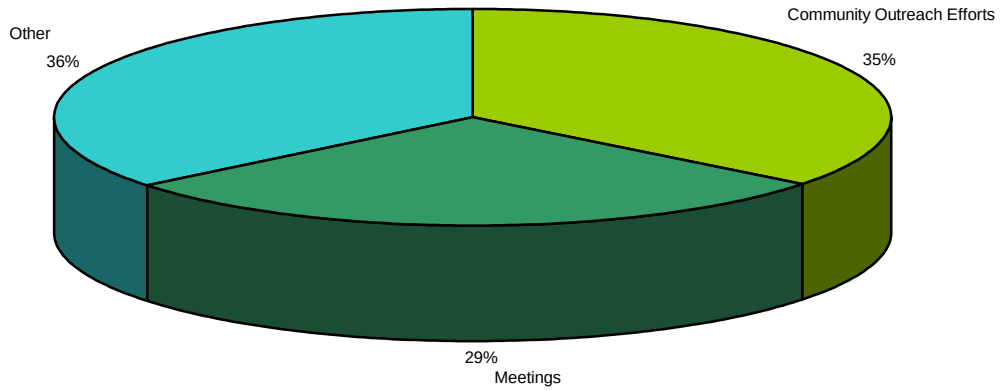


Figure 6-4 Construction Outreach Methods Used Countywide

6.3.5 Stormwater Quality Staff Training

The Co-permittees targeted employees involved with construction engineering and inspection for training regarding the requirements of the Program for Construction Sites. Training methods varied amongst the Co-permittees and ranged from informal meetings, to formal classroom training or self-guided training. The Co-permittees also trained staff on the prevention, detection and investigation of illicit discharges and illegal connections (ID/IC) associated with construction activities. See **Section 8** for more information regarding ID/IC training.

During this reporting period, the Co-permittees trained 260 construction inspection staff in stormwater management, construction inspections, SWPCPs, SWPPPs, illicit discharge response, and non-stormwater discharges. **Figure 6-5** depicts the number of staff trained in the program areas for each Co-permittee. All of the Co-permittees exceeded the performance criterion established in the SMP and trained more than the required 90% of the targeted employees.

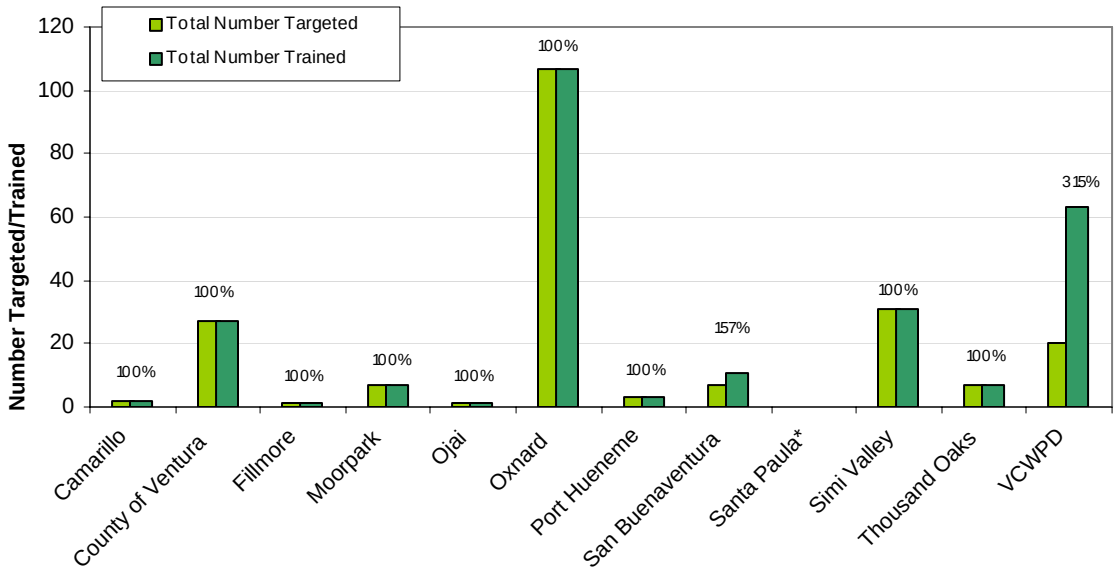


Figure 6-5 Construction Inspection Staff Trained

* Note that Santa Paula did not submit any Construction Program annual report data this permit year.

6.4 Five Year Permit Summary of Program Accomplishments

6.4.1 Joint Construction Site Inspections

Starting in the 2003-04 reporting period, VCWPD in coordination with the RWQCB targeted several state permitted construction sites for a joint inspection program. With recent regulatory changes that require construction sites of one acre or more to obtain a State General Construction Permit, more and more construction projects are now subject to several layers of regulation. The Co-permittees recognize the potential for problems with these construction sites being subjected to different inspection agencies and the possible likelihood of developers, contractors and local homeowners receiving different direction and feedback on how to best implement stormwater pollution prevention measures at their sites. In order to avoid this situation and ensure continued countywide consistency with respect to BMP selection and implementation, VCWPD staff, with RWQCB inspectors, visited several state permitted construction sites for joint inspections. These inspections provided both VCWPD and the RWQCB an opportunity to see the other in action and the chance to discuss at length their style, method and primary concerns at construction sites.

The results of these joint inspections were discussed in detail at the Construction Subcommittee meetings where the Co-permittees were able to evaluate the best way to not only ensure a consistent countywide approach but also the best method for streamlining the regulatory process for the construction community. These discussions are ongoing with the Co-permittees committed to protecting stormwater quality in Ventura County and implementing an inspection program that is efficient and responsive to the construction community.

6.4.2 Joint Construction Training Workshops

General Construction Permit Compliance Workshop

During the 2001-02 reporting period, VCWPD in coordination with the Association of General Contractors of California (AGC) held two one-day workshops on how to comply with the General Construction Permit. VCWPD again provided training with AGC in April 2003. At both workshops, presentations were given on the regulatory foundation for the permit, Co-permittee responsibilities for implementing the permit and the ease with which construction sites could achieve compliance with the permit. Both events were very successful with participation from municipal staff, local development and construction community and engineering consulting firms.

Table 6.1 General Construction Permit Compliance Workshops

Event	Attendance
July 2001	270
April 2003	75

APWA Construction Training Workshop

During the 2002-03 reporting period, VCWPD in coordination with the Association of Public Work Agencies (APWA) and the RWQCB held a one-day workshop that covered stormwater regulations and how to comply with the General Construction Permit. The workshop outlined the General Construction Permit and how to comply with its requirements. Approximately 50 people attended the event. The workshop's success reinforced the Co-permittees' belief that education is one of the primary tools to creating stormwater awareness and changing behavior. Thus, the Co-permittees will continue to target additional audiences for educational outreach and plan to continue to hold training workshops as needed.

Building Industry Association Stormwater Seminar

On behalf of the Co-permittees, VCWPD during the 2001-02 reporting period, participated in a daylong seminar, entitled New Stormwater Regulations and Construction/Development Projects that drew more than 270 participants in Downey, California. Presentations focused on RWQCB construction/development requirements, municipal construction/development requirements and potential legal actions for non-compliance. In addition to VCWPD, representatives from the RWQCB, Los Angeles County Stormwater Program, Orange County Stormwater Program and San Bernardino Stormwater Program were present.

As a result of recent significant changes in water quality regulations incorporated in the General Construction Permit, the Co-permittees strongly believe participation in such events is crucial to educating the construction/development community and achieving widespread compliance. The Co-permittees will continue to take advantage of similar opportunities to further stormwater awareness and facilitate compliance with permit requirements.

Pollution Prevention for Concrete Products Workshop

During the 2001-02 reporting period, the Co-permittees received a large number of illicit discharge reports related to concrete washout activities and agreed that a workshop targeting concrete supply companies, local contractors and handymen would be appropriate. VCWPD in coordination with the City of Thousand Oaks held a one-day workshop that covered

stormwater regulations and appropriate BMPs for working with concrete products. The workshop emphasized prevention of non-stormwater discharges (source control), appropriate cleaning methods, material storage, and proper disposal. A total of 57 people attended the event. The workshop's success reinforced the Co-permittees' belief that education is one of the primary tools to creating stormwater awareness and changing behavior. Thus, the Co-permittees will continue to target additional audiences for educational outreach and plan to hold training workshops as needed.

6.4.3 Educational Outreach/Material Development

New Homeowner Brochure

During the 2001-02 reporting period, the Co-permittees begin to discuss the need for a "New Homeowner" brochure to assist developers, Home Owner Associations (HOAs) and residents with their efforts to prevent non-stormwater discharges. A significant number of illicit discharges can occur in owner-occupied homes in a phased development project. Illicit discharges may result from concrete and masonry work, painting activities, landscaping and gardening and minor construction in and around the home. The Construction Subcommittee in coordination with the Residential/Public Outreach Subcommittee developed a brochure to address these issues. The Co-permittees finalized and distributed 6,000 of these brochures to homeowners, developers and Home Owner Associations (HOAs) during the 2002-03 reporting period.

The Co-permittees also continue to encourage the developer community to prepare their own brochures and incorporate notices and warnings regarding stormwater pollution prevention requirements into contractual agreements, CC&Rs and other new owner documents.

Phase II

During the 2002-03 reporting period, due to significant changes in water quality regulations, the Co-permittees in coordination with RWQCB notified and provided educational outreach to construction sites that were now subject to the General Construction Permit when Phase II went into affect (March 2003). The Co-permittees strongly believe that education and outreach to the construction community is crucial to engaging the construction/development community and achieving permit compliance. The Co-permittees will continue to take advantage of similar opportunities to further stormwater awareness and facilitate compliance with permit requirements.

6.4.4 Home Depot Employee Training

Beginning in the 2002-03 reporting period, the City of Oxnard in coordination with Home Depot provided storm water pollution prevention training to Home Depot Employees. This training emphasized best management practices for many common pollutants of concern (pesticides, fertilizers/nutrients, paint and hazardous material) purchased at Home Depot. By providing simple solutions to the employees for the prevention of stormwater pollution, the City of Oxnard effectively armed an additional group of people that can educate local residents on stormwater pollution prevention. The City also provided Home Depot employees with 225 "Ask Me How to Prevent Pollution" buttons in an effort to prompt customers to ask questions.

In addition, the City annually provides Home Depot "Pollution Prevention Fact Sheets" to be placed in the paint aisles and the garden center. These fact sheets detail basic techniques and methods that homeowners can incorporate in their home improvement projects to prevent stormwater pollution. The fact sheets include tear sheets that local residents can remove and take home as friendly reminders of how easily they can help to better their environment.

SECTION 7.0 PROGRAM FOR PUBLIC AGENCY ACTIVITIES

7.0 Program Description

7.1 Introduction

The Co-permittees own and operate facilities and build and maintain much of the infrastructure of the urban and suburban environment throughout their jurisdictions. Many existing and enhanced public agency activities can therefore significantly contribute to the control of urban stormwater pollution.

Camarillo Corporate Yard

With the adoption of the second term permit, the Co-permittees were required to begin to formally re-evaluate and revise the municipal activities program. This re-evaluation was accomplished through the development and implementation of the Model Municipal Activities Program outlined in the SMP.

The objectives of this model program is to provide the Co-permittees with:

- A program framework for reducing the adverse impacts that municipal activities may have on water quality;
- An iterative process by which they can effectively monitor and respond to problems as they are discovered; and
- Methodologies to meet permit requirements

7.2 Baseline BMPs

All of the Co-permittees routinely conduct preventive maintenance activities that are widely recognized as effective BMPs for pollutant control. These activities include solid waste collection/recycling, drainage facility maintenance, catch basin stenciling and emergency spill response.

An annual evaluation of these activities is conducted through the Public Infrastructure Subcommittee's Tours of Co-permittee Corporate Yards and/or facilities, and where appropriate, improvements or new practices implemented to further reduce the amount of pollutants discharged into the storm drain system. An important component of this evaluation process is the documentation and collection of data related to these activities in the Co-permittees' Corporate Yard SWPCP.

7.2.1 Solid Waste Collection/Recycling

The Co-permittees have solid waste collection programs for public, residential, commercial and industrial areas. The Co-permittees conduct public education outreach through a variety of methods including community newsletters, radio and television public service announcements, brochures and utility bill inserts. (For more information on solid waste collection/recycling programs see **Section 3**).

7.2.2 Drainage Facility Maintenance – Catch Basin/Inlet Cleaning

The Co-permittees inspect the drainage system within their jurisdictions routinely, and clean out accumulated debris on an as-needed basis. Removal of accumulated debris and sediment is carried out either manually or by mechanical methods using flushing in emergency situations only. By removing this amount of material from the catch basin inlets and

stormdrain system, the Co-permittees make a significant contribution in preventing the passage of these materials in downstream receiving waters.

During the reporting period, the Co-permittees reported the collection of over 14,000 tons of solid debris during drainage facility maintenance activities compared to 59,971 tons of material removed last year.

7.2.3 Drainage Facility Maintenance – Stencil Program

The goal of the stenciling program is to label and subsequently maintain those labels on stormdrain catch basins located throughout Ventura County. During the reporting period, the Co-permittees reported re-stenciling 224 catch basins. It should be noted that Co-permittees only re-stencil catch basins when the label is no longer legible or has become detached. (For more information on the stencil program see **Section 3**).

7.2.4 Emergency Spill Response

The Co-permittees all have the authority to control releases to the storm drain system through their individual Water Quality Ordinances and each Co-permittee has designated appropriate staff for enforcing their ordinance.

Emergency responses to water pollution incidents are routinely undertaken by Co-permittee designated staff, as well as, various fire and other municipal departments. Depending upon the type and cause of the incident, Co-permittee staff may pursue a variety of administrative or criminal enforcement actions as they are outlined with their Water Quality ordinances.

Although each Co-permittee is responsible for responding to water pollution complaints and incidents within their jurisdiction, very often neighboring Co-permittees will coordinate their efforts with either very large events and/or overlapping spills. The Co-permittees focus on responding quickly and efficiently to emergency spills with priority on mitigating the spills potential to adversely impact the environment is to be commended.

7.3 Program Implementation

A significant portion of the Co-permittees' activities includes the operation and maintenance of municipal infrastructure. These activities have the potential to impact stormwater quality and as such the Co-permittees have implemented a Program for Public Agency Activities. This program addresses the implementation of BMPs to control pollutant discharges to the maximum extent practicable (MEP).

In order to address the Co-permittees' potential impacts on stormwater, the following activities have been targeted:

- Activities at Co-permittee Corporation Yards
- Drainage System Operation and Maintenance Activities
- Roadway Operation and Maintenance Activities
- Pesticide, Herbicide and Fertilizer Application and Use
- Training of Municipal Staff

7.3.1 Corporation Yards

The Co-permittees utilize corporation yards to support operation and maintenance activities within their jurisdiction. Corporation yards are operated and maintained by the Co-permittees for the following activities or facilities:

- Vehicle and equipment storage, parking or maintenance
- Vehicle and equipment fueling and fueling facilities
- Wash racks for cleaning vehicles and equipment
- Sign painting activities
- Material storage areas
- Workshops, garages
- Employee support facilities, such as offices, locker rooms and meeting rooms

Table 7-1 Co-permittee Corporation Yards

Co-permittee	Corporation Yard Name	Location	SWPCP Developed & Implemented	SWPCP available on site
Camarillo	Camarillo Corporate Yard	283 South Glenn Drive	Yes	Yes
County of Ventura	El Rio Corporate Yard	682 El Rio Drive	Yes	Yes
	Moorpark Yard	7150 Walnut Cyn. Road	Yes	Yes
Fillmore	Fillmore Public Works Yard	711 Sespe Avenue	Yes	Yes
Moorpark	Public Works/Parks Yard	675 Moorpark Avenue	Yes	Yes
Ojai	Ojai Corporate Yard	Signal Street	Yes	Yes
Oxnard	Oxnard Corporate Yard	1060 Pacific Avenue	Yes	Yes
	Regional Recycling Center	111 S. Del Norte Blvd.	Yes	Yes
	Oxnard Water Treatment Yard	251 S. Hayes Avenue	Yes	Yes
Port Hueneme	Municipal Service Center	700B E. Port Hueneme Road	Yes	Yes
	Service Yard Annex	746 Industrial Avenue	Yes	Yes
San Buenaventura	SanJon Corporate Yard	336 SanJon Road	Yes	Yes
Santa Paula	Corporation Street Yard	903 Corporation Street	Yes	Yes
	Palm Avenue Yard	180 South Palm Avenue	Yes	Yes
Simi Valley	Simi Public Service Center	500 W. Los Angeles Avenue	Yes	Yes
Thousand Oaks	Municipal Service Center	1993 Rancho Conejo Blvd.	Yes	Yes
VCWPD	El Rio Corporate Yard	682 El Rio Drive	Yes	Yes
	Moorpark Yard	7150 Walnut Cyn. Road	Yes	Yes

7.3.1.a *Storm Water Pollution Control Plan Development*

The Permit required the Co-permittee to develop and implement a SWPCP at designated corporation yards by July 27, 2002. As the Principal Co-permittee, VCWPD developed a

SWPCP template to be used as a guide by the Co-permittees in the development of their plans for each of the Co-permittee designated corporate yard facilities (listed in **Table 7-1 Co-permittee Corporation Yards**).

As shown in **Table 7-1 Co-permittee Corporation Yards**, all of the Co-permittees have modified and implemented the model SWPCP to suit their specific site's activities at their corporate yards. The Co-permittees keep a copy of the SWPCP at the facility site and review it annually to see that the information is current and accurate. BMPs that have been implemented are annually assessed to determine if they are working as planned, and any required changes are noted in the SWPCP.

As specified in the SWPCPs, untreated stormwater runoff is prohibited from discharging to the storm drain system from hazardous and toxic waste storage areas by January 27, 2001 and fueling areas, vehicle maintenance and repair areas and temporary street maintenance material and waste areas by July 27, 2001. All vehicle and equipment wash areas are to be self-contained, self-contained and covered, or equipped with a clarifier and properly connected to the sanitary sewer. These specific site BMP requirements and associated deadlines were discussed and reviewed frequently by the Co-permittees during Public Infrastructure Subcommittee meetings. All of the Co-permittees have met the performance criteria established in the SMP, and have implemented appropriate BMPs to their hazardous and toxic waste storage areas, fueling areas, vehicle maintenance and repair areas, street maintenance material and waste areas.

Example of Wash Rack Area

7.3.2 Drainage System Operation and Maintenance

As required by the Permit, Co-permittees inspect catch basins and other drainage facilities that are a part of their system. These inspections are scheduled and completed at least once a each year before the wet season (Permit-defined wet season begins October 1). Inspections include the visual observation of each catch basin, and open channels to determine if the facility has accumulated trash, sediment or debris that requires removal for protection of water quality or to maintain hydraulic capacity or function of the facility.

Co-permittees routinely clean their drainage facilities. "Routine cleaning" for these facilities, means the removal of accumulations of trash, sediment and debris that would likely be washed down stream with the next runoff event. Co-permittees also clean their facilities on an as-needed basis.

For catch basins, "as-needed cleaning" occurs whenever trash, sediment or debris accumulation in the catch basin is at least 40% of capacity. Because of the design of detention and retention basins includes the accommodation of multi-year accumulations of debris and sediment, "routine cleaning" of these facilities, means the removal of barriers from the inlet/outlet of the facility to restore the operational design and efficiency of the facility.

The debris/sediment is cleaned whenever the accumulation has filled the basin to target levels established in the facility design or subsequently adopted operation and maintenance protocols for the facility. In addition, debris basins designed to capture debris in flows upstream of urban areas are not considered to be detention or retention basins. Debris basins are inspected and maintained in accordance with applicable local policies and procedures appropriate for these facilities.

When performing cleaning activities, Co-permittees implement appropriate BMPs to reduce to the MEP materials in the facility and prevent them from being washed downstream.

Figure 7-1 depicts the number of catch basins/inlets that were inspected and/or cleaned by Co-permittees this reporting period in relation to the total number of facilities. All of the Co-permittees achieved the 90% performance criteria established in the SMP.

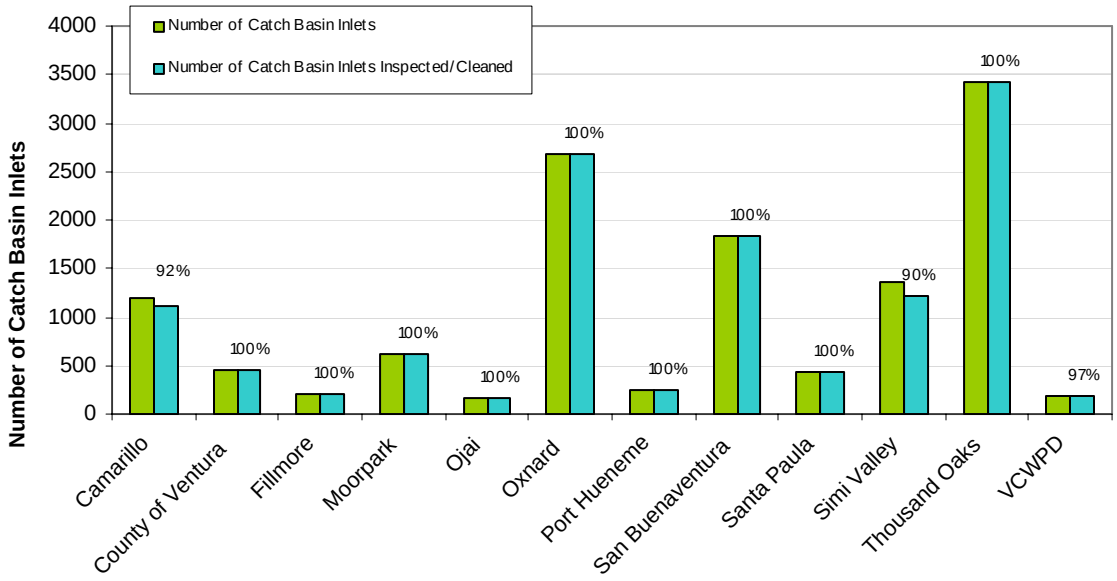


Figure 7-1 Drainage Facilities Cleaned - Catch Basins/Inlets

The major type of material removed by the Co-permittees is depicted in **Figure 7-2** and the source of this material is depicted in **Figure 7-3**.

Total Debris removed Countywide = 961 tons

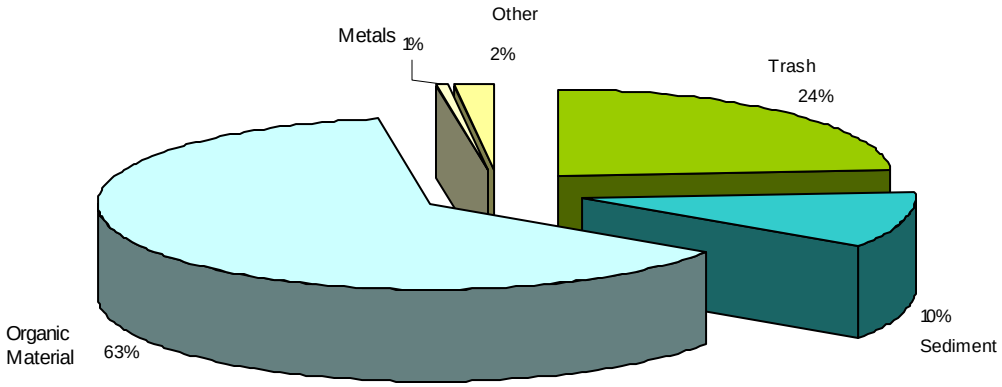


Figure 7-2 Countywide Catch Basin Debris by Material

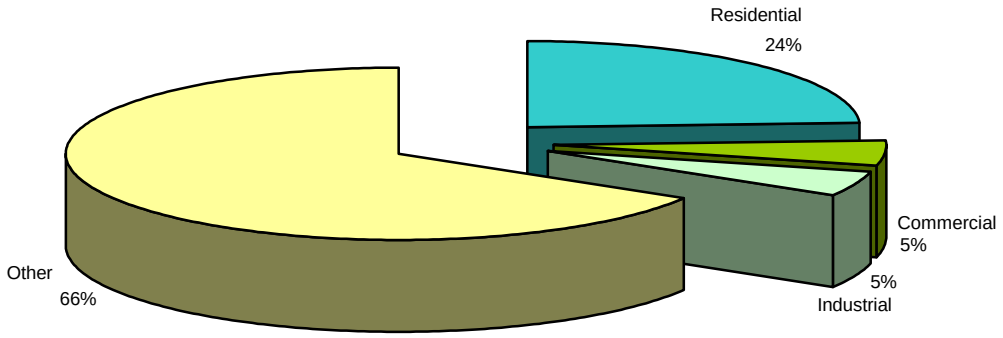


Figure 7-3 Countywide Catch Basin Debris by Source

In addition to the debris removed from catch basin inlets, Co-permittees removed another 12,100 tons of debris from their channels/ditches, which differs from the 26,080 tons removed last year. Variations in the amount of debris removed are to be expected from year to year as storm patterns, population and landscaping differs from year to year. **Figure 7-4** depicts the number of channels/ditches that were inspected and/or cleaned by Co-permittees this reporting period in relation to the total number of facilities. All of the Co-permittees achieved the 90% performance criteria established in the SMP.

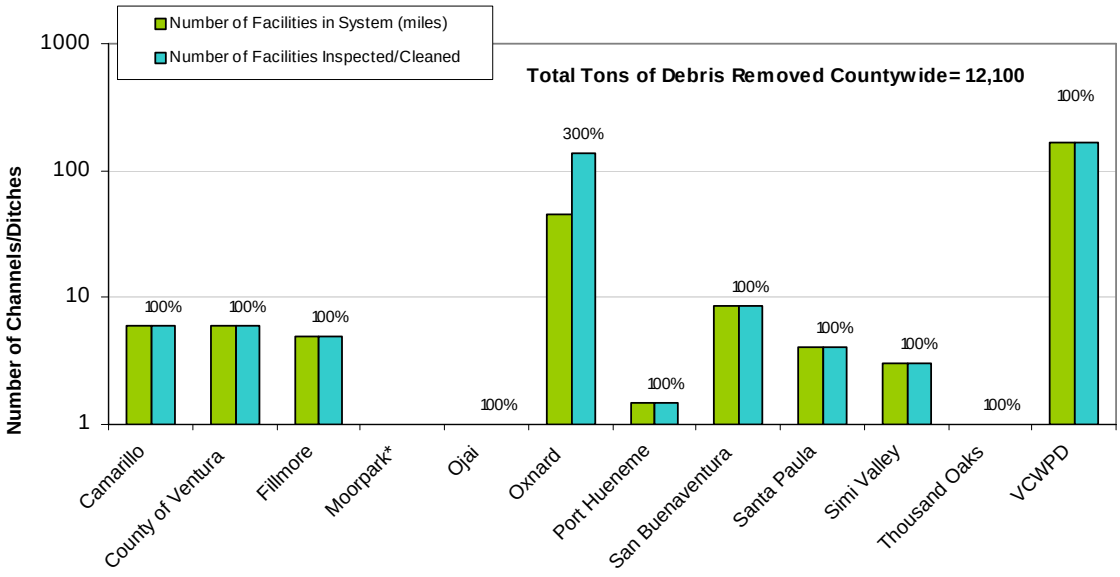


Figure 7-4 Drainage Facilities Cleaned - Channels/Ditches

* Note that all channels and/or ditches within the City of Moorpark's jurisdiction are maintained by VCWPD.

This reporting period the Co-permittees removed 1,043 tons of debris from their detention/retention basins (down from 33,544 tons last year). This variation in debris removal is due to the differing cleaning and maintenance schedules for each Co-permittee. **Figure 7-5** depicts the number of facilities that were inspected and/or cleaned by Co-permittees this reporting year in relation to the total number of facilities. All of the Co-permittees achieved the 90% performance criteria established in the SMP.

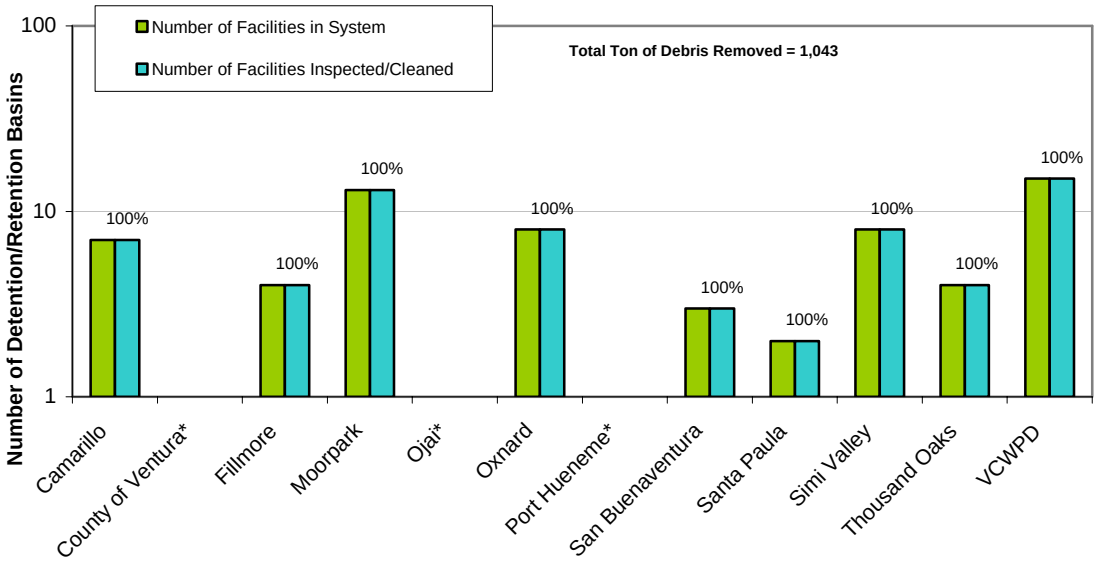


Figure 7-5 Drainage Facilities Cleaned - Detention/Retention Basins

* Note the County of Ventura and the cities of Ojai and Port Hueneme do not own nor maintain any of these types of facilities within their jurisdiction.

7.3.3 Roadway Operation and Maintenance

Co-permittees have classified curbed streets within their jurisdiction and have implemented a sweeping program for these streets. The identified streets are swept by the Co-permittees, at a minimum, in accordance with the following classifications:

- High traffic downtown areas: sweep at least four times per month
- Moderate traffic collector streets and residential areas: sweep at least six times per year
- Other continuously bermed public streets: sweep at least one time per year prior to wet season

For the purpose of streets in the "other" category, "prior to the wet season" means sweeping the street at least once during the three-month period (July, August, September) immediately prior to the wet season (Permit-defined wet season begins October 1). "Continuously bermed" means a street in the permitted area where a berm exists on both sides of the street without breaks.

To increase the efficiency of the street sweeping, Co-permittees have made an effort to encourage voluntary relocation of street-parked vehicles on scheduled sweeping days. This has been achieved by placing temporary "no stopping" and "no parking" signs, posting permanent street sweeping signs and/or distributing street sweeping schedules to residents and businesses.

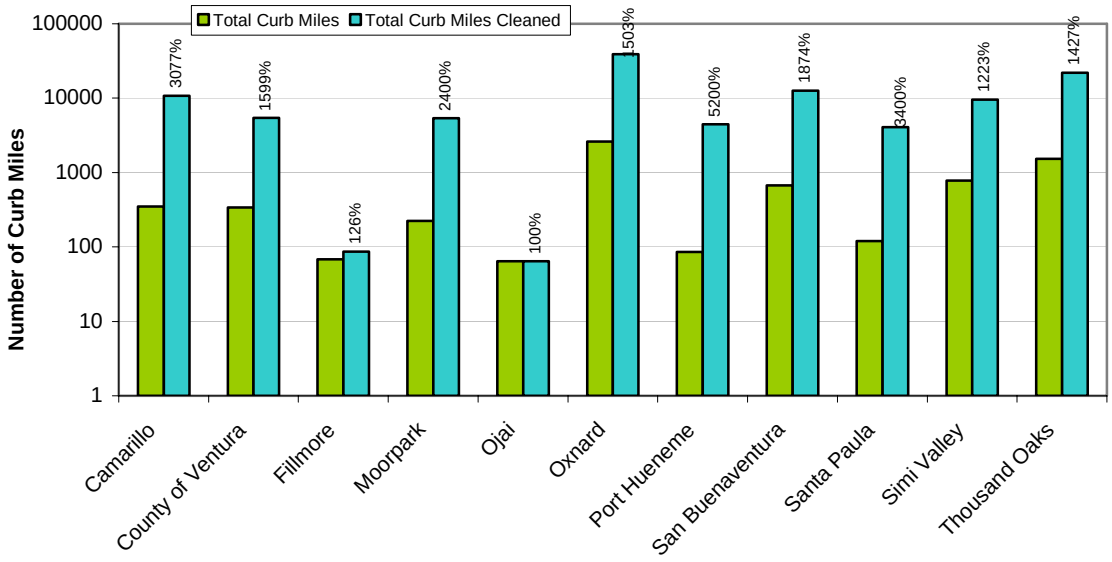


Figure 7-6 Street Cleaning Effort

Figure 7-6 indicates the street cleaning effort in total miles cleaned. Co-permittees have made an excellent progress in their street cleaning efforts, with all of the Co-permittees exceeding the performance criteria established in the SMP.

Street maintenance activities have the potential to discharge pollutants to the storm drain system if appropriate protective measures are not implemented. Therefore, Co-permittees require roadway maintenance staff, roadway maintenance contractors and others to implement BMPs to control discharge of pollutants to the storm drain system as a result of roadway maintenance activities.

At a minimum, Co-permittees have included the following BMPs:

- Prohibit saw-cutting during a storm event of 0.25 inches or greater
- Prohibit the discharge of untreated runoff from temporary or permanent street maintenance material and waste storage areas from entering the storm drain system

Some Co-permittees contract their street maintenance work and most issue street cut or similar permits. Co-permittees have addressed work under these contracts or permits by including contract provisions and/or permit conditions that require street maintenance or repair work comply with the minimum requirements shown above and other BMPs required for protection of water quality.

In the event that roadway maintenance work must be conducted immediately in order to protect lives or property, Co-permittees make every effort to conduct emergency work in a manner protective of water quality.

7.3.4 Pesticide, Herbicide and Fertilizer Application and Use

The Permit requires the Co-permittees to develop and adopt a standardized protocol for the routine and non-routine application of pesticides, herbicides (including pre-emergents) and fertilizers by July 27, 2001. As the Principal Co-permittee, VCWPD developed the protocol,

which was reviewed in the Public Infrastructure Subcommittee. The Management Committee approved and adopted the protocol prior to the permit deadline.

The standardized protocol includes the following minimum requirements to control the discharge of pollutants to stormwater as a result of pesticide, herbicide and fertilizer applications:

- Prohibit the application of pesticides, herbicides and fertilizers during rain events
- Prohibit the application of pesticide, herbicides and fertilizers within one day of a rain event forecasted to be greater than 0.25 inches except for application of pre-emergents
- Prohibit the application of pesticides, herbicides and fertilizers after a rain event where water is leaching or running from the application area
- Prohibit the application of pesticides, herbicides and fertilizers when water is running off-site from the application site

In addition, Co-permittees require all staff applying pesticides to be either certified by the California Department of Food and Agriculture, or under the direct on-site supervision of a certified pesticide applicator, as defined in the standardized protocol. Co-permittees have also restricted the purchase and use of pesticides and herbicides to certified staff.

Co-permittees that contract out for pesticide applications have included contract provisions that require the contract applicator to meet all requirements of this program, including compliance with the standardized protocol, the prohibitions and requirements for certification and supervision of pesticide applicators.

7.3.5 Stormwater Quality Staff Training

Each Co-permittee targets staff based on the type of stormwater quality and pollution issues that they could encounter during the performance of their regular maintenance activities. Targeted staff included those who perform activities in the following areas: stormwater maintenance, drainage and flood control systems, streets and roads, parks and public landscaping and corporation yards.

Training methods vary amongst Co-permittees and range from informal meetings, to formal classroom training or self-guided training. The Co-permittees also train staff on the prevention, detection and investigation of illicit discharges and illegal connections (ID/IC). (See **Section 8** for more information regarding ID/IC training).

During the reporting period, the Co-permittees trained 834 municipal staff in stormwater management, SWPCPs, illicit discharge, response and non-stormwater discharges. **Figure 7-7** depicts the number of staff trained in the program area for each Co-permittee. All Co-permittees met or exceeded the performance criterion established in the SMP and trained a minimum of 90% of targeted employees.

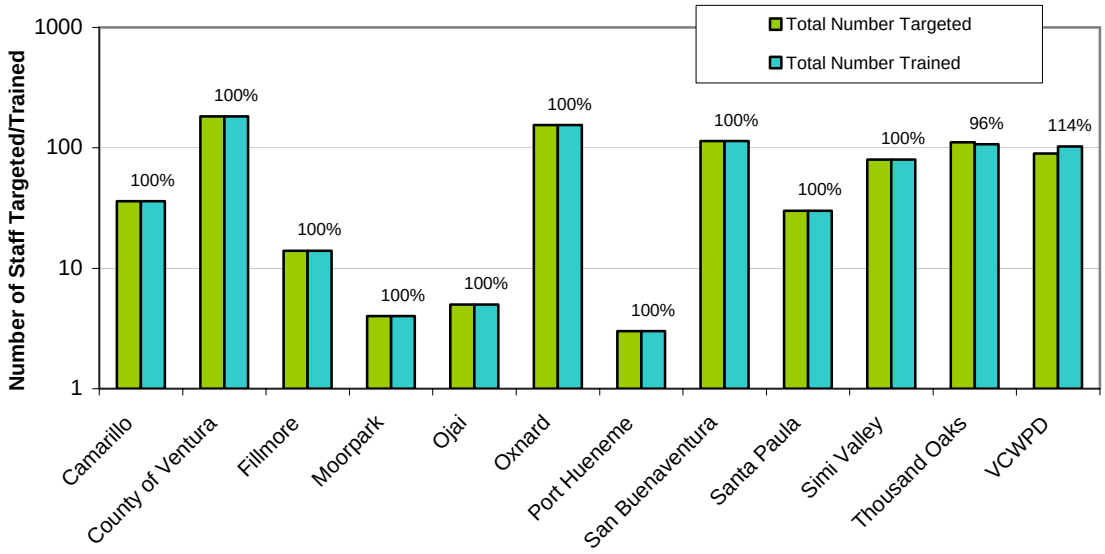


Figure 7-7 Public Agency Staff Trained

7.4 Five Year Permit Summary of Program Accomplishments

7.4.1 Regional Board Audit of Co-permittees' Corporation Yards

During the 2003-04 reporting period, each of the Co-permittees underwent an audit inspection of their corporation yards by the RWQCB to evaluate compliance with stormwater requirements. Tetratech, Inc. assisted RWQCB in conducting the audits, which included, but was not limited to, inspection of areas used for outdoor storage, vehicle washing, vehicle maintenance, fueling operations, and chemical storage. Housekeeping practices, along with availability and implementation of a SWPCP were also evaluated.

When appropriate, individual Co-permittees were required to submit a Compliance Schedule for correcting any noted deficiencies. These were due to RWQCB by the end of April 2004. Corresponding Final Compliance Reports were submitted in May 2004. While all items noted by the auditors were minor and easily rectified, the Co-permittees were energized by the opportunity to further enhance their efforts to mitigate stormwater pollution at their facilities. All of the Co-permittees were in compliance with the schedule set by RWQCB and should commended for their speedy and comprehensive response to the audit findings.

7.4.2 Tours of Co-permittees' Corporation Yards

The Public Infrastructure Subcommittee meets on a monthly basis to discuss permit compliance issues and protection of stormwater as it relates to government activities. Subcommittee members take this opportunity to share ideas and discuss new and innovative BMPs for the protection of stormwater quality. Presentations by Subcommittee members and guest speakers allow members to share experiences, successful BMP practices and new technology and ideas. Participation in these meetings has been instrumental in the many new stormwater protection improvements at corporation facilities throughout Ventura County.

As an educational exercise, some of the Subcommittee meetings included site visits to other government corporation yard facilities located throughout Ventura County. These visits provide the Co-permittees with the unique opportunity to see first hand how potential problems were identified and corrected. This exercise has fostered a growing dialogue among the Co-permittees and has been such a great success that the Co-permittees plan to continue this activity next permit year.

7.4.3 Aquatic Pesticide NPDES Permit

In March 2001, the Ninth Circuit Court of Appeals determined that discharges of pollutants from the use of aquatic pesticides to waters of the United States require coverage under an NPDES permit (General Permit No. CAG990003). Coverage under this General Permit is for public entities that discharge pollutants to water bodies associated with the application of aquatic pesticides for resource or pest management. This permit is required regardless if the public entity is already covered by a municipal NPDES permit. This General Permit applies to aquatic pesticide applications directly into a water body and/or directly to organisms in the water or on the water surface with the purpose and intent of killing the target aquatic organisms. The impacts of these chemicals may not be limited to the target organisms – other plants and aquatic life in the treatment area may be impacted. Due to water movement at the treatment locations, the residual pesticides can be carried to adjacent areas while concentrations in the water are still high enough to cause adverse impacts to not only aquatic organisms but also to other beneficial uses such as, irrigation, ground water recharge and recreation.

During the 2003-04 reporting period, VCWPD contracted with Larry Walker Associates (LWA) to continue the implementation of a cooperative regional monitoring program with the cities of Camarillo, Port Hueneme and San Buenaventura to meet the requirements of the original General Permit. A 2003 calendar year annual report was submitted to the RWQCB January 2004.

An updated version of the Aquatic Pesticide Permit for the control of aquatic weeds (General Permit No. CAG990005) was adopted May 2004. In response to the updated General Permit, VCWPD again contracted with LWA to file a Notice of Intent (NOI) to seek coverage under the permit. The other cooperative agencies opted to discontinue aquatic pesticide application for the coming year and did not submit NOIs for coverage under the updated General Permit. Per the requirements of the updated General Permit, VCWPD submitted an Aquatic Pesticide Application Plan (APAP) to the RWQCB July 2004. VCWPD will initiate the implementation of the water quality monitoring program detailed in the APAP during the 2004 aquatic pesticide application season.

7.4.4 Corporate Yard SWPCP Inspection Form

In compliance with permit requirements, the Co-permittees developed and implemented Storm Water Pollution Control Plans (SWPCPs) at their corporate yards. Once implemented, the permit requires annual inspections of the corporate yards to evaluate the implementation and effectiveness of the SWPCP. In order to facilitate this process, the Public Infrastructure Subcommittee began discussions on what components of the SWPCP should be evaluated and how best to conduct inspections. As a product of these discussions, the Subcommittee developed a model inspection form that the Co-permittees could implement at their yards.

During the 2003-03 reporting period, the Co-permittees discussed their efforts using the model inspection form. These discussions are on-going and will be further improved by recent RWQCB audits. The Co-permittees plan to continue to address SWPCP implementation and annual inspections at the Public Infrastructure Subcommittee and utilize the lessons learned for inclusion in future inspection activities.

7.4.5 Countywide Public Agency Activities Training Workshop

During the 2002-03 reporting period, VCWPD provided a training session on stormwater regulations and how they relate to municipal activities at the Maintenance Superintendents Training and Equipment Workshop held May 22, 2003. This training event was open to all Co-permittee municipal staff countywide and was well attended. The Co-permittees recognize not only the need to provide such training but believe that by performing countywide training events, there is greater consistency in the implementation of stormwater regulations and activities and limited resources are leverage to their best benefit.

7.4.6 Alternative Weed Management

The requirements for a General Permit for aquatic pesticide applications prompted many of the Co-permittees to review and evaluate their current maintenance activities for maintaining their drainage systems. Several Co-permittees attended one of the several seminars hosted by the Ventura County Environmental and Energy Resources Department (EERD) on Integrated Pest Management (IPM) approach to weed management. These seminars provided the Co-permittees alternative less-toxic approaches to weed control. Some Co-permittees found that they could incorporate these strategies with only minor modifications to their maintenance activities.

With increasing regulations on the use of pesticides and the growing awareness of environmental impacts from pesticide use, the Co-permittees will continue to explore alternatives and implement BMPs that mitigate their impacts on the local ecosystem. The Co-permittees forward, progressive approach is praiseworthy.

7.4.7 Co-permittee Discussion/Sharing of Best Management Practices

The Public Infrastructure Subcommittee conducts discussions of BMPs at their monthly meetings. These discussions are intended as a forum to learn through shared experiences. During the 2002-03 reporting period, some of the BMPs shared include the retractable roll off cover developed and implemented by the City of Moorpark, a concrete truck wash water recycle device, and the use of high pressure solid Carbon Dioxide (CO_2) blasting for the removal of paint and other material.

7.4.7.a *City of Moorpark Roll-Off Cover*

The City of Moorpark recognized the need to prevent stormwater run-on and run-off from their roll-off bins when stored at their corporate yard. Since easy access to these bins are crucial to unloading removed debris from municipal trucks, the City investigated the idea of a custom-built removable cover that would allow easy access and prevent stormwater from entering and leaving the bins. After some discussion of material, costs and durability, the City of Moorpark designed and constructed a removable cover pictured below.

City of Moorpark Roll-Off Cover BMP

City of Moorpark Roll-Off Cover BMP

7.4.7.b *Concrete Truck Wash Water Recycle*

In addition to the Roll-Off Cover, the City of Moorpark shared with the Public Infrastructure Subcommittee a second BMP designed and implemented by a contractor who performs work throughout the County. This innovative contractor has implemented a concrete truck was water recycle system where wash water from the concrete truck is collected and recycled back into the concrete mix contained in the truck. Use of the recycle wash bucket (pictured below) prevents concrete wash water from entering the storm drain system and polluting the receiving water downstream. This resourceful business owner should be commended for his efforts.

Concrete Truck Wash Water Recycle BMP

7.4.7.c *Ventura County Research of High Pressure CO_2 Applications*

The County of Ventura General Services Agency (GSA) during the 2002-03 reporting period began investigating the use of high pressure solid CO_2 blasting for removing paint and other material traditionally eliminated via sand and hydro blasting technology. This new technology would replace a long-practiced method, which creates a potential threat to stormwater quality. GSA intends to find the best approach for a pilot study of this new cleaning method for the next permit year. The Public Infrastructure Subcommittee will be following the use of this new technology closely to determine if other environmentally friendly applications can be incorporated at the Co-permittee corporate yards.

SECTION 8.0 PROGRAM FOR ILLICIT DISCHARGES/CONNECTIONS

8.0 Program Description

8.1 Introduction

Illicit discharges/illegal connections can be sources of contamination within municipal storm drain systems.

An illicit discharge is any intentional discharge to a municipal storm drain that is not composed entirely of stormwater and that is not covered by a NPDES permit. An illicit discharge refers to the disposal of non-stormwater materials such as paint or waste oil into the storm drain or the discharge of waste streams containing pollutants to the storm drain system.

An illegal connection to the storm drain system is an undocumented and/or unpermitted physical connection from a facility to the storm drain system. The permit requires the Co-permittees to undertake programs to identify and eliminate such illegal connections.

Example of an Illegal Connection

8.2 Program Development

The Co-permittees have developed and implemented a Program for Illicit Discharges/Illegal Connection Response that is a combination of educational outreach tools and enforcement activities to increase the knowledge of target audiences about impacts of stormwater pollution; to change behavior of target audiences; and to involve and engage different communities throughout the County in mitigating the impacts of stormwater pollution on rivers, streams and oceans.

8.3 Program Focus

The Permit requires the identification and elimination of illicit discharges and illegal connections to the municipal separate stormwater sewer system (MS4). This requirement is based in one of two primary objectives set forth in the Clean Water Act amendments of 1987, which established the framework for regulating stormwater discharges from municipal, industrial and construction activities under the NPDES system:

- Effectively prohibit non-stormwater discharges
- Reduce the discharge of pollutants to the maximum extent practicable (MEP)

The Permit has defined illicit discharge as follows:

Illicit Discharge: means any discharge to the storm drain system that is prohibited under local, state or federal statues, ordinances, codes or regulations. The term illicit discharge includes all non-stormwater discharges except discharges pursuant to an NPDES permit, discharges that are exempted or conditionally exempted in Part 1 of the Permit.

Categories of non-stormwater discharges that are not prohibited (exempted or conditionally exempted) under the Permit (and detailed in the SMP) are listed in **Table 8.1 Discharges Not Identified as a Source of Pollutants**.

Table 8.1 Discharges Not Identified as a Source of Pollutants*

Non-stormwater Discharges
Water line Flushing
Discharges from potable water sources
Foundation drains
Air conditioning condensate
Water from crawl space pumps
Reclaimed and potable irrigation water
De-chlorinated swimming pool discharges
Individual residential car washing
Sidewalk washing
Discharges or flows from emergency fire fighting activities

* Each of the aforementioned non-stormwater discharges must meet the following conditions in order to ensure that the discharge will not be a source of pollutants.

1. The discharge must not be known to contain any pollutants or contaminants that will cause a condition of pollution, contamination, or nuisance in the receiving water.

2. The source of the discharges is not from a site that is under clean up and/or abatement orders; where previous water or soil testing has indicated the presence of contaminants or pollutants; where toxic or hazardous chemicals, substances, or wastes are or have been treated, stored, or disposed; or that is known as a result of past investigative or exploratory work to be a source or potential source of contaminants or pollutants concern.

3. The discharge must not contain any visible sediment.

4. The chlorine residual must be below 0.1 ppm (mg/L).

5. The pH must be between 6.0 and 9.0.

6. The discharge is exempt from conditions 1-5 if it results from fire fighting activities that are related to emergencies or discharges from potable water sources during emergencies.

The term “illicit discharges” used in this program includes several categories as follows:

- Incidental spills or disposal of wastes or non-stormwater. These may be intentional, unintentional or accidental and would typically enter the storm drain system directly through drain inlets, catch basins or manholes
- Discharges of sanitary sewage due to overflows or leaks; usually incidental but may be continuous
- Continuous or intermittent discharges of prohibited non-stormwater other than through an illegal connection. These typically occur as surface runoff from outside the public right-of-way (e.g., area washdown from an industrial site)
- Continuous or intermittent non-stormwater discharges through an illegal connection

SECTION 8.0 PROGRAM FOR ILLICIT DISCHARGES/CONNECTIONS

The Permit defines illegal connection as:

Illegal Connection: shall mean any man-made conveyance that is connected to the storm drain system without a permit or through which prohibited non-stormwater flows are discharged, excluding roof-drains and other similar type connections. Examples include channels, pipelines, conduits, inlets or outlets that are connected directly to the storm drain system.

To meet the goals and objectives of this program, the Co-permittees have developed a comprehensive illicit discharge/illegal connection program, which includes the following components:

- Illicit discharge elimination
- Illegal connection elimination
- Public Reporting
- Education and Outreach
- Illicit Discharges/Illegal Connections Staff Training

8.3.1 Illicit Discharge Elimination

The goal of this component is to detect and eliminate illicit discharges from entering the storm drain system to reduce pollutants from such discharge to the MEP. The baseline objectives include:

- Incidental spills/overflows reported by the public, other agencies or observed by a Co-permittee field staff during the course of their normal daily activities will be investigated, contained and cleaned up
- Prohibited non-stormwater discharges reported by the public, other agencies, or observed by Co-permittee field staff (such as surface runoff associated with cleaning activities from a commercial use) will be eliminated through voluntary termination or enforcement
- Suspected non-stormwater discharges reported by the public, other agencies, or observed by Co-permittee field staff whose origin is unknown, will be investigated to determine the nature and source of discharge and eliminated through voluntary termination or enforcement action (when possible)

Co-permittees have prioritized problem areas (whether geographical and/or activity-related) for inspection, cleanup and enforcement using the methods defined in the program.

8.3.2 Illegal Connection Elimination

The goal of this component is to detect and eliminate illegal connections to reduce pollutants discharged through such connections to the MEP. The baseline objectives include:

- Inspect the storm drain system to identify illegal connections during scheduled infrastructure maintenance by personnel
- Connections to the storm drain system that are suspected or observed to be a source of an illicit discharge will be investigated to determine the origin and nature of the discharge
- Once the illegal connection has been investigated, Co-permittees perform one of the following:
  - If the discharge is determined to consist only of exempted non-stormwater, the connection will be allowed to remain and will no longer be considered an illegal connection. Co-permittees may elect to issue a permit for the connection or allow the connection to remain if information on the connection is documented; or

- The discharge will be permitted through a separate NPDES permit; or
- The connection will be terminated through voluntary action or enforcement proceedings

8.3.3 Public Reporting

The goal of this component is to promote, publicize and facilitate public reporting illicit discharges and illegal connections. The baseline objective is:

- Implement a program to receive calls from the public regarding potential illicit discharges and illegal connections, communicate and coordinate a response, perform all necessary follow up to the complaint, and maintain documentation

8.3.4 Education and Outreach

The goal of this component is to educate targeted audiences, the industrial/commercial business community and the land development/construction community on stormwater quality management, and the importance of eliminating or mitigating non-stormwater discharges to local streams and channels. Baseline objectives include:

- Provide educational material on non-stormwater discharges and why they are harmful to streams, and oceans at local community events
- Target the land development/construction community with educational material and provide workshops on stormwater quality regulations and illicit discharge prevention response
- Target the industrial/commercial community with educational material and provide workshops on stormwater quality regulations and illicit discharge prevention and response

8.3.5 Illicit Discharge/Illegal Connections Staff Training

The goal of training municipal staff is to raise the level of awareness on illegal connections and illegal discharges. When staff is properly trained on how to identify illicit discharges and/or illegal connections, the likelihood that non-stormwater discharges and/or connections to the storm drain system will be more accurately identified and reported is increased.

8.4 Program Implementation

8.4.1 Incident Response

8.4.1.a. *Source Control*

The Co-permittees have a number of programs that have facilitated the detection of sources of illicit discharges. These programs include industrial facility site visits, drainage facility inspection, water quality monitoring and the wide distribution of public education materials that provide phone numbers and web addresses to encourage the reporting of spills.

Example of Illegal Dumping

Through routine maintenance activities within the municipal storm drain system, Co-permittee field personnel continue to report suspected problems and/or discharges to the system. In addition to

inspection, the Co-permittees receive notifications from various other sources such as the public and regional and/or local agencies.

This permit year, the Co-permittees continued to:

- Investigate the cause, determine the nature and estimate the amount of discharge for reported illicit discharge/dumping incidents
- Determine when possible the type of materials and source type for reported illicit discharge/dumping incidents
- Determine when possible the probable cause for the illicit discharge/dumping and take appropriate actions to prevent similar discharges from reoccurring
- Verify that reported illicit discharge/dumping incidents were terminated and/or cleaned
- Refer illicit discharge/dumping or illegal connections to other agencies when appropriate
- Identify and eliminate illegal connections
- Provide educational materials and contact numbers for reporting illicit discharge/dumping when conducting stormwater inspections

Figure 8-1 and **Figure 8-2** show the results of the Co-permittees' efforts. Data presented in **Figure 8-1** indicate that 7% of the reported incidents were not illicit discharges. Last reporting year this level of inaccurate reporting was 6% (down from 11% from PY3/RP9). In order to facilitate accurate reporting of illicit discharges, the Co-permittees will continue their efforts to educate county residents on how to properly identify an illicit discharge and report it to the appropriate agency.

All of the reports that were illicit discharges were resolved countywide (meaning they were cleaned up; referred to another agency; followed up; and/or educational material was distributed). The number of incidents investigated and addressed by the Co-permittees that reported discharges exceeds the 90% performance criteria established in the SMP. Note: These figures represent incidents that Co-permittees responded to as part of the Stormwater Management Program. Incidents addressed by EHD Hazardous Waste Program or local CUPA may not be included in these figures.

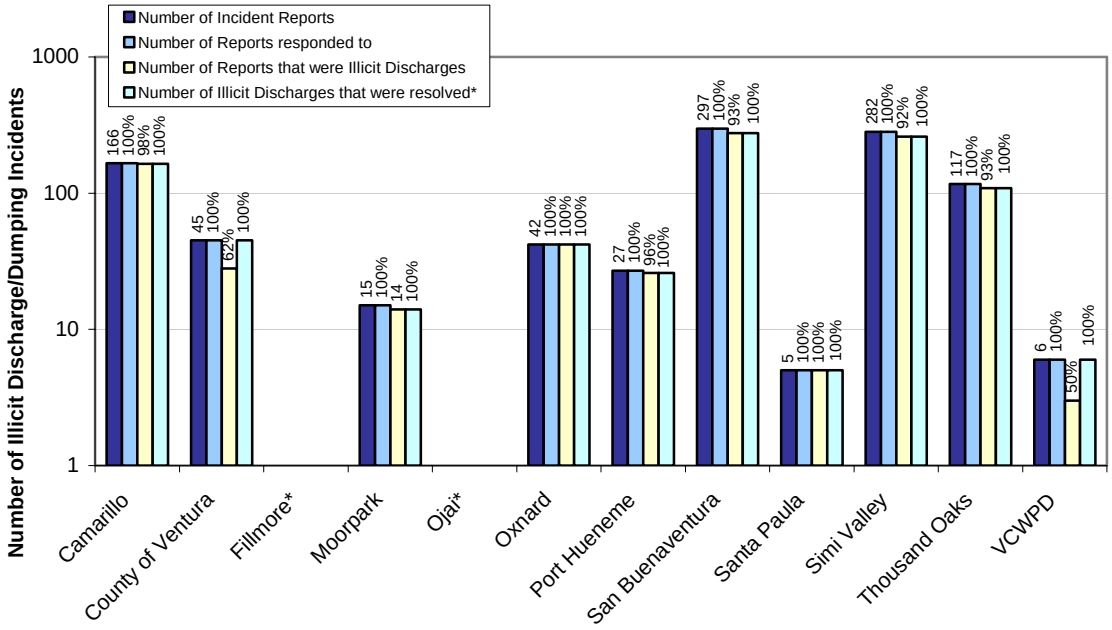


Figure 8-1 Illicit Discharge/Dumping Response

* No Illicit discharges were reported by the cities of Fillmore and Ojai.

Figure 8-2 indicates the number of illegal connections identified and eliminated. Each Co-permittee detects and eliminates illegal connections within its municipal storm drain system. Any illegal connection identified by the Co-permittees during routine inspections is investigated. Appropriate actions are then taken to approve undocumented connections by permit procedure and/or pursue removal of those connections that are determined to be illicit connections and not permissible.

If evidence of an illegal discharge is detected and the source does not appear to be evident a source investigation may be conducted to determine if the discharge is being conveyed through an illegal connection.

Depending on the type of illicit connection detected, the Co-permittees will eliminate any connection by means of appropriate legal procedures. Follow-up will be conducted to ensure that abatement activities have been successfully and adequately implemented.

Compliance with established regulations on obtaining encroachment permits before installation of drains enforced. Owners of existing drains without appropriate permits are notified to comply. For those drains where the owner is unresponsive or cannot be identified, each Co-permittee is responsible for deciding whether to formally accept the connection as part of their public drainage system or cap it off.

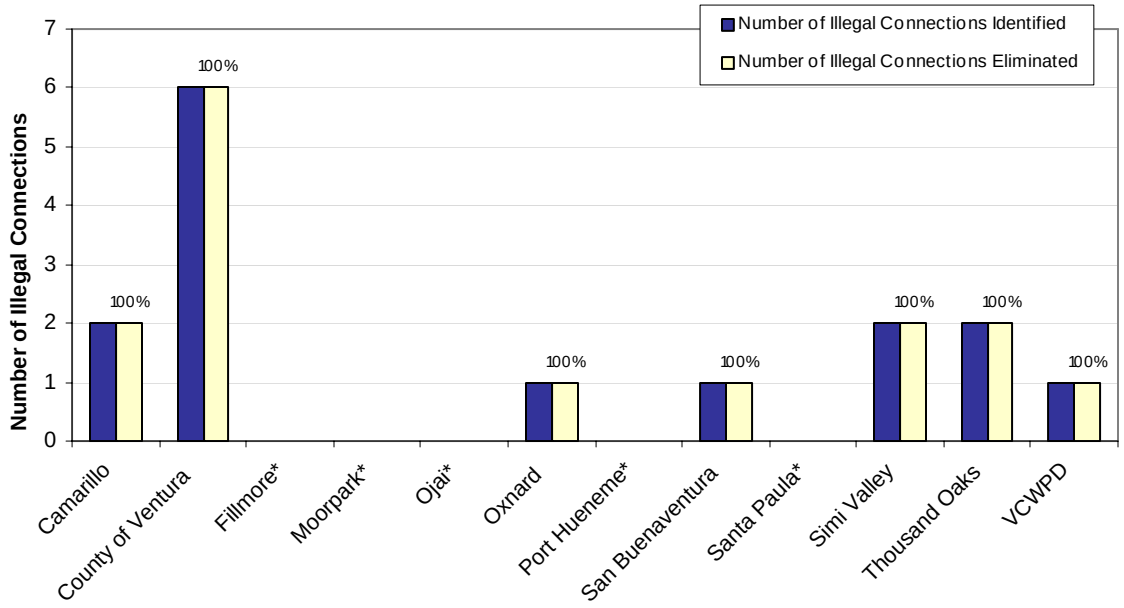


Figure 8-2 Illegal Connection Response

* No illegal connections were reported by the cities of Fillmore, Moorpark, Ojai, Port Hueneme, and Santa Paula.

8.4.1.b. *Source Determination*

As part of their investigation of reported illicit discharges/dumping incidents, the Co-permittees attempt to determine the material's source. This investigation generally entails inspection of the surface drainage system in the vicinity of suspected illicit discharges. This may include accessible areas in the public right-of-way adjacent to residences and businesses, catch basins, open channels near known points of discharge, and upstream manholes.

If the source can be determined, Co-permittees take one or all of the following actions (when appropriate):

- Voluntary cleanup/termination
- Initiate enforcement procedures
- Take steps to prevent similar discharges from reoccurring

When the source cannot be determined, the appropriate department or contractor will be notified to contain and clean up the material. Because these situations and material can vary, procedures will vary as well. The following are steps that in general are taken by Co-permittees to determine source:

- Verify location of the spill/discharge
- Investigate the cause (look for origin)
- Determine the nature and estimate the amount of illicit discharge/dumped material
- Containment and cleanup
- When appropriate, refer documented non-stormwater discharges/dumping or illegal connections to the proper agency for investigation
- If appropriate, notify the RWQCB and/other proper agencies

Figure 8-3 indicates the likely cause for illicit discharges countywide. The vast majority of incidents resulted from cleaning activities, which the Co-permittees have defined as *any activity intended to wash, tidy up or make clean*. In order to reduce the number of illicit discharges and to prevent similar incidents from reoccurring, the Co-permittees have taken a variety of actions. Some Co-permittees have provided additional training to field staff (such as Building Inspectors, Engineering Inspectors, maintenance personnel) that can look for "potential" discharges. When "potential" discharges were found, Co-permittees provided educational material to the appropriate resident, business owner, etc. In addition, other Co-permittees have started to distribute educational material with all encroachment and building permits. Other Co-permittees have published articles in local magazines regarding pool maintenance, vehicle maintenance and homeowner projects. Some Co-permittees have also distributed letters, brochures and informational door hangers directly to homeowners during residential street sweeps in known problem areas. The proactive and innovative educational outreach efforts of the Co-permittees should be commended.

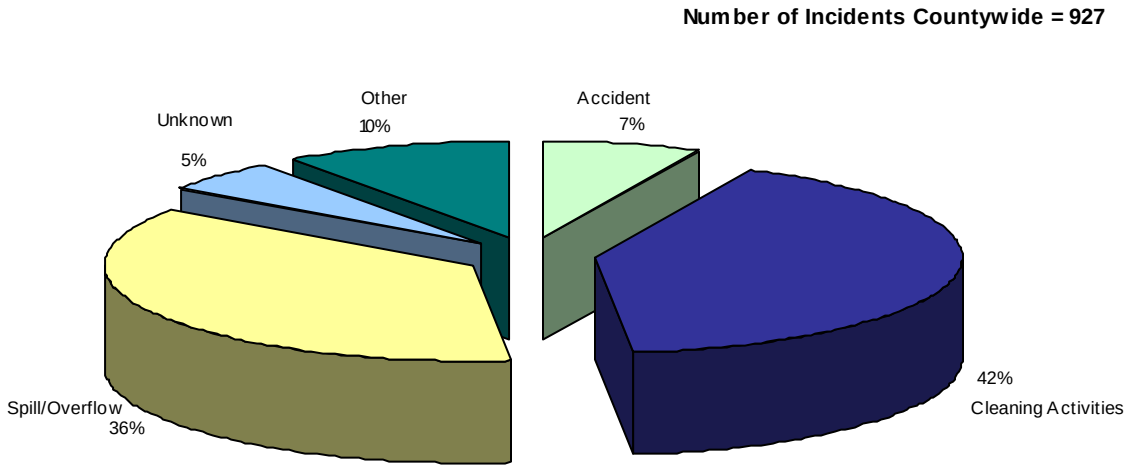


Figure 8-3 Probable Cause of Illicit Discharges Countywide

In addition, Co-permittees were able to determine both the type and source of material discharged during illicit discharge/dumping events. **Figure 8-4** shows the type of material discharged, while **Figure 8-5** indicated the source of the material. The categories "wastewater", "building materials", and "hazardous material" comprise the majority of material discharged. For more information on categories for material type see **Section 8.5.2**.

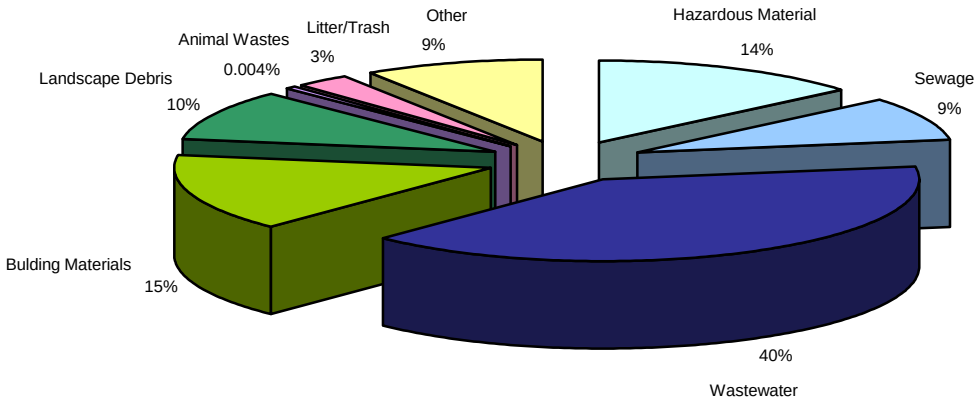


Figure 8-4 Type of Material Discharged during Illicit Dishcarges Events Countywide

Major sources of illicit discharge/dumping incidents were attributed to residential (50%) and industrial/commercial (32%). Since these two sources account for 82% of all illicit discharges, the Co-permittees plan to continue to target business facilities and residents for comprehensive educational outreach. In addition, Co-permittees will continue to cross-train all targeted staff on how to identify and report illicit discharges. These efforts will continue to provide an effective countywide illicit discharge/illegal connection program.

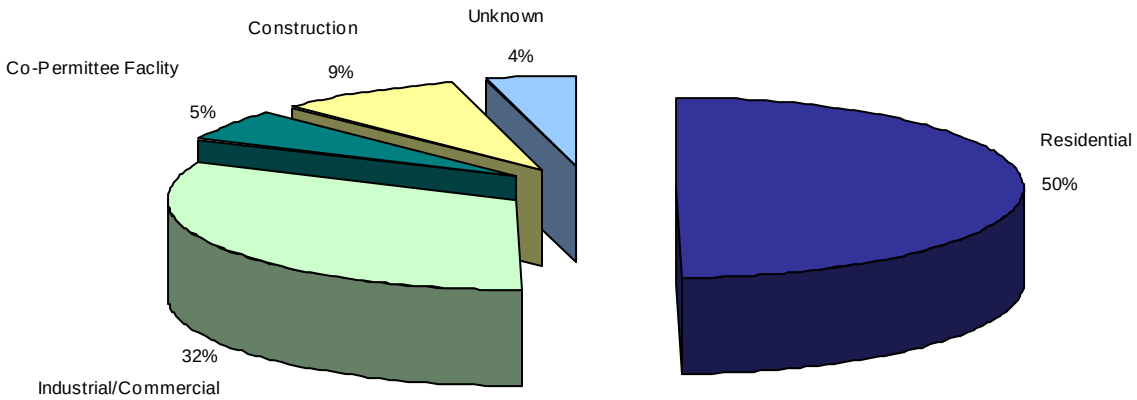


Figure 8-5 Source of Material Discharged during Illicit Discharge Events Countywide

8.4.1.c. *Enforcement*

Co-permittees have continued to implement enforcement procedures to eliminate illicit discharges and illegal connections. Enforcement procedures are consistent with the Co-permittees' legal authority stipulated in their respective ordinances. While legal authority varies, most enforcement processes follow a common sequence.

Typically they include:

- Verbal or written warnings for minor violations
- Formal notice of violation or non-compliance with specific actions and time frames for compliance
- Cease and desist or similar order to comply
- Specific remedies such as civil penalties (e.g., infraction), non-voluntary termination with cost recovery, or referral for criminal penalties or further legal action

Enforcement activity begins at the appropriate level as determined by the Co-permittees' authorized representative. For incidents that are more sever or threatening at the outset, enforcement will start at an increased level. Enforcement steps are accelerated if there is evident of a clear failure to act or an increase in the severity of the discharge. Enforcement actions for violating any of the provisions of the Co-permittees' ordinances may include any of the following or a combination thereof:

- Criminal Penalties
  - Monetary punishment
  - Imprisonment
- Civil Penalties
  - Monetary punishment

Figures 8-6 and **8-7** indicate the number and type of enforcement actions taken by the Co-permittees in response to reported illicit discharge/dumping events during this reporting period. The data presented in **Figure 8-6** indicates that most Co-permittees issued some form of enforcement action when resolving an illicit discharge and/or dumping event. A total of 927 verified illicit discharges were reported countywide and Co-permittees issued enforcement actions on 80% of these incidents.

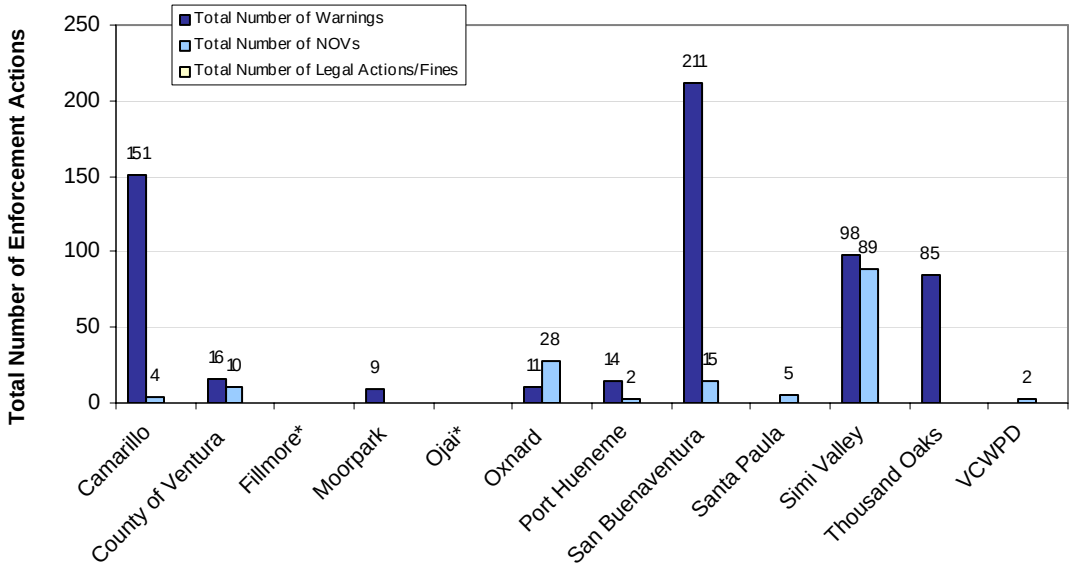


Figure 8-6 Number of Enforcement Actions

As indicated in **Figure 8-7**, the vast majority of enforcement actions consisted of both verbal and written warnings of violation. Last permit year, Notice of Violations constituted 18% of all enforcement actions. This year, the Co-permittees continued this level of action by issuing a total of 155 Notice of Violations (21%). No monetary fines were collected by the Co-permittees this year. This continued enforcement effort underscores the Co-permittees high level of expectations from its residential and business communities. After ten years of stormwater educational outreach, the Co-permittees believe that additional tools, such as Notice of Violations (NOVs) and fines are appropriate in certain instances to achieve compliance.

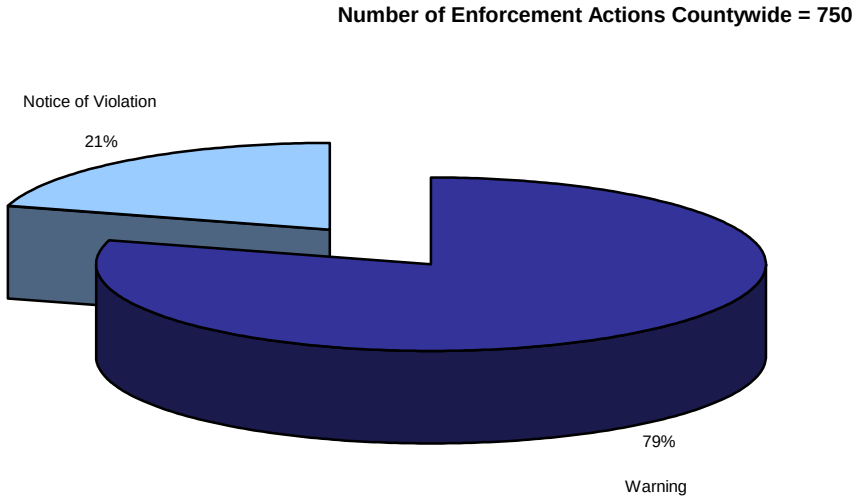


Figure 8-7 Types of Enforcement Actions taken Countywide

In addition, the Co-permittees continued to utilize a database of reported illicit discharge incidents that includes the following information for each event:

- Date of initial inspection
- Type of material discharged
- Source type of discharge
- Probable cause of discharge
- Date of follow-up inspection
- Date of conclusion/clean up/removal/follow up/education
- Enforcement taken action

A print out of the Co-permittees' database is attached in Appendix 2. The Co-permittees annually update the database with their activities for the current reporting year and provide a copy to the RWQCB in the Annual Report.

8.4.2 Education and Outreach

Stormwater pollution prevention is most easily and cost effectively achieved through education and awareness. This reporting year, Co-permittees continued to distribute educational material that describes illicit discharges and provides contact numbers for reporting illicit discharges to automotive, food service and construction sites during inspections. Co-permittees have developed their educational material with the following goal:

- Instruct special groups on elements of stormwater quality, tools available, where to find assistance/reference materials and where efforts from the public/private sectors are best focused to be most effective

Details on the number of educational contacts made during this reporting period have been included in **Section 4** (Program for Industrial/Commercial Business) and **Section 6** (Program for Construction Sites).

8.4.3 Stormwater Quality Staff Training

Each Co-permittee targets staff based on the type of stormwater quality and pollution issues that they may encounter. Targeted staff included drainage, roadway, landscape and facilities staff, industrial pretreatment inspectors and code enforcement officers. Training was incorporated with existing business inspection, construction site, and public agency activity programs.

Staff was trained in a manner that provided adequate knowledge for effective illicit discharge identification, investigation, reporting and/or clean up. Training was achieved in a variety of ways, including informal "tailgate" meetings, formal classroom training and/or self-guided training methods.

During this reporting period, Co-permittees trained 193 municipal staff on illicit discharge response and non-stormwater discharges. **Figure 8-8** depicts the number of staff trained. All of the Co-permittees exceeded the performance criterion established in the SMP, and trained more than the 90% of targeted employees.

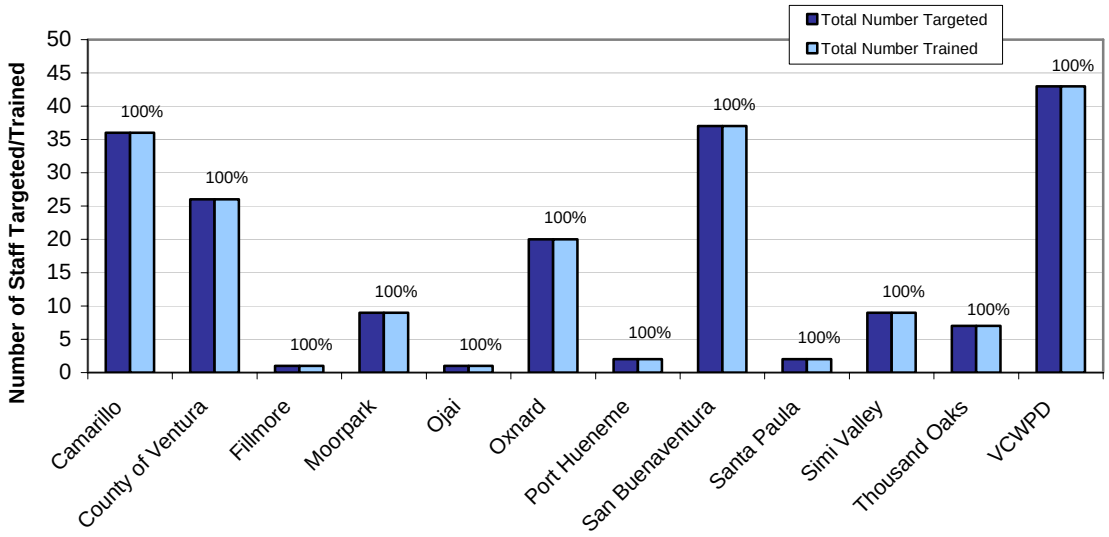


Figure 8-8 Illicit Discharge/Illegal Connection Staff Training

8.5 Five Year Permit Summary of Program Accomplishment

8.5.1 Incident Response Database

Due to new reporting requirements, the Co-permittees were required to develop an Access Database to track and report their Illicit Discharge/Illegal Connection Incident Response Program. VCWPD developed a model database that included a user-friendly format that allowed Co-permittees to input all relevant data regarding each illicit discharge/dumping event. A print out of the database has been provided to the RWQCB each year since its development and is annually update in the Annual Report.

8.5.2 Additional Categories for Material Type

In 2002-03, the Co-permittees realized that the number of categories that had been traditionally used to characterize material type (Hazardous Material, Sewage, Wastewater) resulting from an illicit discharge were limited and often resulted in many illicit discharges being characterized as "other". In order to better describe the material involved, the Co-permittees discussed at length the typical types of illicit discharges that occur within their jurisdictions and what material is often involved. These discussions were very helpful in clarifying the fact that the Co-permittees often had different ideas and opinions on how to describe these events. After much discussion the Co-permittees agreed on an additional four categories for material type. To ensure accurate reporting, the Co-permittees agreed that definitions for each class of "material type" would keep any guesswork in describing these events to an absolute minimum.

Table 8-2 Illicit Discharge Material Type details the categories used by the Co-permittees to describe the material type of an illicit discharge. The definitions of these various categories are solely for facilitating the Co-permittees with their characterization of material type for annual report consistency. The Co-permittees are aware that these definitions are by no means all-inclusive nor necessarily how another agency or person would define these categories.

The Co-permittees used a variety of resources in helping to define these categories including the Ventura Count Environmental Health website, the RWQCB website and the Environmental Protection Agency's glossary of terms and educational outreach materials.

Table 8-2 Illicit Discharge Material Type

Material Type & Definitions	
TYPE	DEFINITION
Hazardous Material	By-products of society that can pose a substantial or potential hazard to human health or environment when improperly managed. Posses at least one of the four following characteristics (ignitability, corrosivity, reactivity, or toxicity), or is identified as a listed waste (e.g., oil, used anti-freeze, hydraulic fluid)
Sewage	The waste and wastewater produced by residential and commercial sources and discharged into sewers, includes the sludge produced by Publicly Owned Treatment Works.
Wastewater	The spent or used water from a home, community, farm or industry that contains dissolved or suspended matter.
Building Materials	Any debris associated with construction activities used to construct a building and/or stand/alone facility, such as plaster, dry-wall, nails, wood, etc.
Landscape Debris	Excessive eroded soils, sediment and/or organic materials.
Animal Wastes	Discharge from confinement facilities, kennels, pens, recreational facilities, stables, show facilities and residential yards.
Litter/Trash	Synthetic consumer by-product
Other	Any remaining materials that do not fit into the above mentioned categories.

8.5.3 Storm Drain Curb Markers

In addition to marking their storm drain inlets with a pollution prevention message, the City of Camarillo has implemented the use of storm drain curb markers with a phone number to report illicit discharges. This creative combination of two permit-required activities (provide an illicit discharge reporting number to the public and stencil storm drains with a "no dump" message) is to be commended. Consequently, the City has experienced a significant increase in the number of reports of suspicious substances in the gutter and drain. This resourceful approach has proven a great success for the City in their efforts to improve illicit discharge reporting and the City plans to implement the markers citywide.

Example of Storm Drain Curb Marker

8.5.4 Illicit Discharge Hotline

The City of San Buenaventura has implemented an innovative means to provide city employees and residents with a tool to report illicit discharges. During the 2002-03 reporting period the City developed and distributed a static-cling windshield sticker that displays the City's Illicit Discharge Hotline phone number to all city vehicles along with a flyer that describes illicit discharges and

encourages employee participation in this program. The City has empowered their entire municipal field staff with the tools and knowledge to combat stormwater pollution and should be commended for their efforts.

8.5.5 Joint Pollution Prevention Workshops

During the 2001-02 reporting period, VCWPD in coordination with the City of Thousand Oaks held a one-day workshop that covered stormwater regulations and appropriate BMPs for working with concrete products. The workshop was coordinated with the Program for Construction Sites and emphasized prevention of non-stormwater discharges (source control), appropriate cleaning methods, material storage and proper disposal. For more information regarding this event, see **Section 6** (Program for Construction Sites).

9.0 Water Quality Monitoring

9.1 Executive Summary

Pursuant to NPDES Permit No. CAS004002, the Ventura Countywide Stormwater Quality Management Program (Management Program) must submit a Stormwater Monitoring Report annually by October 1st summarizing results of water quality monitoring conducted during the monitoring year. Consistent with this requirement the Ventura Countywide Stormwater Quality Management Program has prepared this Report to satisfy the permit requirements as well as to assess the effectiveness of the overall Stormwater Monitoring Program.

This report provides an investigation of stormwater program effectiveness, characterizes the surface water quality of Ventura County, and summarizes water quality data for monitoring conducted during the 2004/05 season. Analysis of samples collected at various monitoring sites throughout the watershed provides information to assess the impact of stormwater runoff and helps characterize the status of surface water quality for watersheds in Ventura County. The monitoring aids in the identification of pollutant sources as well as the evaluation of the Stormwater Monitoring Program's effectiveness. Evaluating the Stormwater Monitoring Program's effectiveness allows for changes to be made and continual improvement of the overall Program. This adaptive management strategy improves the quality and effectiveness of the Stormwater Monitoring Program and minimizes the impact of stormwater pollutant discharges throughout the watersheds.

For the 2004/05 monitoring season, several key points have been identified and are highlighted below.

- **The Ventura Countywide Stormwater Monitoring Program (Stormwater Monitoring Program) met the monitoring requirements of its NPDES permit.**

- **Water quality monitoring data were successfully collected during four wet weather and two dry weather events monitored by the Stormwater Monitoring Program.** The four wet weather events included monitoring at the Stormwater Monitoring Program's Land Use (Event 1), Receiving Water (Event 1), and Mass Emission (all events) sites, collectively representing all three watersheds (Calleguas Creek, Santa Clara River, and Ventura River) in which the Stormwater Monitoring Program conducts its water quality monitoring activities. The two dry weather events included monitoring only at the Mass Emission stations. The Stormwater Monitoring Program conducted a thorough QA/QC evaluation of the environmental and QA/QC results generated from its analysis of water quality samples and found the resultant data set to have achieved a 96.5% success rate in meeting program data quality objectives. Overall, the 2004/05 monitoring season produced a high quality data set in terms of the low percentage of qualified data, as well as the low reporting levels achieved by all laboratories analyzing the Stormwater Monitoring Program's water quality samples.

- **The heavy rains experienced during the 2004/05 monitoring season produced larger runoff events than are typically observed in Ventura County.** Average flows measured at the Mass Emission stations during early January 2005 (Event 4) were two times greater than the highest flows measured during 2003/04 monitoring events at ME-CC and ME-SCR, and almost 13 times greater than the highest flow measured during a monitoring event last season at the ME-VR site. As evidenced by the extremely high total suspended solids concentrations measured during Event 4, along with measured elevated concentrations of metals, organics, and pesticides (see Section 9.9), it is reasonable to assume that the large precipitation and runoff event acted to flush out watersheds and scour streambeds and adjacent riparian habitat.

- **The Ventura River NPDES Mass Emission Monitoring Station (ME-VR), formerly located on Casitas Vista Road at Foster Park, was determined to be unsafe due to land slides that occurred during the heavy rainfalls of January and February, 2005.** Safety concerns with the station's location at Foster Park prompted the Stormwater Monitoring Program to relocate the ME-VR station to the Ojai Valley Sanitation District's Treatment Plant above the POTW outfall. The new ME-VR2 station is located approximately one mile downstream of the station's former location, ME-VR. The new monitoring site is in an ideal location on the Ventura River due to the presence of a levee on the east side and bedrock on the west side of the site. The new location also provides an improved ability to secure monitoring equipment. Two dry weather events (Events 5 and 6) on the Ventura River were monitored at the new ME-VR2 site using portable monitoring equipment. All monitoring equipment, including a new rain gauge, will be permanently installed at the ME-VR2 site by October 1, 2005, for use during the 2005-2006 monitoring year.

- **The Ventura County Watershed Protection District (VCWPD) employed the services of CRG Marine Laboratories, Inc. in order to achieve lower detection limits.** As a means of improving the detection capability of various constituents found in the water quality samples collected by the VCWPD, the Stormwater Monitoring Program has again employed the services of CRG Marine Laboratories, Inc (CRG). CRG began analyzing the majority of the water quality parameters evaluated by the Stormwater Monitoring Program at the beginning of the 2003/04 monitoring season, and in January 2005 added mercury to the list of water quality parameters the laboratory analyzes for the Stormwater Monitoring Program. CRG is known for their ability to measure analytes at concentrations much lower than most water quality laboratories. During the current monitoring year, CRG was able to achieve detection limits for trace organic compounds (i.e., organics, PCBs, and pesticides) that are 100 – 1000 times lower than laboratories used in the past. This translates into a current achievable detection limit of 0.01 µg/L for an organic compound such as 1,4-Dichlorobenzene, whereas in years past the detection limit for this constituent was 10 µg/L. Additionally, CRG typically achieved detection limits for metals that are 10 times lower than historic levels for this class of constituent.

- **VCWPD used its water quality database to store and analyze stormwater quality data.** The Stormwater Monitoring Program invested approximately $150,000 in the past two years to develop a water quality database to further expedite, standardize, and enhance the Stormwater

Monitoring Program's data management and data analysis activities. Key attributes include automated importation of environmental and QA/QC data contained in a laboratory electronic data deliverable (EDD) into the database; semi-automated QA/QC evaluation; automated comparison of the Stormwater Monitoring Program's data to water quality objectives; and a wide array of hard copy and electronic data reporting features. The database has allowed the Stormwater Monitoring Program to improve its overall data management effort by providing staff with a robust data management tool for the storage, analysis, and reporting of stormwater monitoring data. The VCWPD envisions that the NPDES Stormwater Quality Database will serve as a model example for watershed planning efforts throughout Ventura County. Additionally, the database was recently used in the literature review element of the Santa Clara River Data Gap Analysis Project by AMEC Earth and Environmental in support of the Santa Clara River Enhancement and Management Plan.

- **VCWPD is investigating the installation of an additional flow meter at ME-SCR to provide complete flow measurements at the site during wet weather events.** A flow meter is presently installed at the top of the diversion dam for wet weather monitoring, while there is no flow meter installed at the river diversion gate. Consequently, total wet weather flow cannot be measured. There exist technical challenges to the measurement of flow at the river diversion gate since floating debris and sediment can interfere with such measurement. VCWPD is currently investigating the use of a Marsh-McBirney Flo-Dar meter which may be capable of accurately measuring flow at the river diversion gate.

- **Acute toxicity was observed during one wet weather event at R-1, W-3, and W-4.** Acute toxicity tests were performed at all monitoring sites during the first October 2004 monitoring event (Event 1). A TUa > 1 (which demonstrates acute toxicity) was observed at the R-1 Land Use, and the W-3 and W-4 Receiving Water sites. Although toxicity was detected subsequent Toxicity Identification Evaluation (TIE) tests were unable to identify the toxicant(s) because the toxicity had dissipated in all three samples at the point the TIEs were performed.

- **Chronic toxicity on *Haliotus rufescens* (Red Abalone) was observed during two wet weather events at Mass Emission station ME-VR.** This year, the Stormwater Monitoring Program used the marine species *Haliotus rufescens* (red abalone) for chronic toxicity testing due to the fact that the purple sea urchin, *Strongylocentrotus purpuratus,* was unavailable during both October 2004 monitoring events due to seasonal conditions. Chronic toxicity tests using red abalone were conducted during the first two events at all Mass Emission stations. Chronic toxicity (as determined by a TUc > 1.0) was detected in two consecutive wet weather (Events 1 – 2) samples collected at the Mass Emission site ME-VR. In accordance with NPDES permit requirements, a TIE was initiated for this site. The toxicity testing laboratory was unable to identify the toxicant(s) because the toxicity observed in the Event 2 sample had dissipated at the point the TIE was initiated. Chronic toxicity was not detected in any of the water quality samples collected from Mass Emission stations during the May 2005 dry weather event.

- **Elevated pollutant concentrations were observed at all monitoring sites during one or more monitored wet weather storm events, as well as at all Mass Emission sites during one or more dry weather events.** Constituent concentrations above Los Angeles Region 4 Basin Plan, California Toxics Rule, and/or California Ocean Plan water quality objectives were measured at the following monitoring sites:

Mass Emission Sites (all wet weather exceedances except where noted)

ME-CC

Anion: Chloride (dry)

Bacteriological: E. Coli, Fecal Coliform

Conventional: Total Dissolved Solids (dry)

Metal: Aluminum, Cadmium (wet and dry), Chromium (wet and dry), Copper (wet and dry), Lead, Mercury, Nickel (wet and dry), Selenium (dry), Zinc

Nutrient: Nitrate as N (dry)

Organic: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthere, Bis(2-ethylhexyl)phthalate, Chrysene, Indeno(1,2,3-cd)pyrene, total PAH compounds (wet and dry)

Pesticide: 4,4'-DDD, 4,4'-DDE, Aldrin, total DDT compounds

ME-SCR

Anion: Chloride (dry)

Bacteriological: E. Coli (wet and dry), Fecal Coliform

Metal: Aluminum (wet and dry), Cadmium, Chromium (wet and dry), Copper (wet and dry), Lead, Mercury, Nickel, Zinc

Organic: Benzo(a)anthracene, Benzo(b)fluoranthene, Bis(2-ethylhexyl)phthalate, Chrysene, total PAH compounds

ME-VR

Anion: Chloride

Bacteriological: E. Coli, Fecal Coliform

Metal: Aluminum, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc

Organic: Benzo(a)pyrene, Benzo(b)fluoranthene, Bis(2-ethylhexyl)phthalate, Chrysene, total PAH compounds

Pesticide: total DDT compounds

ME-VR2

Metal: Chromium (dry), Copper (dry), Nickel (dry)

Receiving Water Sites (all wet weather exceedances)

W-3

Bacteriological: E. Coli, Fecal Coliform

Conventional: Total Dissolved Solids

Metal: Aluminum, Chromium, Copper, Lead, Mercury, Nickel

Nutrient: Nitrite as N

Organic: total PAH compounds

Pesticide: total DDT compounds

W-4

Bacteriological: E. Coli, Fecal Coliform

Conventional: Total Dissolved Solids

Metal: Chromium, Copper, Lead, Mercury, Nickel, Zinc

Nutrient: Nitrite as N

Organic: Bis(2-ethylhexyl)phthalate, total PAH compounds

Pesticide: 4,4'-DDD, 4,4'-DDE, total DDT compounds

Even though receiving water objectives are not directly applicable to constituent concentrations measured at Land Use monitoring stations, the Stormwater Monitoring Program performed comparisons between Land Use water quality data and Los Angeles Region 4 Basin Plan, California Toxics Rule, and California Ocean Plan objectives as a means of identifying potential pollutants of concern.

Land Use Sites (all wet weather exceedances)

R-1

Bacteriological: E. Coli, Fecal Coliform

Metal: Aluminum, Copper, Zinc

Organic: Benzo(b)fluoranthene, Benzo(k)fluoranthene, Bis(2-ethylhexyl)phthalate, Chrysene, Indeno(1,2,3-cd)pyrene, total PAH compounds

Pesticide: 4,4'-DDE, total DDT compounds

I-2

Bacteriological: E. Coli, Fecal Coliform

Conventional: Total Dissolved Solids

Metal: Aluminum, Chromium, Copper, Zinc

Organic: Benzo(b)fluoranthene, Benzo(k)fluoranthene, Bis(2-ethylhexyl)phthalate, Chrysene, total PAH compounds

Pesticide: 4,4'-DDE, total DDT compounds

A-1

Bacteriological: E. Coli, Fecal Coliform

Conventional: Total Dissolved Solids

Metal: Aluminum, Chromium, Copper, Lead, Mercury, Nickel, Zinc

Nutrient: Nitrate as N

Organic: total PAH compounds

Pesticide: 4,4'-DDD, 4,4'-DDE, total DDT compounds

Bioassessment Monitoring

The following were the main findings for the 2004 benthic macroinvertebrate (BMI) survey of the Ventura River watershed:

- **Rainfall in the Ventura watershed was below normal during the 2003 to 2004 rain year and did not fall during the five months preceding the 2004 BMI sampling event in September 2004.** As a result only nine of the fifteen sampling locations had sufficient water flow for sampling.

- **Physical habitat conditions at the nine sampling sites ranged from suboptimal to optimal.** The best habitat scores were at locations on the main stem of the Ventura River, upper San Antonio Creek and Matilija Creek. The lowest scores were at locations on San Antonio Creek and Stewart Canyon Creek.

- **Based on the Southern California Index of Biological Integrity (So CA IBI) the aquatic health of the Ventura watershed during 2004 ranged from poor to good.** One site located in the upper watershed on Matilija Creek ranked in the good range, one site each on the Ventura River and Matilija Creek ranked in the poor range and the other six sites in the watershed ranked in the fair range. The sites that ranked in the poor range were located in areas of the watershed that were impacted by either a large human transient population on the Ventura River or was located downstream of a small residential community on Matilija Creek.

- **During the previous three years, the San Diego IBI (SD IBI) has been used to assess the aquatic health of the Ventura watershed. The scores for the SD IBI and the So CA IBI were compared for the previous four years (2001 to 2004). The SD IBI consistently ranked sites in the watershed as either good or very good, while the So CA IBI ranked the same sites as poor or fair.** The development of the So CA IBI included reference stations covering a much wider geographic range than was used for the development of the SD IBI. As a result, the So CA IBI is comparing the Ventura watershed against more appropriate reference conditions and provides a better measure of the aquatic health of this system.

- **A historical analysis that included all the BMI data collected from 2001 through 2004 showed that the BMI communities were delineated more by their location in the watershed than by survey year.** The types and abundances of species found throughout the watershed during the four year period changed very little. Most of the changes were subtle shifts in the relative abundances of groups of species that were common throughout the watershed. These results indicated that water quality in the watershed remained relatively stable during this four year period.

9.2 Background

Pursuant to NPDES Permit No. CAS004002, the Ventura Countywide Stormwater Quality Management Program must submit a Stormwater Monitoring Report, annually by October 1, and include the following:

- Status of implementation of the Stormwater Monitoring Program
- Results of the Stormwater Monitoring Program
- General interpretation of the results
- Tabular and graphical summaries of the monitoring data obtained during the previous years.

Consistent with this requirement, the Ventura Countywide Stormwater Quality Management Program (Management Program) has prepared this Report to address the permit requirements as well as to assess the effectiveness of the overall Management Program. The Ventura Countywide Stormwater Monitoring Program (Stormwater Monitoring Program), as originally proposed, is described in Chapter 9 of the Report of Waste Discharge submitted in February 1999. To facilitate the incorporation of information learned during implementation of the Management Program, increase the effectiveness of the Management Program, and streamline stormwater monitoring procedures, modifications to the Stormwater Monitoring Program have been implemented since 1999. As part of this adaptive management strategy, improvements to the *Mass Emission Stations Water Quality Monitoring Standard Operating Procedures (SOP) 2000-2005* were implemented in April 2003 to make them consistent with NPDES No. CAS004002, Order No. 00-108. The Stormwater Monitoring Program includes both stormwater management and scientific elements. The collection and analysis of stormwater samples across Ventura County and the analysis and interpretation of the resulting data are the central activities of the Stormwater Monitoring Program. The Stormwater Monitoring Program is currently conducted with the following four major objectives at its focus:

- Characterizing stormwater discharges from monitoring sites representative of different land uses: industrial, agricultural, and residential
- Establishing the impact of stormwater discharges on receiving waters by conducting receiving water quality, mass emission, and bioassessment monitoring
- Identifying pollutant sources based on analysis of monitoring data, inspection of businesses, and investigation of illicit discharges
- Defining stormwater program effectiveness using data collected before and after implementation of pollution prevention programs

This report provides an overview of stormwater program effectiveness and characterizes the surface water quality of Ventura County. Analysis of samples collected at various sites throughout the watershed gives an overall representation of the impact of stormwater discharges. The monitoring also aids in the identification of pollutant sources as well as the assessment of stormwater program effectiveness. Evaluating program effectiveness allows for changes to be made in the Stormwater Monitoring Program in order to resolve any problems that may exist. This adaptive management strategy improves stormwater

monitoring program effectiveness and minimizes the impact of stormwater pollutant discharges on the watershed.

The pertinent parts of the Stormwater Monitoring Program include the following:

9.2.1 Land Use Site (Discharge Characterization) Monitoring

Land use monitoring is designed to capture stormwater discharge from a specific type of land use. In the Stormwater Management Plan, sites are chosen to represent three land use types: agricultural, industrial, and residential.

Land use monitoring began during the 1992-93 monitoring season and is designed to characterize stormwater discharges from the three specific land uses noted above. During the 2004/05 monitoring season, samples from one wet weather event were collected for water chemistry and toxicity at the agricultural (Wood Road, A-1), industrial (Ortega Street, I-2) and residential (Swan Street, R-1) monitoring sites.

9.2.2 Receiving Water (Tributaries) Monitoring

Receiving water monitoring is designed to characterize the quality of receiving waters rather than discharges to the receiving waters. This type of monitoring evaluates smaller tributaries to the main river systems. Monitoring smaller tributaries allows the Stormwater Monitoring Program to focus on smaller sub-basins of the watershed that are not impacted by discharges from wastewater treatment facilities. Monitoring a localized section of the watershed allows the Stormwater Monitoring Program to better examine the impact of stormwater on the watershed than mass emission monitoring (see discussion below). During the 2004/05 monitoring season, the Receiving Water sites La Vista (W-3) and Revolon Slough (W-4) were monitored once under wet weather conditions. Water chemistry and toxicity samples were collected at both sites. Receiving water monitoring at these sites was first implemented during the 1997-98 season and captures stormwater runoff from the Revolon Slough sub-basin.

9.2.3 Mass Emission Monitoring

The purpose of mass emission monitoring is to identify pollutant loads to the ocean and identify long- term trends in pollutant concentrations. Mass Emission sites are located in the lower reaches of major watersheds. Through water quality monitoring at these sites, the Stormwater Monitoring Program can evaluate the cumulative effects of stormwater and other surface water discharges on beneficial uses in the watershed prior to discharge to the ocean. Both Mass Emission and Receiving Water stations measure water quality parameter concentrations in a surface water body, whereas Land Use monitoring stations permit the water quality characterization of discharges to surface water bodies. Mass Emission monitoring stations measure water quality parameter concentrations resulting from discharges throughout an entire watershed. The Mass Emission drainage area is much larger than the drainage area for the Receiving Water sites and includes other sources of discharge, such as wastewater treatment plants, non-point sources, and groundwater discharges.

Mass Emission stations are located in the three major Ventura County watersheds: Calleguas Creek (ME-CC), Ventura River (ME-VR and ME-VR2), and Santa Clara River (ME-SCR). Each Mass Emission station was monitored this season, with the new ME-VR2 site replacing the ME-VR site for two dry weather monitoring events due to damages and safety concerns at the ME-VR site. During the 2004-2005 monitoring season, water quality samples from four wet weather and two dry weather events were collected for water chemistry and toxicity at the Mass Emission sites. Monitoring at two of these stations, ME-CC and ME-VR, was initiated during the 2000/01 monitoring season, while monitoring at the ME-SCR station was initiated during the 2001/02 monitoring season, and monitoring at the new ME-VR2 station was initiated in May 2005.

9.2.4 Bioassessment Monitoring

The Ventura County Stormwater Monitoring Program also includes the Bioassessment Monitoring Program. Biological assessments (bioassessments) of water resources integrate the effects of water quality over time and are capable of simultaneously evaluating multiple aspects of water and habitat quality. When integrated with physical and chemical assessments, bioassessments help to further define the effects of point and non-point source discharges of pollutants and provide a more appropriate means for evaluating impacts of non-chemical substances, such as sedimentation and habitat destruction. A work plan for in-stream bioassessment monitoring in the Ventura River watershed was developed and submitted in January 2001 to the Regional Water Quality Control Board (RWQCB) as part of the revised Stormwater Management Plan. For four years, starting in 2001, bioassessment monitoring has been conducted once a year in the fall to establish baseline data. The bioassessment monitoring for this reporting period occurred in September 2004, and included 15 monitoring stations representing main streams and tributaries. Six of the 15 monitoring locations visited this season did not possess sufficient flow to enable benthic macroinvertebrate sample collection. Staff participated in both field and lab bioassessment training this year that was sponsored by the California Department of Fish and Game and the Southern California Coastal Water Research Program. Bioassessment monitoring is conducted during the fall because it is the time period during which flows are most consistent and macroinvertebrates are most productive and diverse. The fall season provides a consistent, stable environment for sampling that allows for macroinvertebrate comparability from year to year. The results and discussion of the fall 2004 bioassessment monitoring are provided in Section 9.3 of this report.

9.2.5 Monitoring Station Re-location

The Ventura River National Pollutant Discharge Elimination System (NPDES) Mass Emission Monitoring Station (ME-VR), formerly located on Casitas Vista Road at Foster Park, was determined to be unsafe due to land slides that occurred during the heavy rainfalls of January and February, 2005. Safety concerns with the station's location at Foster Park prompted the Stormwater Monitoring Program to relocate the ME-VR station to the Ojai Valley Sanitation District's Treatment Plant (located at 6363 North Ventura Avenue, Ventura, CA) above the POTW outfall. The new ME-VR2 station is located approximately one mile downstream of the station's former location, ME-VR. The new monitoring site is in an ideal location on the Ventura River due to the presence of a levee on the east side and bedrock on the west side of the site. The new location also provides an improved ability to secure monitoring equipment. Two dry weather events (Events 5 and 6) on the Ventura River were monitored at the new ME-VR2 site using portable monitoring equipment. All monitoring equipment, including a new rain gauge, will be permanently installed at the ME-VR2 site by October 1, 2005, for use during the 2005-2006 monitoring year. Note that the four wet weather Ventura River monitoring events described in this report took place at the old ME-VR station located at Foster Park.

9.2.6 Report Contents

This report discusses work conducted from July 2004 to August 2005 and includes precipitation and flow information and associated water quality data from four wet weather events monitored at the Stormwater Monitoring Program's Land Use (Event 1), Receiving Water (Event 1), and Mass Emission (all events) sites, as well as two dry weather events monitored at each of the Mass Emission stations.

This monitoring report is organized into 10 sections. Section 9.1 provides an executive summary of the activities and findings of the 2004-2005 monitoring season. Section 9.2 provides the background and purpose of the Stormwater Monitoring Program. Section 9.3 provides the results and a discussion of the fall 2004 bioassessment monitoring. Section 9.4 includes a description of the monitoring sites. Section 9.5 discusses precipitation and flow conditions at the monitoring sites. Section 9.6 gives an overview of sample collection procedures and Section 9.7 provides tabular results of the sample analyses. Section 9.8

describes the quality assurance and quality control procedures employed by the Stormwater Monitoring Program and the successes met in achieving data quality objectives. Section 9.9 discusses the water quality results and Section 9.10 summarizes mass loadings and comparisons to water quality objectives.

9.3 Ventura River Watershed 2004 Bioassessment Monitoring Report

9.3.1 Executive Summary

The 2004 bioassessment survey of the Ventura River watershed was conducted by staff members from the Ventura County Watershed Protection District, the Ojai Valley Sanitation District and Aquatic Bioassay and Consulting Laboratories on September 15th, 16th and 17h, 2004. Staff members from the California Department of Fish and Game (CDFG) and/or the Sustainable Land Stewardship Institute (SLSI) have been present during each of the four survey years to audit all sample collection activities and to provide data analysis and reporting services (CDFG = Jim Harrington, SLSI = Monique Born).

Fifteen benthic macroinvertebrate (BMI) sampling locations were visited during the survey, with nine sites having sufficient flow for sample collection. Physical/habitat observations, flow and water quality samples were also collected at each site. The taxonomic identification of BMI organisms, data analysis and report generation was conducted by Aquatic Bioassay and Consulting Laboratories in Ventura, CA. All of the QC guidelines for collection, sorting and identification of BMI organisms specified in the California Stream Bioassessment Protocol (2003) were met.

The physical habitat quality of the survey stations ranged from suboptimal to optimal. Stations located on the main stem of the Ventura River (Stations 0, 4 and 12) the upper portion of San Antonio Creek (Station 9) and on the Matilija Creek system (10, 11, and 13) scored at or just below the optimal range. These sites were characterized by relatively high substrate complexity, were composed of high percentages of cobble and boulders, had good bank stability, had little evidence of sedimentation due to upstream erosion and had good vegetative protection. The lowest physical habitat scores were measured at Station 15 on San Antonio Creek and Station 8 on Stewart Canyon Creek. These sites were characterized by having less instream cover and, especially in the case of Station 15, increased amounts of sedimentation and embeddedness (a measure of the amount of space surrounding cobble and gravel in the streambed). The increased sedimentation is most likely the result of erosion due to upstream grazing, poor bank stability, poor vegetative cover and stable operations. Water quality (pH, dissolved oxygen, temperature, specific conductance) was similar at all sites during the survey.

The aquatic health of the Ventura River watershed was assessed using the Southern California Index of Biological Integrity (So CA IBI). Based on this index, BMI communities that are ranked as poor can be considered to be impaired. The IBI rankings for the nine stations sampled for BMIs in 2004 ranged from good (1 station) to fair (6 stations) to poor (2 stations). The two stations that were rated as poor were located at the Main St. bridge near where the Ventura River discharges into the Pacific Ocean (Station 0) and Station 13 located downstream of a small residential community on Matilija Creek in the upper watershed. Station 11 in the North Fork of Matilija Creek received an IBI score of good, indicating that the BMI community found there is comparable to other reference site locations in southern California. Stations located on San Antonio Creek, at Foster Park on the Ventura River and below the Matilija Dam all scored in the fair range.

An historical analysis was conducted which included all the BMI data collected from 2001 through 2004. This analysis showed that the BMI communities were delineated more by their location in the watershed, than by survey year. The composition of the BMI community was mostly similar throughout the watershed both spatially and temporally. Most of the community changes during the four year period included only subtle shifts in the relative abundances of species. These results indicated that water quality in the watershed remained relatively stable during this four year period.

9.3.2 Introduction

9.3.2.1 Ventura River Watershed

The 228 square mile Ventura River watershed includes rugged mountains, a coastal chaparral ecosystem and valleys that lead to the Pacific Ocean. Almost half of the watershed is in the Los Padres National Forest. The Ventura River is the main watercourse within the watershed, with several major tributaries that includes Matilija Creek, San Antonio Creek and Cañada Larga Creek (Figure 9-1). Matilija Creek drains the mountainous northern most portion of the watershed and can be divided into the main stem of the Creek above Matilija Dam and the North Fork of Matilija Creek which discharges into the main stem below the dam. San Antonio Creek drains the northeastern portion of the watershed and has two main tributaries, Lions Canyon Creek and Stewart Canyon Creek. Cañada Larga Creek drains the eastern portion of the watershed.

The land use patterns within the watershed vary, but for the most part is undeveloped land and open space (89%). There are urbanized areas (1.5%) that include the cities of Ojai and San Buenaventura (southeast side), and unincorporated communities including Oak View, Matilija Canyon, Live Oak Acres, Meiners Oaks and Casitas Springs. The approximate human population of these communities is 20,000. The land use designations in the developed areas vary widely from rural to residential to industrial. Human impacted areas include activities related to grazing and livestock, agriculture, oil production and recreation.

9.3.2.2 Bioassessment Monitoring

Major issues facing streams and rivers in California include modification of in-stream and riparian structure, contaminated water and increases in impervious surfaces, which has led to the increased frequency of flooding. There have been many studies and reports showing the deleterious effects of land-use activities to macroinvertebrate and fish communities (Jones and Clark 1987; Lenat and Crawford 1994; Weaver and Garman 1994; and Karr 1998). A major focus of freshwater scientists has been the prevention of further degradation and restoration of streams to their more pristine conditions (Karr et al. 2000).

During the past 150 years direct measurements of biological communities including plants, invertebrates, fish, and microbial life have been used as indicators of degraded water quality. In addition, biological assessments (bioassessments) can be used as a watershed management tool for surveillance and compliance of land-use best management practices. Combined with measurements of watershed characteristics, land-use practices, in-stream habitat, and water chemistry, bioassessment can be a cost-effective tool for long-term trend monitoring of watershed conditions (Davis and Simons 1995).

Biological communities act to integrate the effects of water quality conditions in a stream by responding with changes in their population abundances and species composition over time. These populations are sensitive to multiple aspects of water and habitat quality and provide the public with more familiar expressions of ecological health than the results of chemical and toxicity tests (Gibson 1996). Furthermore, biological assessments when integrated with physical and chemical assessments, better define the effects of point-source discharges of contaminates and provide a more appropriate means for evaluating discharges of non-chemical substances (e.g. nutrients and sediment).

Water resource monitoring using benthic macroinvertebrates (BMI) is by far the most popular method used throughout the world. BMIs are ubiquitous, relatively stationary and their large species diversity provides a spectrum of responses to environmental stresses (Rosenberg and Resh 1993). Individual species of BMIs reside in the aquatic environment for a period of months to several years and are sensitive, in varying degrees, to temperature, dissolved oxygen, sedimentation, scouring, nutrient enrichment and chemical and organic pollution (Resh and Jackson 1993). Finally, BMIs represent a significant food source for aquatic and

terrestrial animals and provide a wealth of ecological and bio-geographical information (Erman 1996).

In the United States the evaluation of biotic conditions from community data uses a multi-metric technique. In multi-metric techniques, a set of biological measurements ("metrics"), each representing a different aspect of the community data, is calculated for each site. An overall site score is calculated as the sum of individual metric scores. Sites are then ranked according to their scores and classified into groups with "good", "fair" and "poor" water quality. This system of scoring and ranking sites is referred to as an Index of Biotic Integrity (IBI) and is the end point of a multi-metric analytical approach recommended by the EPA for development of biocriteria (Davis and Simon 1995). The original IBI was created for assessment of fish communities (Karr 1981) but was subsequently adapted for BMI communities (Kerans and Karr 1994).

The first demonstration of a California regional IBI was applied to the Russian River watershed in 1999 (DFG 1998). As the Russian River IBI was being developed, the Department of Fish and Game (DFG) began a much larger project for the San Diego Regional Board. After a pilot project conducted on the San Diego River in 1995 and 1996, the San Diego Regional Board contracted DFG to help them incorporate bioassessment into their ambient water quality monitoring program. During 1997 through 2000, data was collected from 93 locations distributed throughout the San Diego region. Finally, between 2000 and 2003, bioassessment data were collected from the Mexican border to the south, Monterey County to the north and to the eastern extent of the coastal mountain range. These data were used to create an IBI that is applicable to southern California and is applied to the data in this report (Ode 2005).

In fulfillment of the District's NPDES storm water permit requirement, the goal of this report was to assess the aquatic health of the Ventura River and its main tributaries based on the results of the physical habitat and BMI community data collected at nine sites in September 2004. In addition, these data were compared and contrasted to the previous three years of data to look for any spatial or temporal water quality trends.

9.3.3 Materials and Methods

9.3.3.1 Sampling Site Descriptions

Fifteen BMI sampling locations were visited in the Ventura River watershed from September 15th to 17th, 2004 (Figure 9-1, Table 9-1). Photographs of each site are displayed in Figure 9-2. The 15 sites can be grouped into four geographic areas: Stations 0, 4, 6 and 12 located in the main stem of the Ventura River; Stations 2 and 3 located in Cañada Larga Creek; the upper watershed which includes Stations 10, 11, 13 and 14 in Matilija Creek and the North Fork of Matilija Creek; and Stations 5, 7, 8, 9 and 15 located in San Antonio Creek and its tributaries, Lions Canyon Creek and Stewart Canyon Creek.

Ventura River Watershed (Stations 0, 4, 6 and 12)

The stations located on the main stem of the Ventura River range in elevation from 19 ft. at Station 0 near the ocean to 1020 ft. at Station 12 below the Matilija Dam. The Ventura River is the main drainage for the entire watershed and receives runoff from three main tributary systems: the Matilija Creek system above the dam; the San Antonio Creek system; and the Cañada Larga Creek system.

Station 0 is located upstream of the Main St. bridge just above where the Ventura River discharges into the Pacific Ocean. It is the first site in the Ventura River that is not influenced by salinity changes caused by tidal flushing. The river bed at Station 0 is heavily influenced by a large transient human population which lives there. The banks on each side of the river are stabilized by rock levees designed to protect the City of San Buenaventura from flooding.

The Ojai Valley Sanitation Plant is located 2.5 miles upstream of Station 0 and discharges 2.0 million gallons per day (MGD) of tertiary treated effluent, a process that includes nitrogen and phosphorus removal.

Station 4 is located at Foster Park, 1.85 miles downstream of the confluence of the San Antonio Creek with the Ventura River. This reach is located downstream of a traffic bridge, has small levees stabilizing both banks. The river bottom is composed of boulders and cobble. During the dry season filamentous algae is prevalent.

Station 6 is located upstream of the traffic bridge at Santa Ana Road. The channel at this site is concrete reinforced and covered with cobble on the sides and bottom. The river has historically flowed underground from a point upstream of Station 6 and then reverted to surface flow at a point downstream of the station. This site has been dry during September for the last four years. The site was selected in the event that sufficient precipitation would fall in the subwatershed to produce flow at this site.

Station 12 is located at the base of the Matilija Dam. The dam, which is fed by Matilija Creek, is filled with sediment and no longer serves as a flood control structure and is scheduled for future removal. The habitat at Station 12 is composed of boulders and natural vegetation.

Cañada Larga Creek (Stations 2 and 3)

Stations 2 and 3 are located on Cañada Larga Creek, the first major tributary to the Ventura River upstream of the ocean. The Cañada Larga drains a rural area composed of ranch land and open space. Station 3 is located near its headwaters and above areas of heavy grazing. Station 2 is located just upstream of the Cañada Larga's confluence with the Ventura River and downstream of the heavily grazed portion of the watershed. Both of these sites were dry during the September 2004 sampling event. Additionally, Station 2 lost its hydrological connection to Cañada Larga Creek during the high flows of January and February, 2005, when the creek's channel was redirected, thus bypassing Station 2.

Matilija Creek, Upper Watershed (Stations 10, 11, 13 and 14)

Each of the stations in the upper watershed is located above the influence of the Matilija Dam, at elevations near or above 1,000 ft. The Matilija Creek system drains a small portion of the Los Padres National Forest and is composed of mostly rural and recreational lands. Each of the monitoring sites is located in relatively pristine areas and is composed of high gradient, bolder and cobble habitats. Stations 10 and 11 are located on the North Fork of Matilija Creek, above (Station 11) and below (Station 10) an active rock quarry. Stations 13 and 14 are located on the main stem of Matilija Creek, above (Station 14) and below (Station 13) a small residential community that uses septic tanks as its means of sanitation. In previous years excessive algal growth had been present at Station 13, leading to concerns that the community could be contributing nutrients to the Creek. Station 14 was dry during the September 2004 sampling event.

San Antonio Creek (Stations 5, 7, 8, 9 and 15)

Stations 5, 7, 8, 9 and 15 are located in the San Antonio Creek system and include sites on San Antonio Creek (Stations 5, 9 and 15), as well as its main tributaries, Lions Canyon Creek (Station 7) and Stewart Canyon Creek (Station 8). Station 5 is located upstream of the bike path on San Antonio Creek just above its confluence with the Ventura River. The streambed is predominantly cobble with dense bank vegetation. Station 7 is located in Lions Canyon Creek above its confluence with San Antonio Creek in an area with stables, heavy grazing and sedimentation. Station 15 is located in San Antonio Creek upstream of Lions Canyon Creek and is composed of boulders, cobble and sand. Station 8 is located in Stewart Canyon Creek

above the confluence with the San Antonio Creek and has a streambed composed of cobble, gravel and sand. Station 9 is located in San Antonio Creek upstream of Stewart Canyon Creek and is composed of cobble, gravel and sand with heavy vegetation on both banks. Both Stewart Canyon and San Antonio Creek at Stations 8 and 9 drain the City of Ojai's downtown and residential areas. Of these sites, Stations 5 and 7 were dry during the September 2004 sampling event.

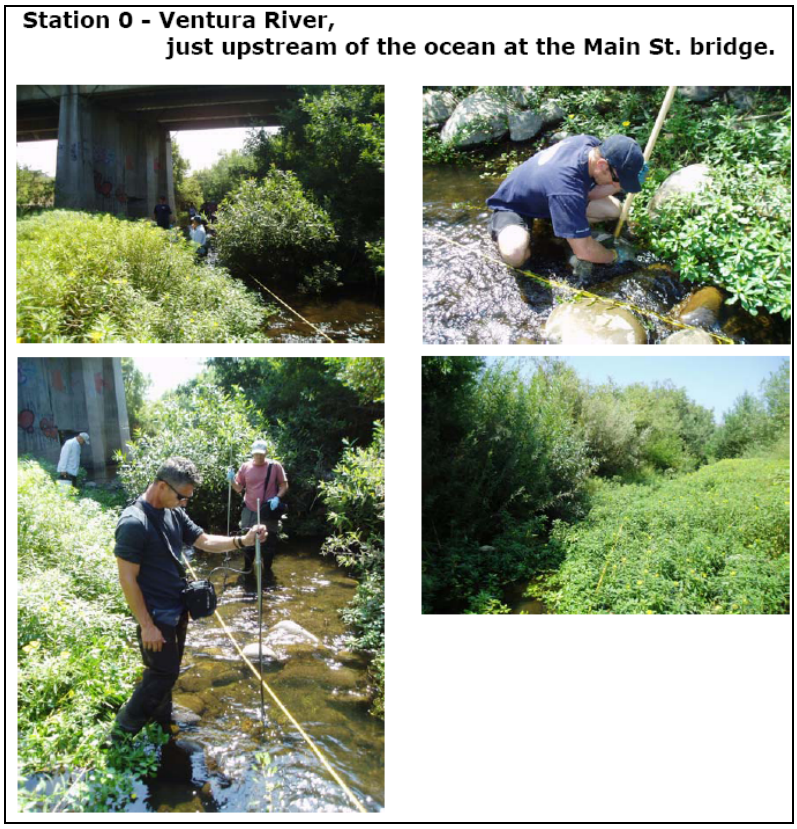

Ventura River
Watershed
Santa Cruz Island
Santa Rosa Island


Station 14
Station 13
North Fork Matilija
Matilija Creek
Matilija Dam
Station 11
Station 10
Station 12
City of Ojai
Stewart Canyon Creek
Station 8
Station 9
Lion Canyon Creek

Figure 9-1: Fifteen BMI sampling locations in the Ventura River Watershed

Table 9-1: Sampling location descriptions for 15 locations in the Ventura River Watershed (key: u/s = upstream; d/s = downstream)

Sta.ID	Name	Description and Comments	Latitude	Longitude	Elev.
0	Ventura River – Main Street Bridge	Mainstem Ventura River, first site above estuary with fresh water.	34 16 54.23	119 18 24.09	19
4	Ventura River - Foster Park	Mainstem Ventura River. Closest downstream site to confluence with San Antonio Creek. Station is also mass emission station. Bioassessment d/s from Foster Park Bridge.	34 21 07.9	119 18 23.7	200
6	Ventura River -Santa Ana Rd.	Mainstem Ventura River **Dry - not sampled**	34 23 59.1	119 18 29.7	403
12	Ventura River - below Matilija Dam	Matilija Creek. First station below Matilija dam and first existing station above urban influence.	34 29 2.4	119 18 1.7	1020
2	Canada Larga Creek	Canada Larga Creek, d/s of grazing **Dry - not sampled**	34 20 31.7	119 17 08.2	293
3	Canada Larga Creek	Canada Larga Creek, above main area of grazing impact. **Dry - not sampled**	34 22 23.3	119 14 8.8	334
5	San Antonio Creek - near Ventura River	San Antonio Creek, first upstream site from confluence with Ventura River. **Dry - not sampled**	34 22 50.9	119 18 23.9	347
7	Lion Canyon Creek – u/s conf. San Antonio Creek	Lion Canyon Creek (tributary to San Antonio Creek) First u/s location from confluence. Site with heavy sediment load and influenced by nearby stables and grazing. **Dry - not sampled**	34 25 19.3	119 15 46.8	623
15	San Antonio Creek above Lion Creek	San Antonio Creek above Lion Creek	34 25 19.3	119 15 46.8	623
8	Stewart Canyon Creek – u/s conf. San Antonio Creek	Stewart Creek (tributary to San Antonio Creek) First u/s location from confluence. Within close proximity to the City of Ojai and less densely developed residential lots.	34 26 07.1	119 14 49.3	685
9	San Antonio Creek near Stewart Canyon Creek	San Antonio Creek. Within close proximity to the City of Ojai and less densely developed residential lots.	34 26 1.8	119 14 52.7	650
10	North Fork Matilija Creek- u/s Ventura River conf.	North Fork Matilija Creek above influence of Matilija Dam and below rock quarry.	34 29 06.0	119 17 59.4	978
11	North Fork Matilija Creek- at gauging station	North Fork Matilija Creek above influence of Matilija Dam and above rock quarry.	34 29 35.1	119 18 18.6	1,360
13	Matilija Creek - below community	Matilija Creek. Above dam and below community. Site has excessive amount of algae.	34 30 04.5	119 20 51.7	1,355
14	Matilija Creek - at gate at end of road	Matilija Creek. Above dam and above community. **Dry - Not Sampled**	34 30 16.9	119 22 26.3	1,553



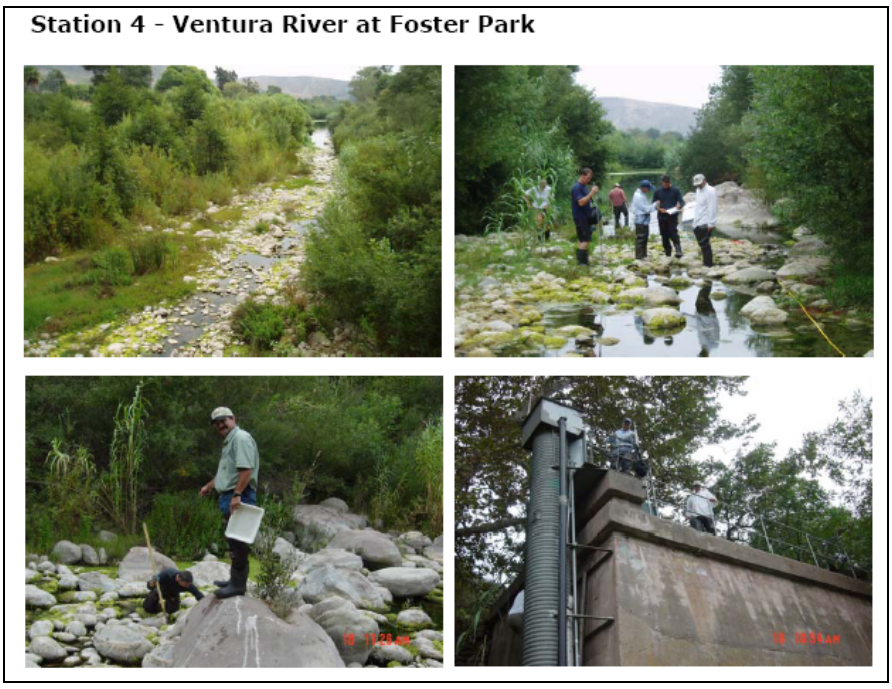


Figure 9-2: Photographs of each site in the Ventura River Watershed

Station 6 - Ventura River at Santa Ana Rd.
Dry

Station12 - Ventura River, below Matilija Dam

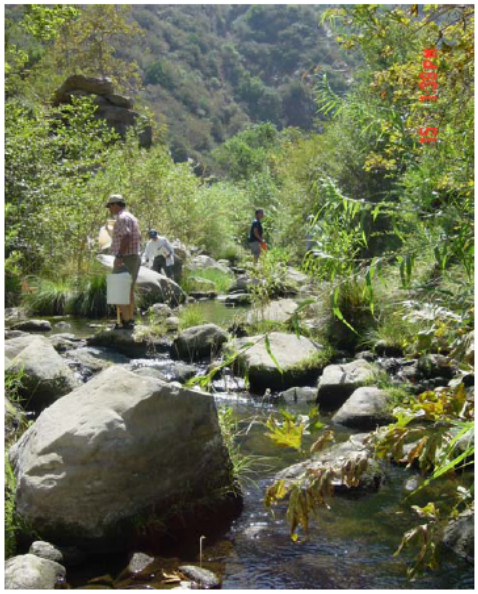


Figure 9-2: Continued

Station 2 - Canada Larga Creek, downstream of grazing Dry

Station 3 - Canada Larga Creek, upstream of grazing Dry

Figure 9-2: Continued

Station 5 - San Antonio Creek, upstream of confluence with the Ventura River

Dry

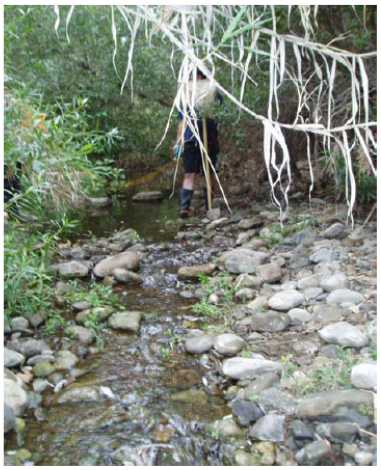
Station 7 - Lions Canyon Creek, upstream of confluence with San Anotonio Creek

Dry

Station 8 - Stewart Canyon Creek, upstream of confluence with San Antonio Creek

Figure 9-2: Continued

Station 9 - San Antonio Creek upstream of Stewart Canyon Creek

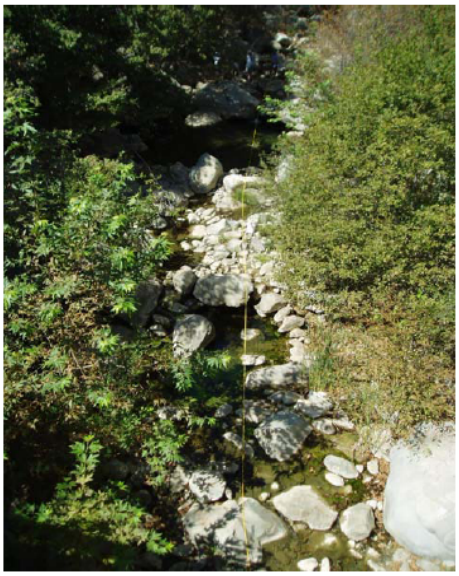


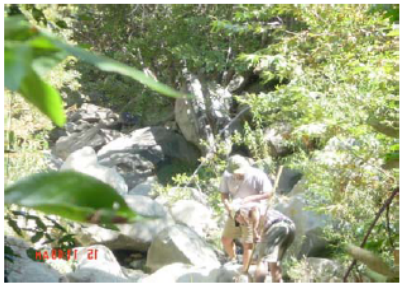
Station15 - San Antonio Creek, above Lions Canyon Creek

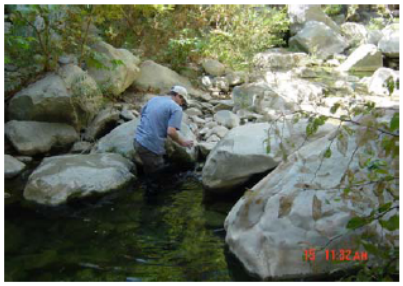



Figure 9-2: Continued

Station 10 - North Fork Matilija Creek, upstream of Ventura River







Station 11 - North Fork Matilija, upstream of gauging station

Figure 9-2: Continued

Station13 - Matilija Creek, below community

Station14 - Matilija Creek, above community
Dry

Figure 9-2: Continued

9.3.3.2 Collection of Benthic Macroinvertebrates

September was chosen for sampling the BMI communities in the Ventura watershed since fall represents the time when the water quality conditions are the most stressful for biotic communities. However, the Ventura River and its tributaries can be dry during the late summer and fall months as is typical of most southern California river systems. In addition, average rainfall during the 2003 – 2004 rainy season was below normal. As a result, only nine of the 15 sites had sufficient water for BMI sampling during September 2004.

Sampling and laboratory procedures for this survey followed the California Stream Bioassessment Procedure (CSBP 2003). The CSBP is a regional adaptation of the U.S. Environmental Protection Agency (EPA) Rapid Bioassessment Protocols (Barbour et al. 1999) and has been used in various parts of the world to measure biological integrity of aquatic systems (Davis et al. 1996). Sampling procedures were audited by Jim Harrington of the California Department of Fish and Game.

Benthic macroinvertebrate (BMI) samples were collected in strict adherence to the CSBP in terms of both sampling methodology and QC procedures. At each station, a 100 m reach was measured and 3 riffles were randomly selected from all the possible riffles that were present within the reach. When access to the full 100 m reach was not possible due to obstacles (i.e. heavy vegetation), riffles were chosen from the portion of the reach where access was possible. Riffles were defined as areas in the reach where the velocity of flow was greatest due to shallow water coupled with a high relief bottom. At each site the California Bioassessment Worksheet (CBW) was used to collect all of the necessary station information.

Once three riffles were randomly identified, the most downstream riffle was occupied and the length of the riffle was measured. A random number table was used to randomly establish three points along the riffle where transects were established perpendicular to stream flow. Starting with the downstream riffle, the benthos within a 2 ft^2 area was sampled upstream of a 1 ft wide, 0.5 mm mesh D-frame kick-net. Sampling of the benthos was performed manually by rubbing cobble and boulder substrates in front of the net, followed by "kicking" the upper layers of substrate to dislodge any remaining invertebrates. The duration of sampling ranged from 60-120 seconds, depending on the amount of boulder and cobble-sized substrate that required rubbing by hand; more and larger substrates required more time to process.

Three locations along each transect that were representative of habitat diversity were sampled and combined into a composite sample. Each composite sample was transferred into a 1 gallon wide-mouth plastic jar containing approximately 300 ml of 95% ethanol. This technique was repeated for each of three riffles in each reach, thus, three composite samples were collected for each site. Chain of Custody (COC) sheets were completed for samples as each station was completed.

9.3.3.3 Physical/Habitat Quality Assessment and Chemical Measurements

Physical habitat quality was assessed for the monitoring reaches using U.S. Environmental Protection Agency (EPA) Rapid Bioassessment Protocols (RBPs) (Barbour et al. 1999). The team collected the physical/habitat measurements at each station and recorded the information on the CBW. These measurements are summarized as follows:

1. Water temperature, specific conductance, and dissolved oxygen were measured using a hand held YSI 85 water quality meter that was pre-calibrated in the field. Similarly, a field-calibrated Beckman Model 225 meter was used to measure pH.

2. Riffle length, width and depth in meters were recorded. Width measures were averages taken at each transect and depth measures were averages taken along each transect.

3. A hand held Marsh McBirney Flo-Mate 2000 velocity meter was used to measure current velocity. Three measures were collected along each transect and then averaged together. Flow was calculated using the cross sectional flow measurement method.

4. A densitometer was used to measure % canopy cover.

5. Substrate complexity, embeddedness, consolidation and categories (fines, gravel, cobble, boulder, and bedrock) were estimated using the CSBP Physical/Habitat Quality Form.

6. Stream gradient was estimated using an inclinometer.

7. Nutrient samples for nitrate and nitrite nitrogen, and phosphate phosphorus were collected and analyzed by the Ojai Valley Sanitation District laboratory.

8. Aquatic bioassay and Consulting Laboratories analyzed all bacterial samples. Samples were collected in sterile 250 mL plastic containers and analyzed according to Standard Methods for the Examination of Water and Wastewater, APHA, 19th Edition, methods 9222 (total and fecal coliforms) and 9230 (*enterococcus* bacteria).

9.3.3.4 Sample Analysis/Taxonomic Identification of Benthic Macroinvertebrate (BMIs)

Sample sorting and taxonomy were conducted by Aquatic Bioassay and Consulting Laboratories. Sorting was conducted in the Aquatic Bioassay laboratory in Ventura, CA and taxonomic identifications were conducted by Dr. Kim Kratz in Lake Oswego, OR. Identifications were made using standard taxonomic keys (Literature Cited, Taxonomic References). In most cases taxa for this study were identified to the species level. In adherence with Taxonomic Effort Level 1 specified in the CSBP, identifications were rolled up to the appropriate taxonomic level for the calculation of biological metrics and the Southern California IBI. Samples entering the lab were processed as follows:

A maximum number of 300 organisms were sub-sampled from the composite sample using a divided tray, and then sorted into major taxonomic groups. All remnants were stored for future reference. The 300 organisms were identified to the genus level for most insects and order or class for non-insects. As new species to the survey area were identified, examples of each were added to the voucher collection. The voucher collection includes at least one individual of each species collected and ensures that naming conventions can be maintained and changed as necessary into the future.

The taxonomic quality control (QC) procedures followed for this survey included:

- Sorting efficiencies were checked on all samples. The leftover material from each sample was inspected by the laboratory supervisor. Minimum required sorting efficiency was 95%, i.e. no more than 5% of the total number of organisms sorted from the grids could be left in the remnants. Sorting efficiency results were documented on each station's sample tracking sheet.

- Once identification work was completed, 10% of all samples were sent to the Department of Fish and Game (DF&G) offices in Rancho Cordova for a QC check. Samples were sorted by species into individual vials that included an internal label. Any discrepancies in counts or identification found by the DF&G taxonomists were discussed, and then resolved. All data sheets were corrected and, when necessary, bioassessment metrics were updated.

9.3.3.5 Data Development and Analysis

Multi-metric Analysis

As species were identified, they were included in an Excel data sheet that, once complete, automatically calculated the bioassessment metrics used to assess the spatial and temporal BMI community changes in the watershed or necessary to calculate the southern California IBI (Ode 2004). The following metrics were calculated and their responses to impaired conditions are listed in Table 9-2:

1. Richness measures: taxa richness, cumulative taxa, EPT taxa, cumulative EPT taxa, Coleopteran taxa.

2. Composition measures: EPT index, sensitive EPT index, Shannon diversity.

3. Tolerance/intolerance measures: mean tolerance value, intolerant organisms (%), tolerant organisms (%), dominant taxa (%), Chironomidae (%), non-insect taxa (%).

4. Functional feeding groups: collectors (%), filterers (%), grazers (%), predators (%), shredders (%).

Table 9-2: Bioassessment metrics used to describe characteristics of the BMI community

BMI Metric	Description	Response to Impairment
Richness Measures		
Taxa Richness	Total number of individual taxa	decrease
EPT Taxa	Number of taxa in the Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (caddisfly) insect orders	decrease
Ephemeroptera Taxa	Number of taxa in the insect order Ephemeroptera (mayflies)	decrease
Plecoptera Taxa	Number of taxa in the insect order Plecoptera (stoneflies)	decrease
Trichoptera Taxa	Number of taxa in the insect order Trichoptera (caddisflies)	decrease
Composition Measures		
EPT Index	Percent composition of mayfly, stonefly and caddisfly larvae	decrease
Sensitive EPT Index	Percent composition of mayfly, stonefly and caddisfly larvae with tolerance values between 0 and 3	decrease
Shannon Diversity	General measure of sample diversity that incorporates richness and evenness (Shannon and Weaver 1963)	decrease
Tolerance / Intolerance Measures		
Tolerance Value	Value between 0 and 10 weighted for abundance of individuals designated as pollution tolerant (higher values) or intolerant (lower values)	increase
Percent Intolerant Organisms	Percent of organisms in sample that are highly intolerant to impairment as indicated by a tolerance value of 0, 1 or 2	decrease
Percent Tolerant Organisms	Percent of organisms in sample that are highly tolerant to impairment as indicated by a tolerance value of 8, 9 or 10	increase
Percent Dominant Taxa	Percent composition of the single most abundant taxon	increase
Percent Hydropsychidae	Percent of organisms in the caddisfly family Hydropsychidae	increase
Percent Baetidae	Percent of organisms in the mayfly family Baetidae	increase
Functional Feeding Groups (FFG)		
Percent Collectors	Percent of macrobenthos that collect or gather fine particulate matter	increase
Percent Filterers	Percent of macrobenthos that filter fine particulate matter	increase
Percent Grazers	Percent of macrobenthos that graze upon periphyton	variable
Percent Predators	Percent of macrobenthos that feed on other organisms	variable
Percent Shredders	Percent of macrobenthos that shreds coarse particulate matter	decrease
Estimated Abundance	Estimated number of BMIs in sample calculated by extrapolating from the proportion of organisms counted in the subsample	variable

Southern California IBI

The seven biological metric values used to compute the Southern California Index of Biological Integrity (So CA IBI) are presented in Table 9-3 (Ode et al. 2005). The So CA IBI is based on the calculation of biological metrics from a group of 500 organisms from a composite sample collected at each stream reach. The sampling design for the Ventura Watershed for each of the last four sampling events (2001 through 2004) included a total of 900 organisms per reach (three replicate samples, 300 organisms each). As a result, before the So CA IBI could be computed for each station, 500 individual organisms were randomly selected from the list of 900 organisms at each station. These 500 organisms were used to compute the seven biological metrics used in the IBI computation. Ode et al. (2005) showed that this adjustment does not affect the outcome of the IBI. This adjustment was also applied to the data for the prior three years, so that historical trends could be elucidated.

San Diego IBI

The seven biological metric values used to compute the San Diego Index of Biological Integrity (SD IBI) are presented in Table 9-4 (Ode et. al. 2002). The SD IBI was developed solely for the San Diego region, but has been applied to the BMI data collected from the Ventura watershed during the past three years for lack of a more appropriate assessment tool.

Table 9-3: Scoring ranges for the seven metrics included in the Southern California IBI and the cumulative IBI score ranks

Metric Scoring Ranges for the Southern California IBI										
Metric Score	Coleoptera Taxa	EPT Taxa		Predator Taxa	% Collector Individuals		% Intolerant Individuals		% Non-Insect Taxa	% Tolerant Taxa
	All Sites	6	8	All Sites	6	8	6	8	All Sites	All Sites
10	>5	>17	>18	>12	0-59	0-39	25-100	42-100	0-8	0-4
9		16-17	17-18	12	60-63	40-46	23-24	37-41	9-12	5-8
8	5	15	16	11	64-67	47-52	21-22	32-36	13-17	9-12
7	4	13-14	14-15	10	68-71	53-58	19-20	27-31	18-21	13-16
6		11-12	13	9	72-75	59-64	16-18	23-26	22-25	17-19
5	3	9-10	11-12	8	76-80	65-70	13-15	19-22	26-29	20-22
4	2	7-8	10	7	81-84	71-76	10-12	14-18	30-34	23-25
3		5-6	8-9	6	85-88	77-82	7-9	10-13	35-38	26-29
2	1	4	7	5	89-92	83-88	4-6	6-9	39-42	30-33
1		2-3	5-6	4	93-96	89-94	1-3	2-5	43-46	34-37
0	0	0-1	0-4	0-3	97-100	95-100	0	0-1	47-100	38-100
Cumulative IBI Scores										
	Very Poor 0-19		Poor 20-39		Fair 40-59		Good 60-79		Very Good 80-100	

Table 9-4: Scoring ranges for the seven metrics included in the San Diego IBI and the cumulative IBI score ranks

Metric Scoring Ranges for the San Diego IBI							
Score	Cumulative Taxa	Dominant Taxon	Sensitive EPT Index	Cumulative EPT Taxa	Shannon Diversity	Intolerant Taxa	Percent Grazers
0	0-16	>56	0-0.6	0-1	0-1.31	0-.5	0-0.6
1	17-19	54-56	0.7-1.3	2	1.31-1.4	0.6-1.0	0.7-1.3
2	20-21	51-53	1.4-2.0	3	1.41-1.49	1.1-1.6	1.4-2.0
3	22-23	49-50	2.1-2.7	4	1.5-1.58	1.7-2.1	2.1-2.7
4	24-25	47-48	2.8-3.3	5	1.59-1.67	2.2-2.7	2.8-3.4
5	26-27	45-46	3.4-4	6	1.68-1.76	2.8-3.2	3.5-4.1
6	28-29	42-44	4.1-4.6	7	1.77-1.84	3.3-3.8	4.2-4.8
7	30-31	40-41	4.7-5.3	8	1.85-1.93	3.9-4.3	4.9-5.5
8	32-33	37-39	5.4-6	9	1.94-2.02	4.4-4.9	5.6-6.2
9	34-35	34-36	6.1-6.9	10	2.03-2.11	5.0-5.4	6.3-7
10	>35	0-33	>6.9	11	>2.11	>5.4	>7
		Very Poor 0-12	Poor 13-25	Fair 26-37	Good 38-54	Very Good 55-70	

Historical Analysis

An historical data analysis was performed using all of the BMI, physical habitat and water quality data collected during the past four sampling surveys (2001 through 2004). The goal of this analysis was to determine if any spatial or temporal trends in the BMI community could be detected and, if changes had occurred, what their cause(s) might be.

Historical IBI Scores

Data from 2001 through 2004 were used to compute the So CA IBI. For the So CA IBI, data from each year were converted from 900 count species abundances to 500 using the randomization process described above. The historic San Diego IBI data presented in previous reports (SLSI 2001, 2002, 2003) were used and for 2004 were computed using the 900 species count as specified in the protocol (Ode et. al. 2002).

Cluster Analysis

The spatial and temporal patterns of the BMI communities in the Ventura River watershed were defined using cluster analyses that were based on Bray-Curtis dissimilarities for pairs of stations. Species with relatively high abundances within a station group characterize the unique species composition of the group. Symbols on the two-way coincidence tables indicate relative abundance by the size of the symbol. Cluster analysis considers relative abundance of each tested taxa across the stations it occupies and is not weighted towards dominant species and therefore provides a more complete assessment of community structure.

9.3.4 Results

Results for the 2004 BMI are presented in the section below, followed by a historical analysis of the combined data from 2001 through 2004.

9.3.4.1 2004

9.3.4.1.1 Rainfall

Rainfall measured at the Stewart Creek gauging station during the 2003 to 2004 rain year (12.6 inches) was 8.5 inches below normal (21.2 inches) (Figure 9-3). Only the 2001 to 2002 rain year had less rain (7.2 inches) during the four years that the Ventura River watershed BMI survey has been conducted. The greatest amount of rain fell during eh 2000 to 2001 rain year (27.1 inches), followed by the 2002 to 2003 rain year (21.7 inches). Typical of southern California, the rain season started in the fall (October or November) and ended in either May or June. Peak months for rain were November through March. In 2004, the last measurable rain fell in April. Therefore, BMI sampling in September followed five months of dry weather and lead to the absence of water at six of the fifteen sampling locations.

9.3.4.1.2 Physical Habitat Characteristics

9.3.4.1.2.1 Velocity and Flow

The physical characteristics of the riffles sampled in the Ventura River watershed during September 2004 are presented in Table 9-5. Riffle velocities ranged from 0.4 ft/sec at Stations 8 (Stewart Canyon Creek) and 10 (North Fork Matilija Creek) to 1.85 ft/sec at Station 13 on Matilija Creek. Flow in the watershed was greatest at Station 0 (2.29 cfs). This flow measurement was taken in one of several channels found in this reach and is therefore an underestimate of the flow that was present across the entire reach. The next greatest flow was measured at Station 13 (1.81 cfs), below the residential community in Matilija Creek. Lowest flows were measured at Station 8 in Stewart Canyon (0.08 cfs) and Station 9 in San Antonio Creek (0.05 cfs).

9.3.4.1.2.2 Canopy Cover and Substrate

Vegetative canopy cover ranged from 4% at Station 10 on the North Fork of Matilija Creek to 68% at Station 11 which is located just upstream of Station 10. Substrate complexity was relatively good at most sites and ranged from 13 at Station 15 (Lions Canyon Creek) to 18 at Station 0 (Main St. bridge). The exceptions to this were low scores (7) at both Stations 8 and 9 located in San Antonio Creek and Stewart Canyon Creeks, respectively. Streambed substrates in the lower watershed (Stations 0, 4, 12, 15, 8, and 9) were, for the most part, composed of similar percentages of fines, gravel, cobble, and boulders. The exceptions to this were Station 12 located under the Matilija Dam where boulders predominated and Station 8 in Stewart's Canyon where cobble predominated. Each of the highest elevation, upper watershed Stations (10, 11 and 14) were composed predominately of boulders. All of the sites were high gradient streams ($\geq$ 2%), except Station 8 in Stewart Canyon where the gradient was 1%.

9.3.4.1.3 Water Quality, Nutrients and Bacteria

The range for pH measurements was narrow among all sites and ranged from 7.4 at Station 8 to 8.2 at Stations 15 and 12 (Table 9-5). Dissolved oxygen concentrations ranged from 5.03 mg/L at Station 13 to 9.28 mg/L at Station 4 on the main stem of the Ventura River. Dissolved oxygen concentrations can vary widely at the same site throughout the day due to changes in water temperature and, based on the amount of available sunlight, the photosynthetic rate of oxygen producing algae. Water temperatures were typical of summer

conditions and ranged from 18.1 °C to 22.5 °C. Specific conductance ranged from 575 S/cm at Station 9 in Stewart Canyon to 1621 S/cm at Station 0.

Nitrate nitrogen was greatest at Stations 8 (1.1 mg/L) and 9 (2.5 mg/L), was just above the detection limit at Station 0 (0.2 mg/L), and was below detection at all other sites. Nitrite nitrogen was below detection at all sites. Phosphate phosphorus was greatest at Station 0 (0.9 mg/L), above detection at Station 8 (0.2 mg/L) and below detection at all other sites.

Total coliform bacteria concentrations were elevated throughout the watershed and were greatest at Station 8 (3500 MPN/100 mL) and lowest at Station 13 below the community on Matilija Creek (900 MPN/100 mL). Fecal coliform concentrations were greatest at Stations 15 (3000 MPN/100 mL), 8 (1100 MPN/100 mL) and 9 (2400 MPN/100 mL) all in the San Antonio Creek system. When the ratio between total and fecal coliform bacteria approaches one, the likelihood that the source of contamination is of either human or animal origin increases. Fecal coliform concentrations at all other sites were much lower. Enterococcus bacteria concentrations were also greatest at stations in San Antonio Creek (Station 8 = 1100, Station 9 = 500).

9.3.4.1.4 Physical/Habitat Scores

Assessment of the physical/habitat conditions of a stream reach is necessary for two reasons: one is to assess the overall quality of a stream reach and another is to assess the physical/habitat of the bioassessment site. In many cases organisms may not be exposed to chemical contaminants, yet their populations indicate that impairment has occurred. These population shifts can be due to degradation of the streambed and bank habitats. Excess sediment, caused by bank erosion due to human activities, is the leading pollutant in streams and rivers of the United States (Harrington and Born 2000). Sediments fill pools and interstitial areas of the stream substrate where fish spawn and invertebrates live, causing their populations to decline or to be altered. Physical/habitat characterization of the site is also important to help ensure that habitats are uniform between riffles so that population differences can be accurately assessed.

Out of a total possible score of 200, physical/habitat scores ranged from 108 at Station 15 at Lions Canyon Creek to 169 at Station 12 below the Matilija Dam (Table 9-5, Figure 9-4). Of the nine sites where samples were collected in 2004, six scored in the optimal range (Stations 0, 12, 9, 10, 11 and 13) and the other three sites (Stations 4, 15, and 8) scored in the suboptimal range. Of note were the following findings:

Instream cover is a measure of the amount of suitable BMI habitat in a reach and includes cobble, tree fall, undercut banks, etc. It was best at Station 0 (18) near the Main St. Bridge and worst at Station 8 (12) in Stewart Canyon.

Embeddedness is a measure of the amount of empty space (interstitial space) surrounding the rocks and cobble in a streambed. The higher the embeddedness score, the more interstitial space there is surrounding the streambed cobble, and the more available habitat there is for BMI's. Excessive upstream erosion and sedimentation can lead to low embeddedness at a site. The embeddedness score (11) was lowest at Station 15 in Lions Canyon, which is downstream of stables and grazing. Additionally, Station 15 had the most sediment deposition (score of 3) of all sites in the watershed. Sediment deposition at all other sites ranged from 12 (Station 8, Stewart Canyon) to 19 (Station 9, San Antonio Creek).

Channel flows were low at most stations due to the low rainfall conditions that preceded this sampling event. Exceptions to this were below the Matilija Dam (Station 12) and on the North Fork of the Matilija (Stations 10 and 11) where stream flow was close to normal. Bank stability scores ranged from 12 at Station 15 to 20 at Station 4. Vegetative protection was highest at Stations 0 and 4 on the main stem of the Ventura River and Station 11 on the North

Fork of the Matilija. The lowest score for vegetative protection was at Station 15 in Lions County.

9.3.4.1.5 BMI Community Structure

The complete taxa list including raw abundances by site and replicate are presented in Appendix A, Table A-1. The ranked abundance of the top 75% of the BMIs identified is illustrated in Table 9-6. The biological metrics calculated for this survey were grouped into the four categories described in Table 9-3 and presented in Figure 9-5 through Figure 9-8: richness measures, composition measures, tolerance/intolerance measures and functional feeding groups. The So CA IBI scores for each station are shown in Table 9-7 and illustrated in Figure 9-9. The biological metrics are presented for each replicate and then averaged by site in Appendix A (Tables A-2 and A-3, respectively).

9.3.4.1.5.1 Species Composition

A combined total of 8,425 BMIs, represented by 102 taxa, were identified from the 27 samples collected at the nine sampling sites during the September 2004 survey (Appendix A, Table A-1). Based on this figure, the projected total abundance for all sites combined would be 87,523 individuals (Figure 9-5 and Appendix A, Table A-1). Stations 0, 4 and 12, located on the main stem of the Ventura River, shared two relatively abundant species in common, Baetid mayflies (*Baetis sp*.) and chrionomids (Orthocladiinae) (Table 9-6). Baetid mayflies were either first or second most abundant at these sites and dominated the total abundance at Station 0, contributing 31% of the total population. At Station 4 the trichopteran, *Hydrophyche sp*., was most abundant while the black fly (*Simulium sp*.) was most abundant at Station 12, below the Matilija Dam.

Stations located in the San Antonio Creek system (Stations 15, 8 and 9) shared three relatively abundant species in common: flies of the *Euparyphus/Caloparyphus* complex, which were dominant at Station 15, *Hydropsyche sp*., which was dominant at Station 9 and Orthocladiinid flies. The gastropod, *Physa/Physella sp*. was most abundant at Station 8. The trichopteran, *Micrasema sp*., was second in abundance at both Stations 8 and 9. This species has a tolerance value of 1, indicating that it is very sensitive to disturbances.

The three Stations in the upper watershed on the Matilija Creek system (Stations 10, 11 and 13), shared four species in common: the beetle, *Microcylloepus sp*., which was most abundant at Stations 10 and 13; both Simulium sp. and Orthocladiinid flies, and Baetid mayflies (*Baetis sp*.). Station 13, on Matilija Creek below the human residential community, was almost exclusively comprised of these four species. The trichopteran, *Micrasema sp*., was most abundant at Station 11, located on the North Fork of Matilija Creek.

9.3.4.1.5.2 Biological Metrics

The biological metrics listed in Table 9-3, above, were calculated for this survey and are presented by group in Figure 9-5 through Figure 9-8 and Appendix A, Table A-3.

***Richness Measures*:** Taxa richness is a measure of the total number of species found at a site. This relatively simple index can provide much information about the integrity of the community. Few taxa at a site indicate that some species are being excluded, while a large number of species indicate a more healthy community. Cumulative taxa is a simultaneous count of all of the taxa from each of the three replicate samples taken at a station. Cumulative EPT taxa is the simultaneous count of all of the mayflies (Ephemeroptera), caddisflies (Trichoptera), and stoneflies (Plecoptera) present at a location. These families are generally sensitive to impairment and, when present, are usually indicative of a healthy community. Both Coleopteran and Predator taxa are included since they are used to calculate the So CA IBI.

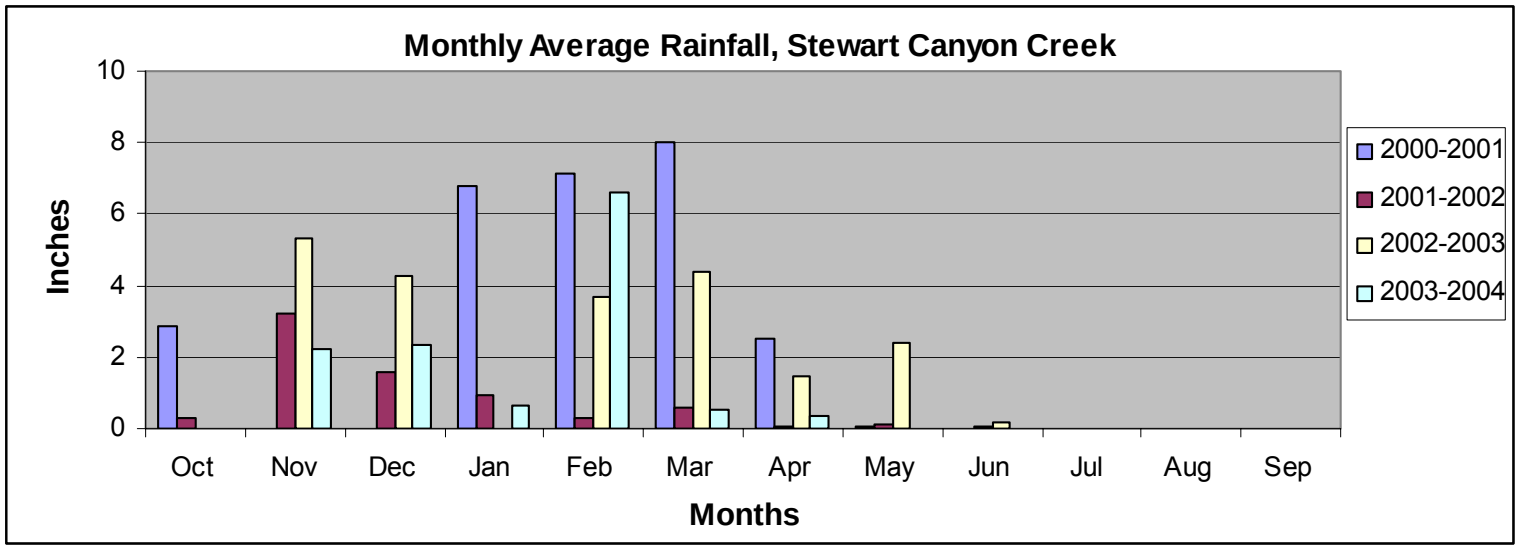


Figure 9-3: Monthly average rainfall (inches) at Stewart Canyon Creek for the 2001-2002 through 2003-2004 rain years

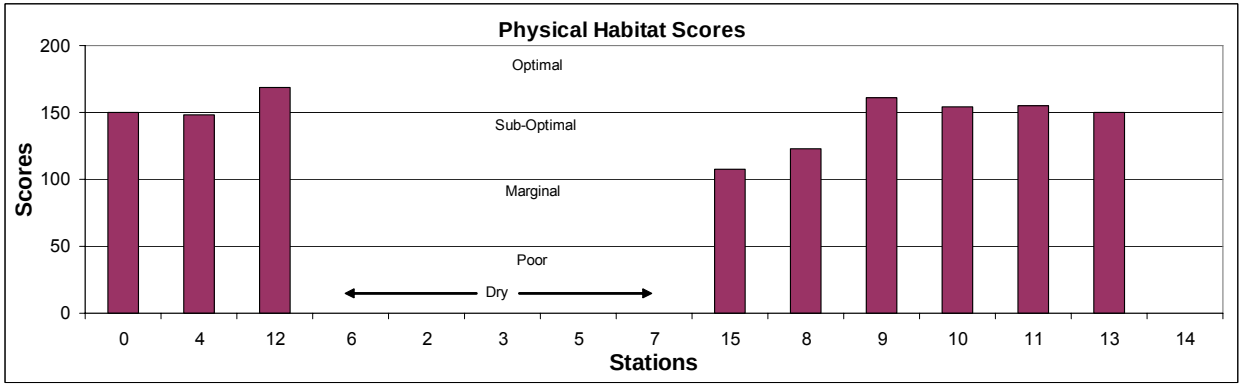


Figure 9-4: Physical habitat scores for reaches in the Ventura River Watershed

Table 9-5: Physical habitat scores and characteristics for reaches in the Ventura River Watershed (CDFG 2004)

	Ventura River				Canada Larga		San Antonio Creek					North Fork Matilija Creek		Matilija Creek	
	Main Street Bridge	Foster Park	Below Matilija Dam	@Santa Ana Rd.	Below Grazing	Above Grazing	u/s Ventura River Confluence	Lion Canyon u/s San Antonio	u/s Lion Canyon	Stewart Canyon u/s San Antonio	u/s Stewart Canyon Creek	u/s Ventura River Confluence	At gauging station	Below community	Above Community
Station	0	4	12	6 Dry	2 Dry	3 Dry	5 Dry	7 Dry	15	8	9	10	11	13	14 Dry
Physical Habitat Parameter															
1. Instream Cover	18	14	16						13	12	16	17	17	15	
2. Embeddedness	16	14	19						11	16	17	17	16	17	
3. Velocity/Depth Regime	10	10	17						14	9	10	18	17	15	
4. Sediment Deposition	16	18	18						3	12	19	16	14	16	
5. Channel Flow	7	4	15						9	8	9	13	14	10	
6. Channel Alteration	12	16	18						13	9	18	13	15	16	
7. Riffle Frequency	19	18	17						13	19	19	16	17	18	
8. Bank Stability	18	20	18						12	15	18	17	16	14	
9. Vegetative Protection	18	18	14						10	13	16	17	18	15	
10. Riparian Vegetative Zone	16	16	17						10	10	19	10	11	14	
Reach Total	150	148	169						108	123	161	154	155	150	
Condition Category	Optimal	Sub-optimal	Optimal						Sub-optimal	Sub-optimal	Optimal	Optimal	Optimal	Optimal	
Physical Habitat Characteristics															
Average Riffle Length (ft)	15	11	14						37	24	11	25	24	20	
Average Riffle Width (ft)	7	4	11						3	4	3	12	7	12	
Average Riffle Depth (in)	7	5	4						6	3	3	8	2	6	
Average Riffle Velocity (ft/sec)	1.2	0.63	1.6						0.73	0.4	0.57	0.4	0.85	1.85	
Flow (cf/sec)	2.29	0.2	0.52						0.55	0.08	0.05	0.21	0.65	1.81	
Vegetative Canopy Cover (%)	50	10	33						37	60	60	4	68	18	
Average Substrate Complexity	18	14	16						13	7	7	17	17	15	
Average Embeddedness	16	14	18						11	16	17	17	16	17	
Substrate Composition (%)															
Fines (<0.1 in.)	5	5	10						23	5	25	2	2	5	
Gravel ((0.1 -2 in.)	20	25	10						23	10	25	0	5	0	
Cobble (2-10 in)	57	40	13						22	80	35	28	42	42	
Boulder (>10 in.)	18	30	70						25	5	15	70	53	53	
Bedrock (solid)	0	0	0						7	0	0	0	0	0	
Substrate Consolidation	High	Mod	High						Mod	High	High	High	High	High	
Percent Gradient (%)	2	2	2						2	1	3	3	3	2	
Chemical Characteristics															
pH	7.82	7.6	8.2						8.16	7.4	7.5	7.9	7.7	7.6	
D.O (mg/L)	6.95	9.28	8.6						7.86	5.83	6.67	8	6.59	5.03	
Water Temperature (C°)	20.3	20.0	22.5						20.3	18.1	18.3	20.3	18.2	18.3	
Specific Conductance (S/cm at 25EC)	1621	1046	778						1425	1135	575	950	1014	812	
Nitrate Nitrogen (mg/L)	0.2	ND	ND						ND	1.1	2.5	ND	ND	ND	
Nitrite Nitrogen (mg/L)	ND	ND	ND						ND	ND	ND	ND	ND	ND	
Phosphate-Phosphorus (mg/L)	0.9	ND	ND						ND	0.2	ND	ND	ND	ND	
Indicator Bacteria															
Total Coliforms (MPN/100 mL	3000	2400	1600						3000	3500	2400	3000	3000	900	
Fecal Coliforms (MPN/100 mL	50	80	2						3000	1100	2400	50	5	8	
Enterococcus (MPN/100 mL)	70	50	<2						50	1100	500	59	17	110	

ND = non-detected, <0.1 mg/L

Taxa richness, both cumulative and individual EPT taxa and Predator taxa each followed a similar trend across sites, with the largest number of taxa found at Station 4 in the lower watershed, Stations 15, 8 and 9 in San Antonio Creek, and Stations 10 and 11 on the North Fork of Matilija Creek (Figure 9-5). Lower numbers were found at Station 0 near the ocean, Station 12 below the Matilija Dam and Station 13 below the small human residential community on the upper Matilija Creek. The numbers of Coleopteran taxa were similar across sites and were greatest at Stations 11 and 15, and least at Station 8 on Stewart Creek.

***Composition Measures*:** The percent EPT taxa, sensitive EPT, percent non-insects and the Shannon Diversity index are all measures of community composition. Species diversity indices are similar to numbers of species; however they contain an evenness component as well. For example, two samples may have the same numbers of species and the same numbers of individuals. However, one station may have most of its numbers concentrated into only a few species while a second station may have its numbers evenly distributed among its species. The diversity index would be higher for the latter station. Percent EPT taxa are the proportion of the abundance at a site that is comprised of mayflies, stoneflies and caddisflies. Percent Sensitive EPT taxa is similar except it includes only those EPT taxa whose tolerance values range from 0 to 3. These taxa are very sensitive to impairment and, when present, can be indicative of more natural conditions. Percent non-insect taxa are used in the calculation of the So CA IBI.

The percentage of EPT ranged from 40 to 60% at Stations 0, 4 and 12 on the main stem of the Ventura River and from 20 to 40% at Stations 15, 8, 10, 11 and 13 on both San Antonio Creek and Matilija Creek (Figure 9-6). Station 9, on San Antonio Creek, exceeded 60% EPT taxa and was an exception to this trend. The percentage of Sensitive EPT taxa was lowest in the lower watershed and highest in San Antonio Creek (Stations 8 and 9) and the North Fork of Matilija Creek (Station 11). Therefore, although large numbers of EPT taxa were present at Stations 0, 4 and 12, most were not sensitive species. The same was true for Stations 15, 10 and 13. Shannon Diversity was similar across all stations. Non-insect species composition was elevated at Stations 15 and 8 in San Antonio Creek.

***Tolerance Measures*:** The Southern California IBI uses both the percent intolerant and tolerant organisms to evaluate the overall sensitivity of organisms to pollution and habitat impairment. Each species is assigned a tolerance value from 0 (highly intolerant) to 10 (highly tolerant). The percent Intolerance Value for a site is calculated by multiplying the tolerance value of each species with a tolerance value ranging from 0 to 2, by its abundance, then dividing by the total abundance for the site. The percent Tolerant Value is similar except that only species with tolerance values ranging from 8 to 10 are included. A site with many tolerant organisms present is considered to be less pristine or more impacted by human disturbance than one that has few tolerant species. The tolerance values for each species were developed in different parts of the United States and can therefore be region specific. Also, different organisms can be tolerant to one type of disturbance, but highly sensitive to another. For example, an organism that is highly sensitive to sediment deposition may be very insensitive to organic pollution. With these drawbacks in mind, the Tolerance measures generally depict disturbances in a stream that, when coupled with other metrics, can provide good information regarding a stream reach.

Percent dominance reflects the proportion of the total abundance at a site represented by the most abundant species. For example, if 100 organisms are collected at a site and species A is the most abundant with 30 individuals, the percent dominance index score for the site is 30%. The benthic environment tends to be healthier when the dominance index is low, which indicates that more than just a few taxa make up the majority of the community.

The percent Hydropsychidae (caddisflies) and Baetidae (mayflies) present in a stream reach can indicate stressed habitat conditions when they are found in high abundance. They will not

be present in highly polluted streams, but can be found in moderately polluted streams, especially when nutrients are high or there is a large amount of sedimentation.

Mean Tolerance Values were similar across sites and ranged from 4.1 at Station 11 to 5.5 at Station 15 (Figure 9-7). There were low percentages of intolerant organisms present at most sites, except at Stations 8 (23.2%), 9 (18.3%) and 11 (26.1%). The highest percentages of tolerant organisms were found at Stations 15 (24%) and 8 (24%). Percent Dominance exceeded 25% at Stations 0, 12, 9, 11 and 13. Hydropsychid caddisflies were present in large numbers at Station 9 (34%). Baetid mayflies were present in large numbers at Station 0 (37%) and 12 (33%).

***Functional Feeding Groups*:** These indices provide information regarding the balance of feeding strategies represented in an aquatic assemblage. The combined feeding strategies of the organisms in a reach provide information regarding the form and transfer of energy in the habitat. When the feeding strategy of a stream system is out of balance it can be inferred that the habitat is stressed. For the purposes of this study, species were grouped by feeding strategy as percent collector-gatherers, collector-filterers, grazers, predators and shredders. The Southern California IBI uses the numbers of predators and percent collectors (gatherers + filterers) at a site to calculate the index.

Collecting was the predominant feeding strategy used by organisms in the watershed (Figure 9-8). Collectors exceeded 75% of the population at Stations 0, 4, 8, 10, 11 and 13. The percentage of filterers ranged from 10.7% at Station 11 to 37.3% at Station 9. Grazers were highest at San Antonio and Matilija Creek Stations 8 (27.3%), 9 (18.6%) and 11 (31.8%). Predators ranged from 4.1% at Station 12 below the Matilija Dam to 18.6% at Station 8 at Stewart Canyon Creek. Shredders were absent or present in low numbers at all sites.

9.3.4.1.5.3 IBI Scores

Work conducted in the 1990's by the San Diego Regional Board and the California Department of Fish and Game, established an Index of Biotic Integrity (IBI) for the San Diego region and its watersheds (Ode and Harrington 2002). The index has recently been expanded to include all of southern California (Ode et. al. 2005) and is used in this section. In previous reports (2001 to 2003), the San Diego IBI was applied to the BMI data collected for the Ventura watershed. A comparison of the So CA IBI and SD IBI scores for each of the four years of survey data is presented in the historical analysis section below.

The IBI is a multi-metric technique that employs seven biological metrics that were each found to respond to a habitat and/or water quality impairment. Each of the seven biological metrics measured at a site are converted to an IBI score then summed. These cumulative scores can then be ranked according to very good (80-100), good (60-79), fair (40-59), poor (20-39) and very poor (0-19) habitat conditions. The threshold limit for this scoring index is 39. Despite the fact that rankings can be identified as "fair", sites with scores above 39 are within two standard deviations of the mean reference site conditions in southern California and are not considered to be impaired. Sites with scores below 39 are considered to have impaired conditions. The metric scoring ranges established for the Southern California IBI survey are listed in Table 9-3 and were used to classify the Ventura watershed sites for the 2004 survey.

The IBI scores for six of the nine sites were in the fair range and included Stations 4 and 12 in the Ventura River, 15, 8 and 9 in the San Antonio Creek system, and Station 10 in the North Fork of Matilija Creek (Table 9-7, Figure 9-9). Two stations scored at or below the impairment threshold of 39 in the poor range: Station 0 at the Main St. Bridge and Station 13 on Matilija Creek below the community. Station 11, on the North Fork of Matilija Creek, scored in the good range.

9.3.4.2 Historical Results (2001 to 2004)

Physical habitat and IBI scores for the first four years of the Ventura watershed BMI monitoring program were combined and are presented graphically by site in Figure 9-10 and Figure 9-11. Since the San Diego IBI was applied to the BMI data in past reports (2001 to 2003), it was computed for the 2004 survey data, and then combined with the previous three years so that the SD IBI scores could be compared to the So CA IBI (Figure 9-12).

9.3.4.2.1 Physical Habitat Scores

Most sites varied from optimal to sub-optimal between years, with the majority of the scores for all sites and years in the sub-optimal range (Figure 9-10). Marginal scores were only reported at Station 1 on the Ventura River below the waste treatment facility in 2001 and Station 2 on Cañada Larga Creek. Station 1 improved to sub-optimal in 2002, while Station 2 was dry during the next three years. Station 12 was the only site to score in the optimal range for each of the four years. Differences in physical habitat scores between years for each site were not large, except at Station 15 where the score dropped from the high end of the sub-optimal range in 2001 and 2002, to the low end in 2003 and 2004. This change was not the result of a large decrease in one or two physical habitat parameters in these latter years, but rather an incremental decrease across each of the 10 parameters.

9.3.4.2.2 IBI Scores

So CA IBI: There was an upward trend in IBI scores for Stations 0, 12, 15, 8, 9, and 13 during the four year period (Figure 9-11). There were not large changes between years for any of these sites, but the scores for Stations 15, 8 and 9 on the San Antonio Creek system increased from Poor to Fair ratings during this period. The 2001 IBI score for Station 5, located on San Antonio Creek above its confluence with the Ventura River, was greater than all other upstream sites on the San Antonio during the same year. This indicates that the water quality and/or habitat conditions lowering the IBI scores at the upstream sites were not fully influencing the downstream portions of this Creek system.

Stations 0 and 1, located on the main stem of the Ventura River, had the lowest IBI scores during the four year period. Station 0 is heavily used by a large transient human population. Both sites are also located downstream of a waste treatment facility. Station 12, located below the Matilija Dam, scored in the Poor range for each of the four years. The physical habitat scores for this site were the highest measured in the watershed during the four year period, indicating that the lower IBI scores measured here were probably due to water quality conditions.

Station 11, located above the rock quarry on the North Fork of Matilija Creek, was the only station that scored in the Good range and did so during three of the four years. Station 10 located downstream of Station 11, scored in the poor to fair range during the same time period indicating the possible effects from the quarry. Additionally, Station 10 is heavily used as a swimming hole by Valley residence. Stations 13 and 14 are located downstream and upstream, respectively, of a small human residential community located on the banks of Matilija Creek. Since both sites scored in the Poor range during the years when samples were taken at each, it appears that the water quality impairment found at these sites was due to more widespread sources than just the influence of the residential community.

So CA IBI Compared to the SD IBI: The So CA IBI scores for each site across the four sampling years were uniformly lower than the scores computed using the SD IBI (Figure 9-12). The SD IBI ranked most stations as either Good or Very Good, while the So CA IBI ranked most in the Poor to Fair range. Only Station 0 during 2003 ranked in the Poor range when using the SD IBI. The general trends between sites were similar between the So CA IBI

and the SD IBI with lowest scores measured at Station 0 and highest scores in San Antonio Creek system and Matilija Creek.

9.3.4.2.3 Cluster Analysis

The spatial and temporal patterns of the BMI communities in the Ventura River watershed were defined using cluster analyses that were based on Bray-Curtis dissimilarities for pairs of stations. The station and species dendograms summarizing the cluster analyses are presented in Appendix A, Figures A-1 and A-2. A two-way coincidence table that summarizes species abundances in each station and species cluster group is presented in Figure 9-13. Species with relatively high abundances within a station group characterize the unique species composition of the group. Symbols on the two-way coincidence table indicate relative abundance by the size of the symbol. Cluster analysis considers relative abundance of each tested taxa across the stations it occupies and is not weighted towards dominant species and therefore provides a more complete assessment of community structure. Table 9-8 presents the ten most common species averaged for each station over time, for each cluster group. A detailed description of the methods used for these analyses are presented in Appendix B.

Seven Station (1 thru 7) and five Species (A thru E) Groups were identified by cluster analysis (Figure 9-13). The seven Station Groups were delineated more by their location in the watershed, than by survey year. For the five Species Groups, there were no clearly defined distribution patterns across stations and years. Most of the changes were subtle shifts in the relative abundances of a group of species that were common throughout the watershed. These results indicate that water quality in the watershed remained relatively stable during this four year period.

Station Group 1 was comprised of stations on the Ventura River located either at the base of the Matilija Dam (Station 12) or by stations in the lower watershed (Stations 0 and 4). The top ten species common to this group included two Baetid mayflies (*Baetis sp*. and *Fallceon quilleri*), four genera of true flies, two caddisflys (including *Hydropsyche sp*.), a beetle (*Microcylloepus sp.*) and a gastropod mollusk (Table 9-8).

Station Group 2 was comprised of Stations 0 and 1 in 2002. The most abundant species at these sites included *Microcylloepus sp*., as well as large numbers of non-insects (Planariidae, *Hyalella sp*. and Cyprididae). Station Group 3 included Station 3 in the Upper Cañada Larga Creek during 2001 and 2002, the only years when it was flowing. The most common species to this group included *Malenka sp*. (a pollution intolerant stonefly), *Hydropsyche sp*. and the dragonfly, *Argia sp*. Station Group 4 was composed of sites on Matilija Creek (Stations 13 and 14) and the North Fork of the Matilija Creek (Station 10). Among all taxa, *Microcylloepus sp*., *Hydropsyche sp*., five genera of true flies, and three mayflies were most abundant.

Station Groups 5 was comprised of sites on San Antonio Creek (Stations 15 and 7) and the lower Ventura River (Station 4). This group was dominated by the true fly, *Euparyphus/Caloparyphus sp*. Station Group 6 included sites from the 2001 survey in the San Antonio Creek and the lower Ventura River. Species composition for this group was dominated by *Hydropsyche sp*., *Euparyphus/Caloparyphus sp*. and the mayfly, *Tricorythodes sp*. Station Group 7 was composed of Station 11 located on the North Fork of Matilija Creek, Station 8 on Stewart Canyon Creek and Station 9 on San Antonio Creek. The composition of species for this group was similar to other sites except that an extremely intolerant species of caddisfly (*Micrasema sp*.) was relatively abundant through the four year period.

9.3.5 Discussion

The 2004 So CA IBI results indicated that the aquatic health of the Ventura watershed ranged from poor to good. Stations 0 and 13 each scored in the poor range, indicating that these habitats were impaired. Station 0 is located just upstream of where the Ventura River

discharges into the Pacific Ocean. During the previous two years the IBI score for this site has been very poor and poor (based on the So CA IBI). Conversely, the physical habitat score at this site has been either suboptimal or optimal as a result of the good instream cover, vegetative protection, bank stability, and the low amounts sedimentation. The explanation for the low IBI scores could be related to several factors including the reinforced levees present on each bank which protect the City of Ventura from flooding, the large transient human population that use the streambed for shelter and possibly the sites location 2.5 miles downstream of the Ojai Valley Sanitation Plant. This site supported few sensitive BMI species and the greatest number of Baetid mayflies found at any site in the watershed. Baetid mayflies are indicative of moderately disturbed conditions that could be the result of either elevated nutrient loading or sedimentation.

Station 13 is located downstream of a small human residential community on Matilija Creek, which is located in the upper watershed in what appears to be good stream habitat. The physical habitat scores during the past four years were either at the top end of the suboptimal range or optimal and have varied little during that time. The So CA IBI scores for this site during the same four years have been in the poor range. In 2004 the low IBI score was due to the absence of sensitive species and elevated numbers of collector species that included mostly Baetid mayflies and caddisflies, (*Hydropsyche sp*.). During 2004, Station 14 located upstream of Station 13 was dry. However, during 2001 and 2003 when the Creek was flowing at Station 14, its So CA IBI score was in the poor range. This indicates that the low score at Station 13 in 2004 may not have been due to some influence from the residential community.

Station 12 is located below the Matilija Dam at a site that had the highest physical habitat scores (optimal) in the entire watershed during each of the last four years. The So CA IBI scores at this site have been in the poor range during the same time period, except in 2004 when the score improved to fair. From 2001 to 2002 the lower IBI scores were the result of the near absence of sensitive species, large numbers of collector species (*Simulium sp*. and *Baetis sp*.), and few predator species. In 2003 and 2004 the IBI rank increased to fair due to an increase in the numbers of predator taxa which included caddisflies, *Ochrotrichia sp*., dragonflies (*Argia sp*.), gastropods (*Sperchon sp*.), and flatworms (Planariidae).

Station 11 is located on the North Fork of the Matilija at an elevation of just over 1,300 ft and was the only site to score in the good range for the So CA IBI during 2001, 2002 and 2004. In 2003 the score dropped into the fair range. High IBI scores at Station 11 indicate that it is comparable in species composition to reference site locations throughout southern California. The physical habitat score at this site was in the optimal (2001, 2002 and 2004) to suboptimal (2003) range.

Station 10 is located below Station 11 and an active rock quarry. During the past four years the IBI scores for this site have been lower than at Station 11 in the poor to fair range. Two factors that could be influencing the aquatic health at Station 10 are the upstream rock quarry or its use as a swimming hole by local residents. In past years the BMI population at this site has been dominated by black flies (*Simulium sp*.).

IBI scores for each of the three San Antonio Creek system stations (15, 8 and 9) steadily increased from fair to poor since 2001. One would expect these sites to receive low IBI scores since the upper San Antonio drains downtown Ojai and the east end of the Ojai Valley, which is agricultural. Also, the physical habitat scores for these sites were mostly suboptimal during the four years. The reason for the improved BMI communities at these sites is unclear.

The SD IBI scores consistently ranked the aquatic health of the Ventura watershed sites as very good or good at nearly all sites during the 2001 to 2004 survey period. In contrast, the computed So CA IBI scores for the same data sets ranked them as poor to fair, with only one site receiving a rank of good. These results show that the use of IBI scores outside of the

region where they were developed can be misleading. Since the development of the So CA IBI included reference sites from throughout the entire southern California area (coastal Monterey to the Mexican boarder), it is a more comparative index for use in the Ventura watershed.

Based on the results of the 2004 bioassessment survey, the sites chosen for BMI analysis in the Ventura watershed can be characterized as providing optimal to suboptimal habitat conditions. The best habitat conditions occurred at sites in the upper watershed and also on the main stem of the Ventura River, where there is high instream cover and complexity, low sedimentation, high bank stability and good vegetative protection. Less optimal habitat conditions exist in San Antonio Creek above its confluence with Lion's Canyon Creek and Stewart Canyon Creek where there was increased evidence of sedimentation.

The data collection technique for physical habitat assessment relies on the subjective opinion of the field crew regarding the habitat conditions found at each site. As a result, the scores for a given site can vary between years as a result of sampling bias. Therefore, minor changes between years at a site do not necessarily imply that a habitat change has occurred. The sampling team strove to eliminate bias by ensuring that staff members were well trained, collaborated on the scoring of each site, and by ensuring that experienced field people were always involved in the collection of these data.

An example of the subjectivity of this sampling technique is provided by the decrease in physical habitat scores at Station 15 in San Antonio Creek between 2002 and 2003. This site is located on private land and is visited by appointment. In the first two years of the program the entire sampling team (four people) participated in the collection of the physical habitat data. Due to the land owner's sensitivity to access, in 2002 and 2003 it was decided that is was more appropriate for only two team members to participate in sampling at this site. Since the habitat at this site did not change dramatically during this time period, it is probable that the decreased physical habitat score was the result of a personnel change.

Results of the historical cluster analysis, which included all the BMI data collected from 2001 through 2004, delineated seven Station and five Species Groups. The station groups were delineated more by their location in the watershed, than by survey year. For the five Species Groups, there were few distribution patterns across stations and years. Most of the changes were subtle shifts in the relative abundances of groups of species that were common throughout the watershed. These results indicated that water quality in the watershed remained relatively stable during this four year period.

9.3.6 Recommendations

1. It is recommended that the new Southern California Index of Biological Integrity (So CA IBI) developed by the California Department of Fish and Game be used to assess the aquatic health conditions of the Ventura River watershed, since it appears to be more sensitive to benthic macroinvertebrate (BMI) community disturbances than the San Diego Index of Biological Integrity (SD IBI).

2. It is recommended that the BMI sampling and taxonomic procedures for this program be modified to follow the new methods developed by the California Department of Fish and Game. This new protocol specifies that the BMI samples collected at a reach be taken along three transects then composited into a single sample, from which 500 organisms are identified for analysis.

3. It is recommended that the Ventura Watershed Protection District continue to work with the Southern California Coastal Water Research Project (SCCWRP) to assist in the development of improved BMI sampling design, sampling protocols, taxonomic identification and analysis techniques.

Table 9-6: Ranked % abundance for species comprising the top 75% of organisms at each site in the Ventura Watershed 2004
Hierarchical taxa codes (Grp): E = Emphemeroptera, T = Trichoptera, D = Diptera, NI = non-insects, C = Coleoptera, O = Odonata

Station 0 Ventura River Main Street Bridge	Grp	Tol	FFG	%
Baetis sp.	E	5	cg	31
Hydropsyche sp.	T	4	cf	14
Chironominae	D	6	cg	13
Simulium sp.	D	6	cf	10
Orthocladiinae	D	5	cg	9
% of Total				77

Station 4 Ventura River Foster Park	Grp	Tol	FFG	%
Hydropsyche sp.	T	4	cf	13
Baetis sp.	E	5	cg	10
Tricorythodes sp.	E	5	cg	10
Chironominae	D	6	cg	10
Ochrotrichia sp.	T	4	cg	8
Tinodes sp.	T	2	cg	6
Euparyphus/Caloparyphus	D	8	cg	6
Oligochaeta	NI	5	cg	5
Orthocladiinae	D	5	cg	5
Fallceon quilleri	E	4	cg	3
% of Total				75

Station 12 Ventura River below Matilija Dam	Grp	Tol	FFG	%
Simulium sp.	D	6	cf	25
Baetis sp.	E	5	cg	18
Fallceon quilleri	E	4	cg	15
Microcylloepus sp.	C	4	cg	12
Orthocladiinae	D	5	cg	7
% of Total				77

Station 15 San Antonio Creek above Lion Canyon	Grp	Tol	FFG	%
Euparyphus/Caloparyphus	D	8	cg	10
Hydropsyche sp.	T	4	cf	9
Fallceon quilleri	E	4	cg	8
Microcylloepus sp.	C	4	cg	8
Cyprididae	NI	8	cg	6
Orthocladiinae	D	5	cg	5
Simulium sp.	D	6	cf	5
Oligochaeta	NI	5	cg	5
Hyalella sp.	NI	8	cg	5
Argia sp.	O	7	p	5
Baetis sp.	E	5	cg	4
Oxyethira sp.	T	3	cg	4
% of Total				73

Station 8 Stewart Canyon Creek u/s conf. San Antonio Creek	Grp	Tol	FFG	%
Physa/Physella sp.	NI	8	sc	14
Micrasema sp.	T	1	sc	12
Hydropsyche sp.	T	4	cf	12
Tinodes sp.	T	2	cg	10
Argia sp.	O	7	p	8
Simulium sp.	D	6	cf	7
Orthocladiinae	D	5	cg	6
Sperchon sp.	NI	8	p	5
Euparyphus/Caloparyphus	D	8	cg	3
% of Total				78

Station 9 San Antonio Creek near Stewart Canyon Creek	Grp	Tol	FFG	%
Hydropsyche sp.	T	4	cf	35
Micrasema sp.	T	1	sc	13
Orthocladiinae	D	5	cg	7
Tricorythodes sp.	E	5	cg	6
Euparyphus/Caloparyphus	D	8	cg	6
Tinodes sp.	T	2	cg	5
Argia sp.	O	7	p	4
% of Total				76

Station 10 North Fork Matilija Creek u/s conf. Ventura River	Grp	Tol	FFG	%
Microcylloepus sp.	C	4	cg	17
Hydropsyche sp.	T	4	cf	13
Dasyhelea sp.	D	6	cg	9
Simulium sp.	D	6	cf	8
Chironominae	D	6	cg	7
Orthocladiinae	D	5	cg	7
Baetis sp.	E	5	cg	5
Ochrotrichia sp.	T	4	cg	5
Tinodes sp.	T	2	cg	4
% of Total				76

Station 11 North Fork Matilija Creek at gauging station	Grp	Tol	FFG	%
Micrasema sp.	T	1	sc	22
Orthocladiinae	D	5	cg	21
Microcylloepus sp.	C	4	cg	9
Hydropsyche sp.	T	4	cf	7
Chironominae	D	6	cg	5
Simulium sp.	D	6	cf	4
Baetis sp.	E	5	cg	4
Euparyphus/Caloparyphus	D	8	cg	4
Maruina lanceolata	D	2	sc	2
% of Total				77

Station 13 Matilija Creek below community	Grp	Tol	FFG	%
Microcylloepus sp.	C	4	cg	30
Simulium sp.	D	6	cf	23
Orthocladiinae	D	5	cg	14
Baetis sp.	E	5	cg	7
Fallceon quilleri	E	4	cg	6
% of Total				80

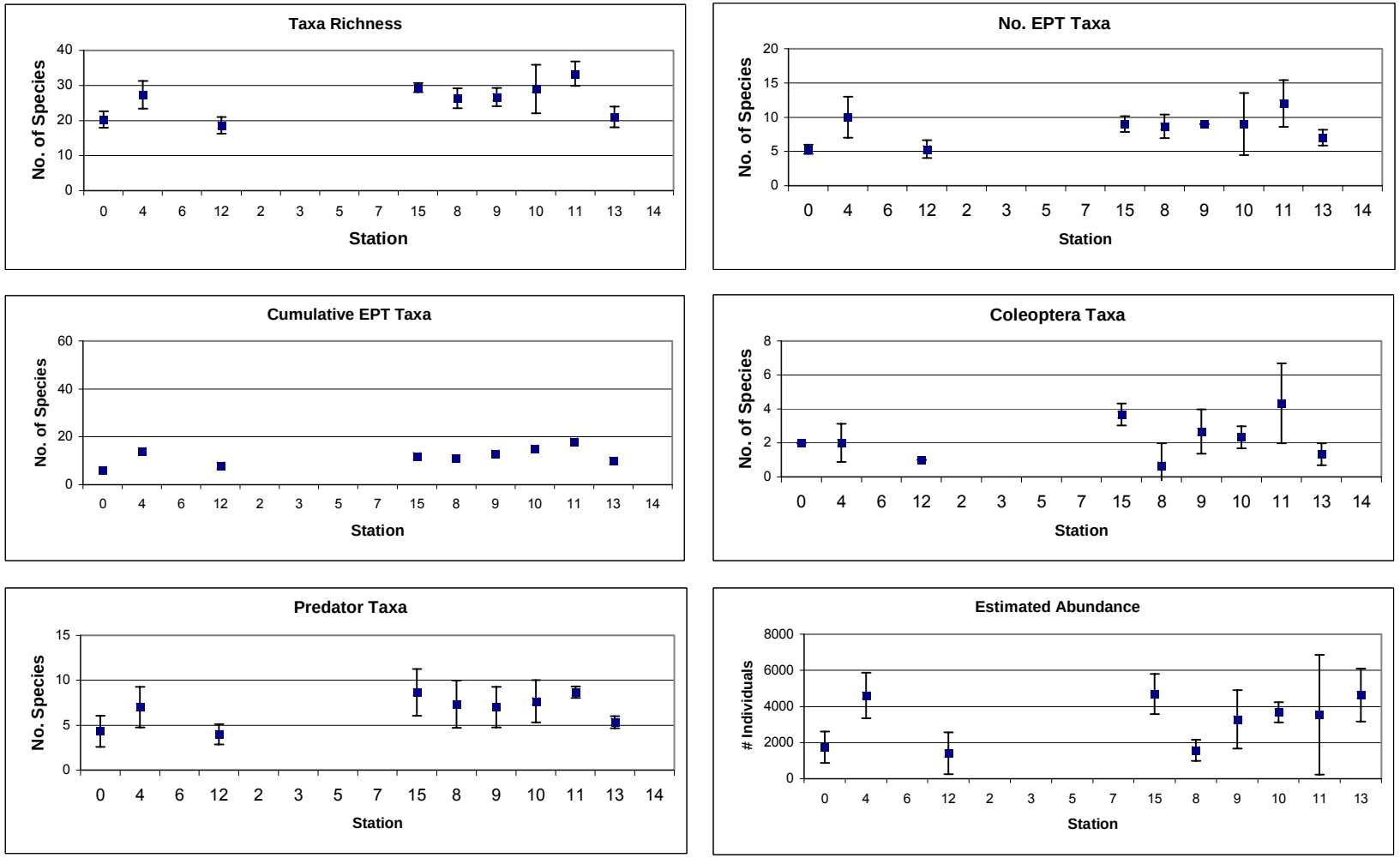


Figure 9-5: Richness measures: average (n=3) for each biological metric (± 95% CI) by site in the Ventura Watershed, 2004

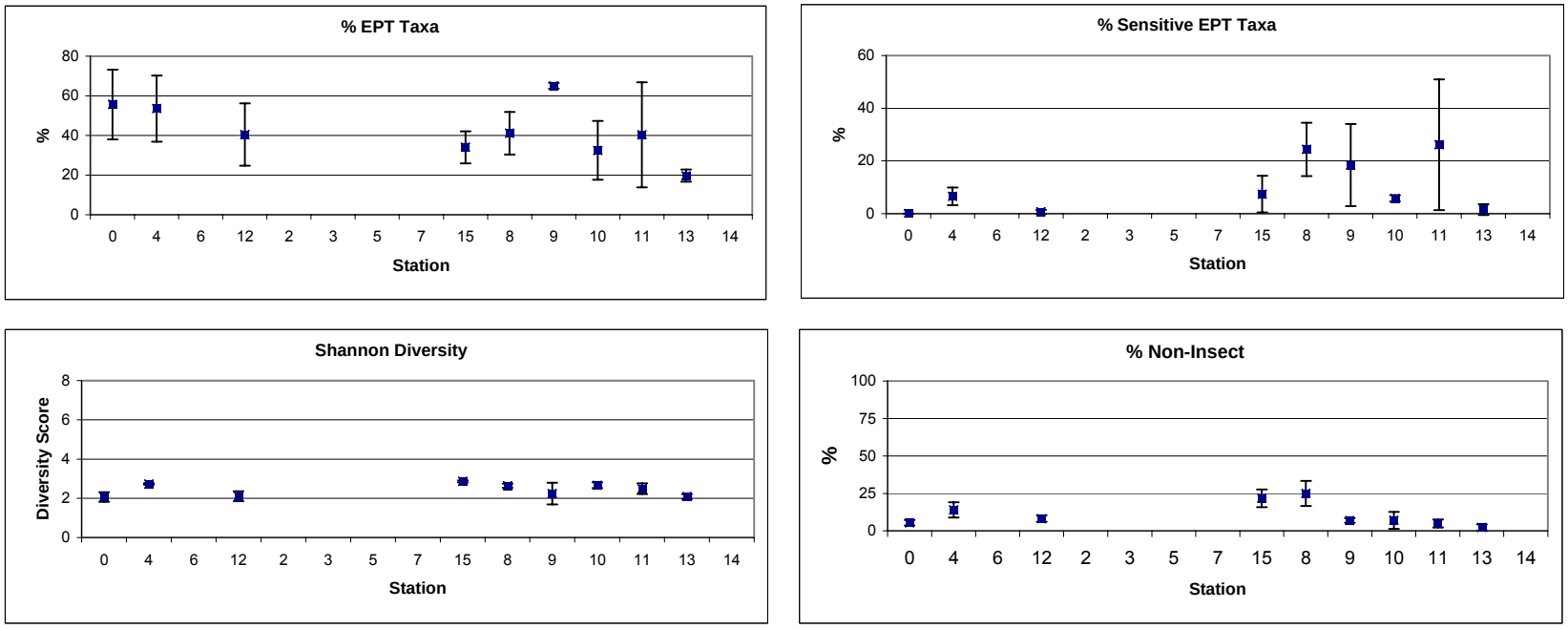


Figure 9-6: Composition measures: average (n=3) for each biological metric (± 95% CI) by site in the Ventura Watershed, 2004

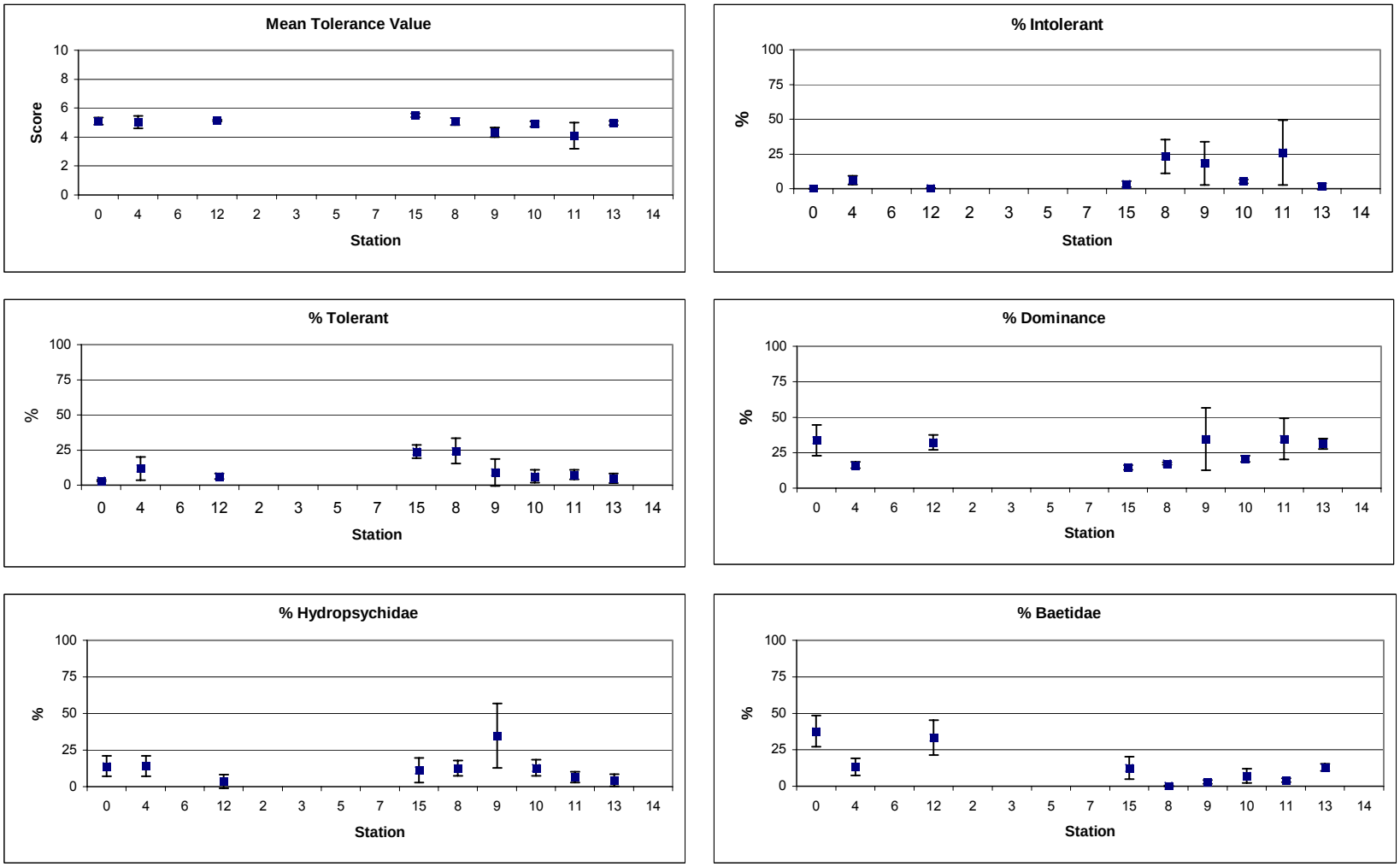


Figure 9-7: Tolerance/Intolerance measures: average (n=3) for each biological metric (± 95% CI) by site in the Ventura Watershed, 2004

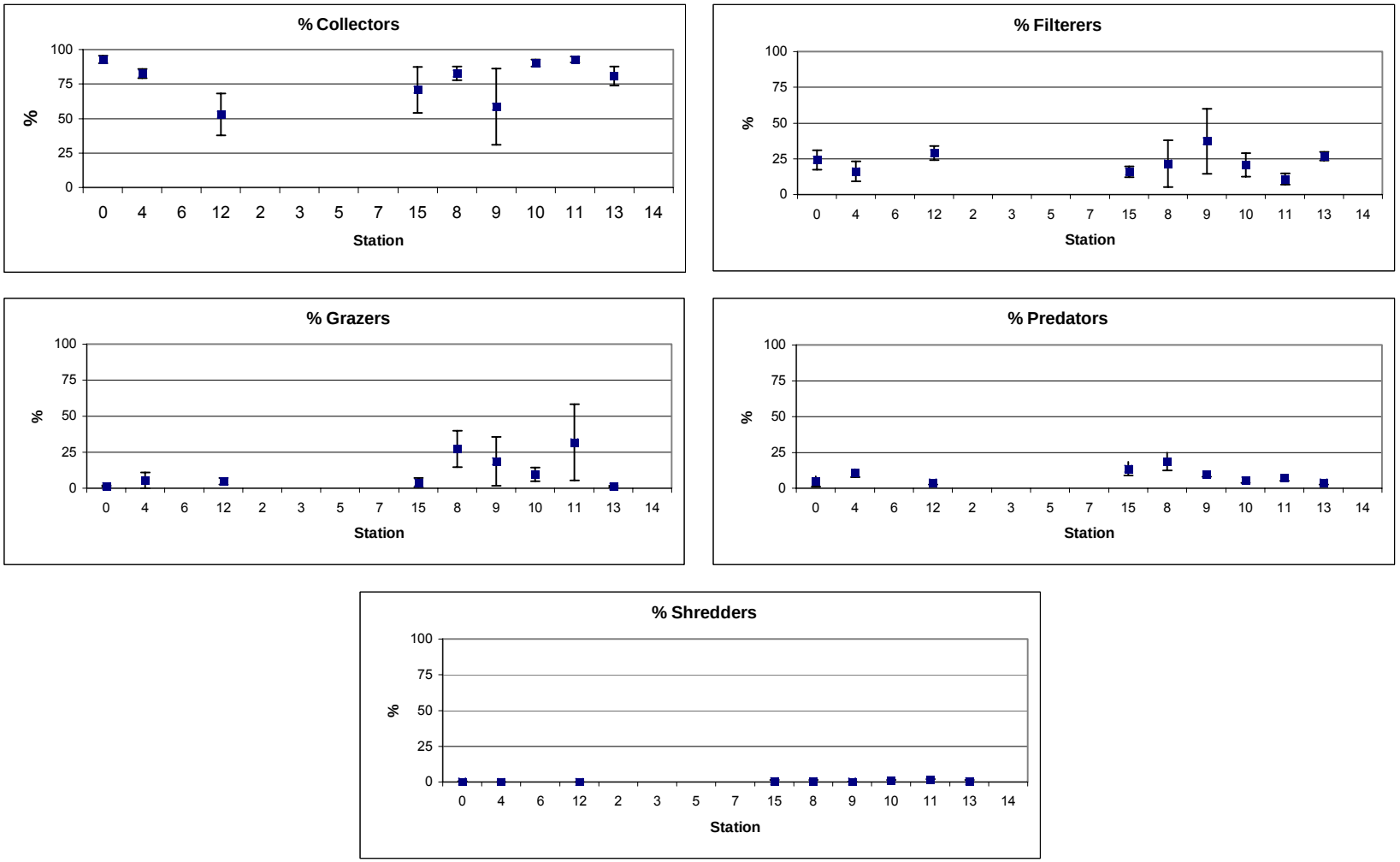


Figure 9-8: Functional Feeding Group measures: average (n=3) for each biological metric (± 95% CI) by site in the Ventura Watershed, 2004

Table 9-7: Southern California IBI scores and ratings for sites sampled in the Ventura Watershed

River/Stream System	Ventura River				Canada Larga		San Antonio Creek					North Fork Matilija Creek		Matilija Creek	
Station Description	Main Street Bridge	Foster Park	Below Matilija Dam	@Santa Ana Rd.	Below Grazing	Above Grazing	u/s Ventura River Confluence	Lion Canyon u/s San Antonio	u/s Lion Canyon	Stewart Canyon u/s San Antonio	u/s Stewart Canyon Creek	u/s Ventura River Confluence	At gauging station	Below community	Above Community
Biological Metric	0	4	12	6	2	3	5	7	15	8	9	10	11	13	14
Coleopteran Taxa	4	7	5						10	5	7	8	10	5	
EPT Taxa	3	7	5						6	6	5	7	6	5	
Predator Taxa	3	9	8						10	10	8	10	9	6	
% Collectors (cg + cf)	1	4	3						5	10	7	4	10	2	
% Intolerant	0	2	0						1	9	7	2	10	1	
% Non-Insect Taxa	10	10	10						8	10	10	10	10	10	
% Tolerant	10	8	9						5	4	9	9	9	10	
Total So. Cal. IBI Rating	31 Poor	47 Fair	40 Fair	Dry	Dry	Dry	Dry	Dry	45 Fair	54 Fair	53 Fair	50 Fair	64 Good	39 Poor	Dry

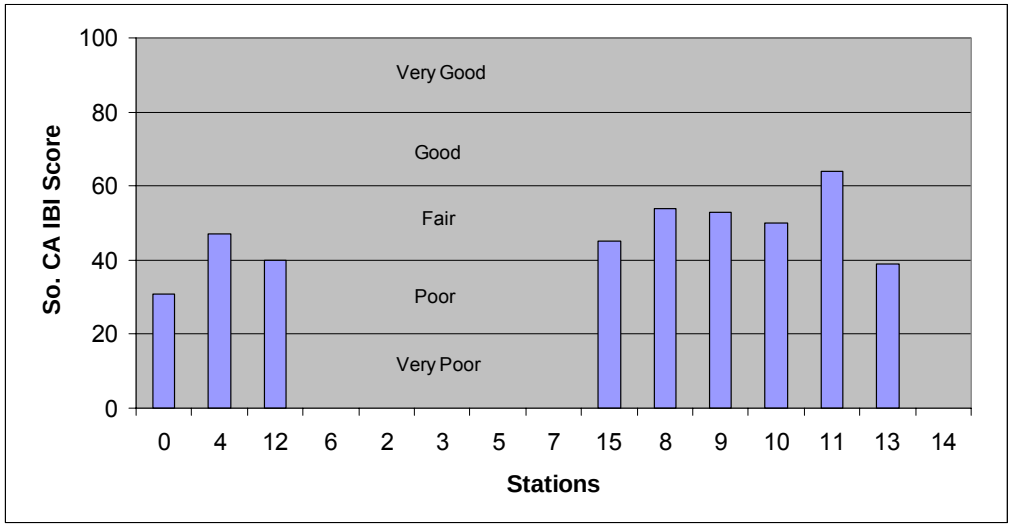


Figure 9-9: Southern California IBI scores for sites in the Ventura Watershed, 2004

Figure 9-10: Physical habitat scores for sites in the Ventura Watershed, 2001 to 2004

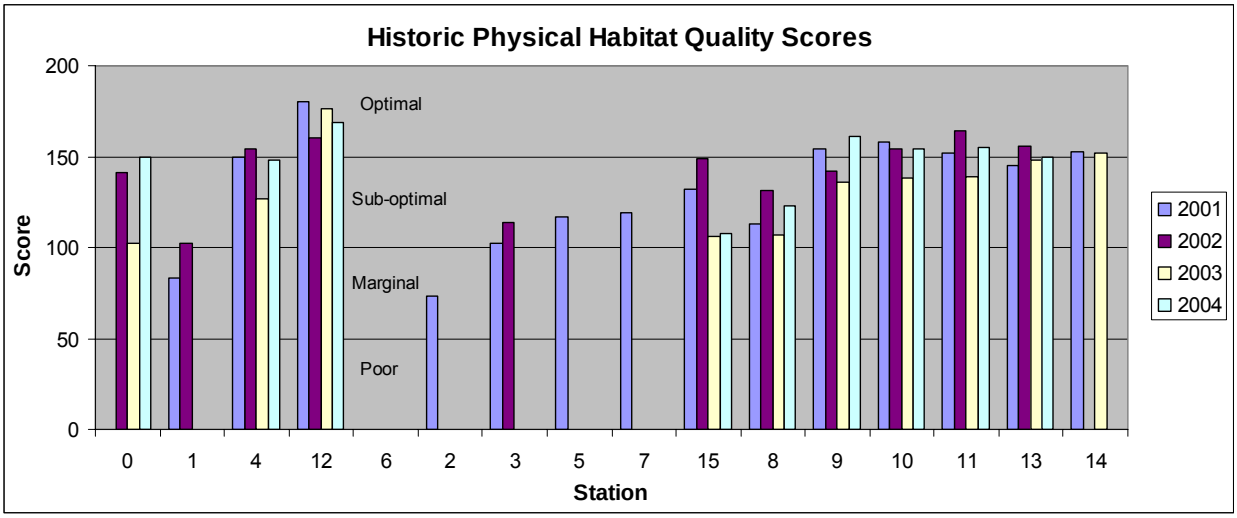


Figure 9-11: So CA IBI scores for sites in the Ventura Watershed, 2001 to 2004

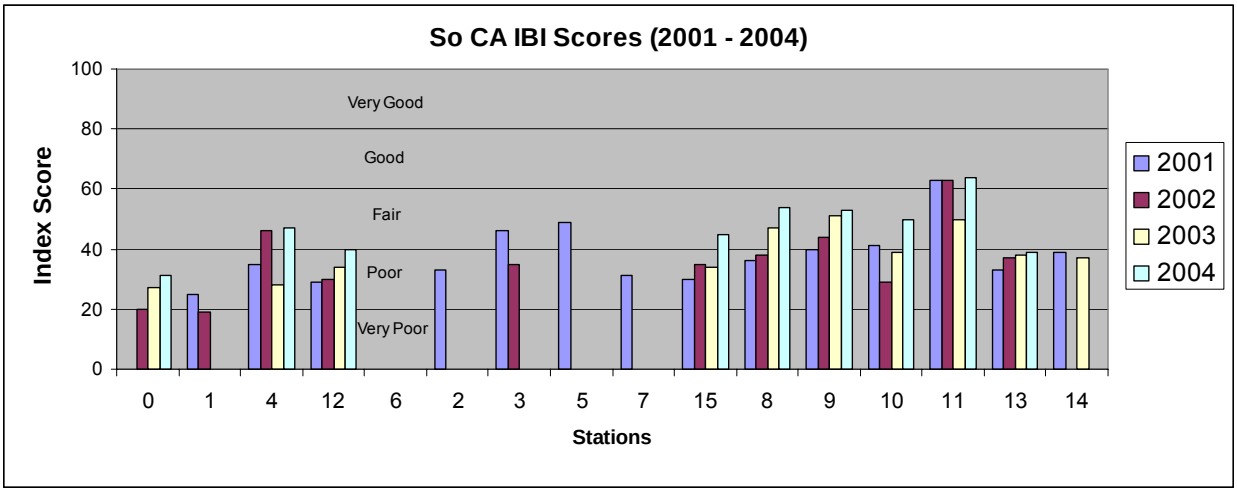


Figure 9-12: SD IBI scores for sites in the Ventura Watershed, 2001 to 2004

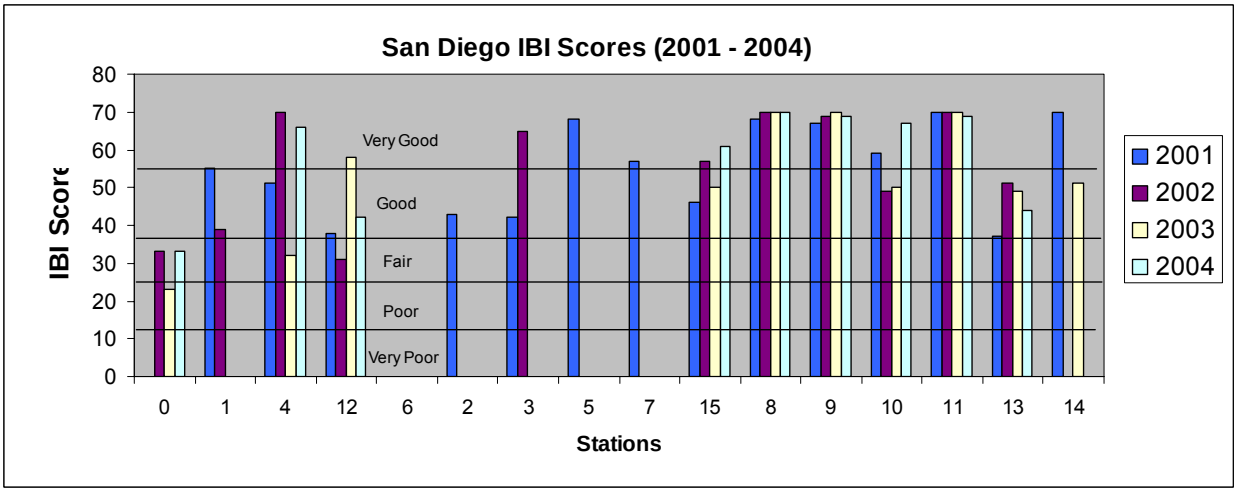


Figure 9-13: Two-way coincidence table of historical species groups (left) vs. stations (top) as resolved by cluster analysis using the Bray-Curtis dissimilarity metric
(Data square root-transformed; symbols represent relative abundance of each species at a station)

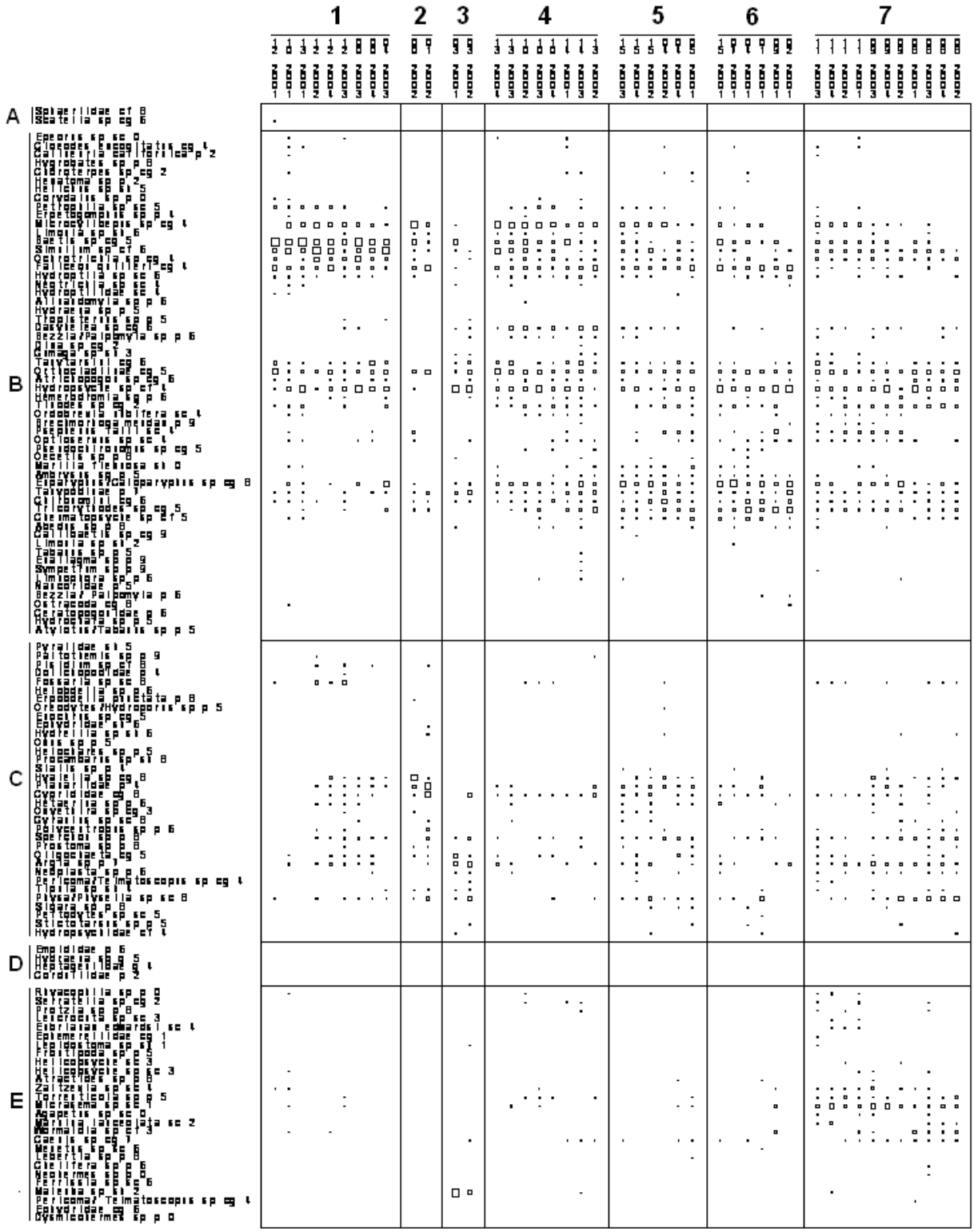


Table 9-8: Top 10 species averaged across each station by species cluster group (2001-2004)
Grp = taxa groups: E = Ephemeroptera; D = Dipterans; T = Trichopterans; C = Coleopterans; M = Mollusks; NI = non-insects; P = Plecopterans; O = Odonata. Tol = tolerance groups. FFG = functional feeding groups: cg = collector gatherers; cf = collector filterers; p = predators; sc = scrapers.

Cluster Grp 1
Ventura River / Matilija Dam

	Grp	Tol	FFG	Avg
Baetis sp	E	5	cg	280
Simulium sp	D	6	cf	153
Hydropsyche sp	T	4	cf	89
Microcylloepus sp	C	4	cg	59
Orthocladiinae	D	5	cg	51
Fallceon quilleri	E	4	cg	49
Ochrotrichia sp	T	4	cg	40
Fossaria sp	M	8	sc	25
Tanytarsini	D	6	cg	23
Euparyphus/Caloparyphus sp	D	8	cg	19

Cluster Grp 2
Lower Watershed 2002

	Grp	Tol	FFG	Avg
Microcylloepus sp	C	4	cg	174
Planariidae	NI	4	p	137
Hyalella sp	NI	8	cg	114
Cyprididae	NI	8	cg	103
Fallceon quilleri	E	4	cg	94
Baetis sp	E	5	cg	75
Orthocladiinae	D	5	cg	58
Physa/Physella sp	M	8	sc	26
Tanypodinae	D	7	p	15
Simulium sp	D	6	cf	12

Cluster Grp 3
Canada Larga Creek

	Grp	Tol	FFG	Avg
Malenka sp	P	2	sh	246
Hydropsyche sp	T	4	cf	217
Argia sp	O	7	p	107
Physa/Physella sp	M	8	sc	76
Baetis sp	E	5	cg	41
Orthocladiinae	D	5	cg	40
Tanypodinae	D	7	p	37
Cyprididae	NI	8	cg	31
Oligochaeta	NI	5	cg	24
Tanytarsini	D	6	cg	19

Cluster Grp 4
Matilija Creek

	Grp	Tol	FFG	Avg
Microcylloepus sp	C	4	cg	169
Hydropsyche sp	T	4	cf	96
Orthocladiinae	D	5	cg	81
Baetis sp	E	5	cg	75
Simulium sp	D	6	cf	62
Dasyhelea sp	D	6	cg	59
Fallceon quilleri	E	4	cg	56
Euparyphus/Caloparyphus sp	D	8	cg	54
Tricorythodes sp	E	5	cg	32
Tanytarsini	D	6	cg	29

Cluster Grp 5
San Antonio Creek

	Grp	Tol	FFG	Avg
Euparyphus/Caloparyphus sp	D	8	cg	105
Fallceon quilleri	E	4	cg	82
Microcylloepus sp	C	4	cg	75
Hydropsyche sp	T	4	cf	67
Orthocladiinae	D	5	cg	52
Chironomini	D	6	cg	46
Simulium sp	D	6	cf	42
Planariidae	NI	4	p	39
Tricorythodes sp	E	5	cg	35
Tinodes sp	T	2	cg	29

Cluster Grp 6
San Antonio Creek / Ventura River

	Grp	Tol	FFG	Avg
Hydropsyche sp	T	4	cf	195
Euparyphus/Caloparyphus sp	D	8	cg	150
Tricorythodes sp	E	5	cg	106
Fallceon quilleri	E	4	cg	85
Orthocladiinae	D	5	cg	45
Chironomini	D	6	cg	45
Baetis sp	E	5	cg	44
Tanypodinae	D	7	p	23
Cheumatopsyche sp	T	5	cf	19
Microcylloepus sp	C	4	cg	18

Cluster Grp 7
North Fork Matilija Creek / Upper San Antonio Creek

	Grp	Tol	FFG	Avg
Hydropsyche sp	T	4	cf	140
Orthocladiinae	D	5	cg	96
Micrasema sp	T	1	sc	84
Physa/Physella sp	M	8	sc	52
Euparyphus/Caloparyphus sp	D	8	cg	46
Simulium sp	D	6	cf	44
Tinodes sp	T	2	cg	42
Microcylloepus sp	C	4	cg	34
Argia sp	O	7	p	33
Ochrotrichia sp	T	4	cg	30

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9.3.8 Taxonomic References

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9.4 Monitoring Site Locations and Descriptions

The locations of stormwater quality monitoring stations and rain gauges are shown in Figure 9-14.

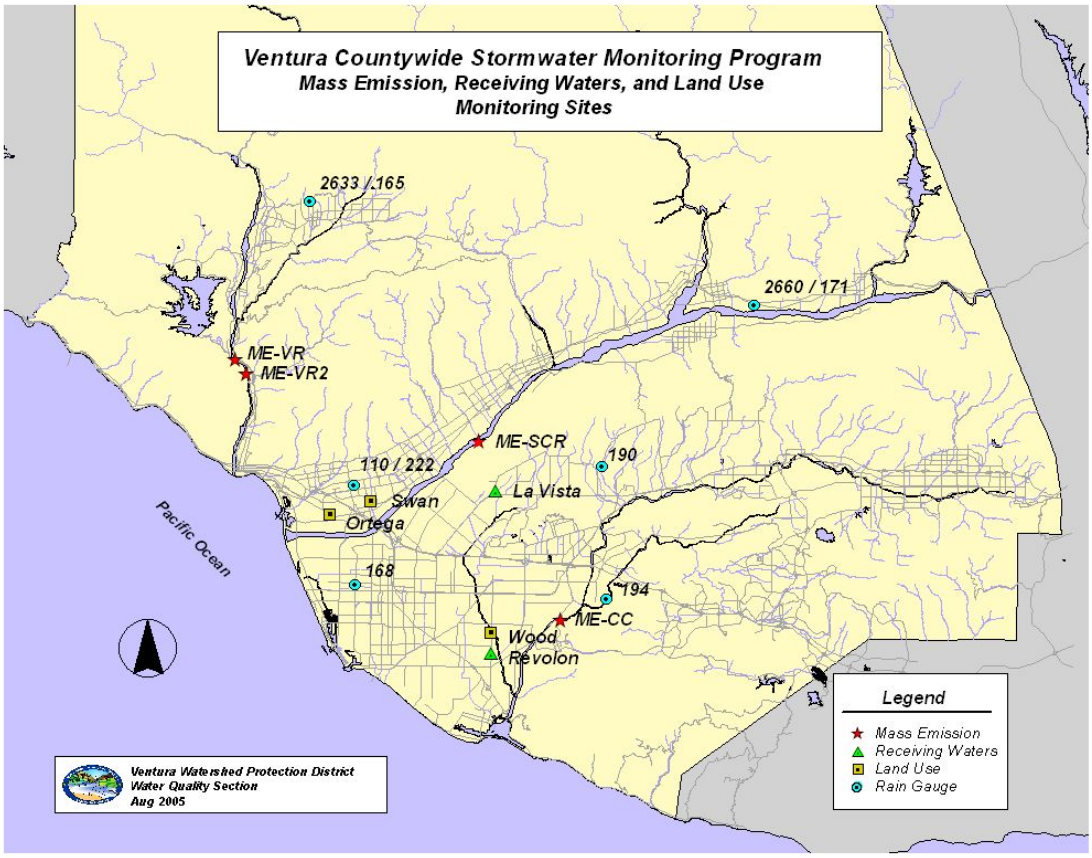

Figure 9-14: Ventura County Stormwater Monitoring Locations

Table 9-9 lists rain gauges with their corresponding gauge number.

Table 9-9: Rain Gauge Sites

ALERT No.	Standard No.	Gauge	Assoc. Monitoring Site
—	194	Camarillo-Adohr	ME-CC
2633	165	Ojai-Stewart Canyon	ME-VR, ME-VR2
110	222	Ventura County Government Center	I-2, R-1
—	190	Somis-Bard	W-3
2660	171	Fillmore Fish Hatchery	ME-SCR
—	168	Oxnard Airport	A-1, W-4

Sites with multiple gauge numbers represent two different rain gauges located at the same location. The ALERT gauge transmits electronic data to the flood warning ALERT (Automated Local Evaluation in Real Time) system and measures precipitation with an accuracy of 0.04 inches. The standard gauge is a tipping bucket that measures rainfall with an

accuracy of 0.01 inches. The more accurate tipping bucket data are used for calculating rainfall totals unless they are unavailable. ALERT gauge numbers are typically 4 digits (i.e. 2633) while tipping bucket gauge numbers are 3 digits (i.e. 165) with the exception of the Ventura County Government Center (i.e., 222/110).

9.4.1 Land Use Sites

The Stormwater Monitoring Program includes three Land Use monitoring sites: Swan Street (R-1), Ortega Street (I-2), and Wood Road (A-1) as shown in Figure 9-14. Each station is identified by a code related to the primary land use in the monitored watershed; I for industrial, A for agricultural, and R for residential. Photographs of the Swan Street (R-1) and Ortega Street (I-2) stations are provided in Figure 9-15, and a photograph of the Wood Road(A-1) site is included in Figure 9-16. The monitoring schedule for the Land Use sites is specified in the Ventura Countywide Stormwater Monitoring Program: Standard Operating Procedures 2000-2005 Stormwater Monitoring. During the 2004/05 monitoring season all Land Use sites were monitored during one wet weather event (Event 1 – 10/16/04) for water chemistry and toxicity. Land Use station characteristics are summarized in Table 9-10.

Table 9-10: Land Use Site Characteristics

Station Code	*Year Installed*	*Location*	*Primary Land Use*	*Drainage Basin Area (acres)*	*Rain Gauge Location*
R-1	1992 (2003 Upgrade)	Swan Street and Macaw Avenue (City of San Buenaventura)	Residential	65	County Government Center
I-2	1992 (2003 Upgrade)	Ortega Street (City of San Buenaventura)	Industrial	189	County Government Center
A-1	1994 (2001 Upgrade)	Wood Road at Revolon Slough	Agricultural	350 (estimated)	Oxnard Airport

The Swan Street (R-1) site receives runoff from a relatively new (15 to 20 year old) residential neighborhood consisting of single-family dwellings, churches, parks, and a recreation center. The Ortega Street (I-2) site is located in an area of older manufacturing facilities, newer industrial parks, and a few undeveloped city lots. The associated drainage basin for (I-2) consists of diverse types of industrial facilities. The Wood Road (A-1) site drains into the Oxnard Agricultural Plain and is comprised almost entirely of agricultural land (primarily row crops), including a small number of farm residences and ancillary farm facilities for equipment maintenance and storage. All three Land Use monitoring sites are equipped with automated monitoring equipment. Sites R-1 and I-2 were upgraded in 2003 with new, portable refrigerated samplers and ISCO 4250 area velocity flow meters.

9.4.2 Receiving Water (Tributaries) Characterization Sites

Two Receiving Water stations are included among the Stormwater Monitoring Program's characterization sites: La Vista (W-3) and Revolon Slough (W-4). Photographs of each site are provided in Figure 9-16. The land use surrounding both Receiving Water sites is dominated by agriculture. The La Vista station is located in the upper Revolon Slough watershed, and the Revolon Slough station is located in the lower Revolon Slough Watershed at Wood Road as shown in Figure 9-14. Both Receiving Water sites were sampled during one wet weather event (Event 1 – 10/16/04) for water chemistry and toxicity during the current monitoring season. Composite samples at sites W-3 and W-4 are collected as time-paced composites. Receiving Water site characteristics are summarized in Table 9-11.

Figure 9-15: Land Use Station Photos: R-1 (Swan Street) and I-2 (Ortega Street)

Figure 9-16: Land Use and Receiving Water Station Photos: A-1 (Wood Road), W-3 (La Vista), and W-4 (Revolon Slough)

Table 9-11: Receiving Water Site Characteristics

Station Code	Year Installed	Location	Land Uses	Percent Developed	Watershed Area (acres)	Rain Gauge
W-3	1997 (2003 Upgrade)	La Vista Avenue south of Center Road	Agricultural/ Open Space	<2%	752	Somis-Bard
W-4	1998 (2003 Upgrade)	Revolon Slough at Wood Road	Agricultural/ Mixed Use	20%	28,800	Oxnard Airport

9.4.3 Mass Emission Sites

Mass Emission monitoring was conducted in the Santa Clara River, Calleguas Creek, and Ventura River watersheds at the stations shown in Figure 9-14. Photographs of each Mass Emission station taken during wet weather monitoring are presented in Figure 9-17 (Event 1, October 2004) and Figure 9-18 (Event 4, January 2005). The two sets of photos show the wide range of flows observed at the monitoring stations during the 2004/05 season. Figure 9-19 shows the newly sited ME-VR2 station, located approximately 1 mile downstream from the ME-VR site, where Ventura River dry weather events were monitored in May and June, 2005. The site characteristics of all Mass Emission stations are summarized in Table 9-12. Both the ME-SCR and ME-VR/ME-VR2 stations are located in large watersheds possessing diverse inputs of runoff sources which are dominated by agricultural and urban land uses.

Table 9-12: Mass Emission Site Characteristics

Station Code	Location	Land Uses	Watershed Area (acres)	Rain Gauge
ME-CC	Calleguas Creek – CSUCI north side of Hueneme Road, just east of Lewis Road at the CSUCI Bridge	Mixed Use	160,640	Camarillo-Adohr
ME-SCR	Santa Clara River – at Freeman Diversion Dam	Mixed Use	1,003,524	Fillmore Fish Hatchery
ME-VR	Ventura River – Foster Park west of State Highway 33, on the south side of Casitas Vista Road, just west of the Foster Park Bridge	Mixed Use	119,680	Ojai-Stewart Canyon
ME-VR2	Ventura River – Ojai Valley Sanitation District Treatment Plant, located approximately 1 mile downstream from retired ME-VR site.	Mixed Use	134,490	Ojai-Stewart Canyon

The Mass Emission stations, ME-CC and ME-VR, were installed and monitored for the first time in 2000/01, the ME-SCR site was installed and first monitored in 2001/02, and the new ME-VR2 station was first monitored in May 2005. ME-CC and ME-VR mass emission samples are collected using automated flow-proportional composite samplers, the ISCO 6712 and 6700FR, respectively. The two dry weather events monitoring in the Ventura River at ME-VR2 were sampled using an ISCO 6712 Portable Sampler programmed to collect composite samples on a time-paced basis. The portable sampler was employed pending permanent equipment installation at the site scheduled for completion by October 1, 2005.

Figure 9-17: Mass Emission Station Photos: ME-CC (Calleguas Creek), ME-SCR (Santa Clara River), and ME-VR (Ventura River) during low flows in October 2004 (Event 1)

Figure 9-18: Mass Emission Station Photos: ME-CC (Calleguas Creek), ME-SCR (Santa Clara River), and ME-VR (Ventura River) during high flows in early January 2005 (Event 4)

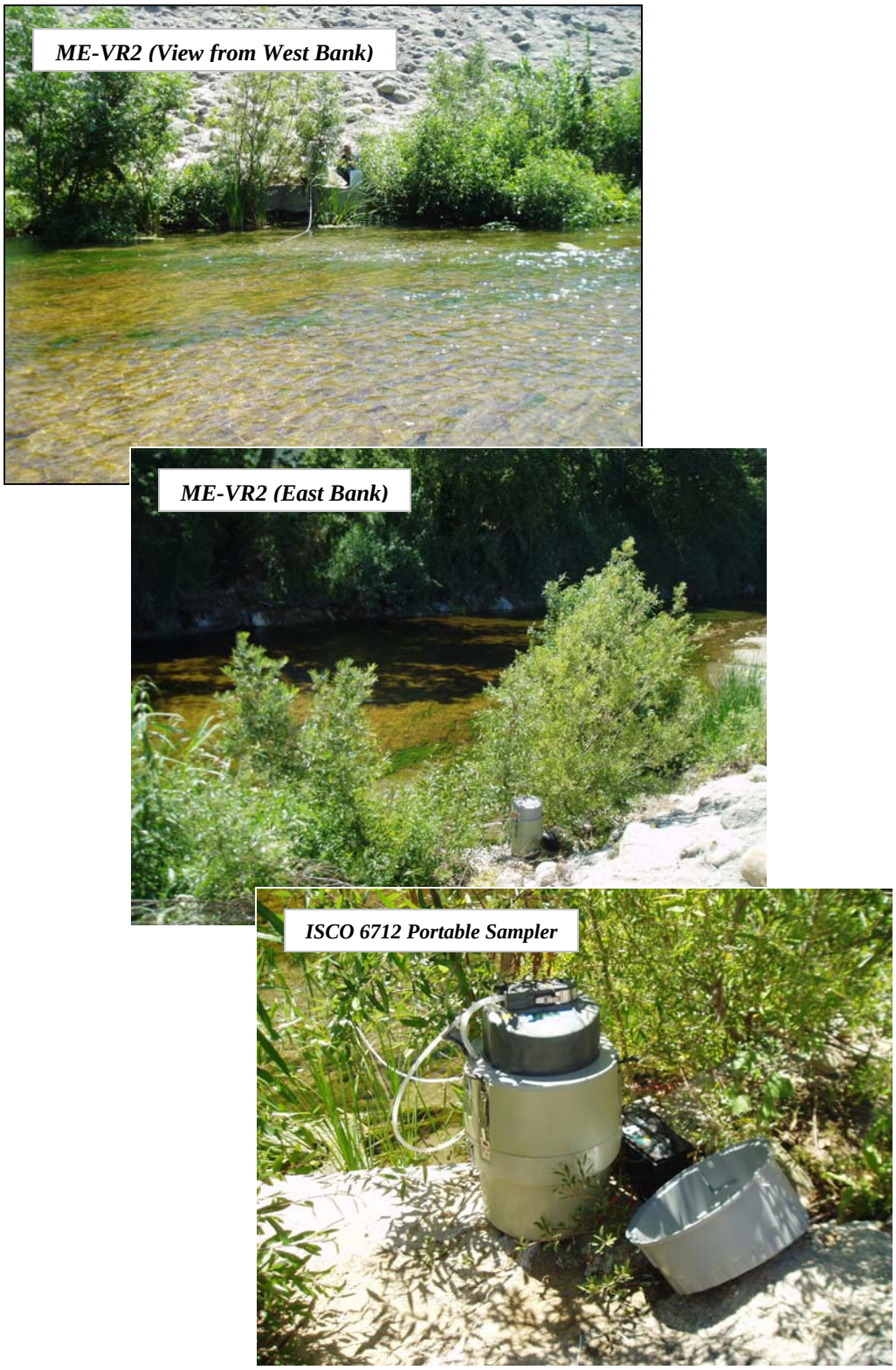

Figure 9-19: Newly sited Mass Emission Station ME-VR2 showing ISCO 6712 portable sampler used to monitor 2004-2005 dry weather events in the Ventura River

The Santa Clara River Mass Emission Station, ME-SCR, also uses an ISCO 6700FR sampler, but the sampler is programmed to collect composite samples on a time-paced basis due to the configuration of the sampling location. The ME-SCR station is located at a dam where water is diverted by United Water Conservation District for ground water infiltration. The diversion configuration poses challenges to the accurate measurement of flows at this location as discussed in Section 9.5. Consequently, time-based composite samples are collected at this site rather than flow-proportional composite samples.

The Mass Emission stations are also configured for remote access monitoring using state-of-the-art telemetry equipment. Additionally, rain gauges are located at the ME-SCR and ME-CC sites, and the ME-VR and ME-SCR stations feature refrigerated sampling units. These refrigerated sampling units allow the Stormwater Monitoring Program to keep its water quality samples at a constant temperature throughout the duration of a monitoring event and thus comply with sample handling QA/QC objectives.

The ME-VR station, formerly located on Casitas Vista Road at Foster Park, was determined to be unsafe due to land slides that occurred during the heavy rainfalls of January and February, 2005 (see Figure 9-21). Safety concerns with the station's location at Foster Park prompted the Stormwater Monitoring Program to relocate the ME-VR station to the Ojai Valley Sanitation District's Treatment Plant (located at 6363 North Ventura Avenue, Ventura, CA) above the POTW outfall. The new ME-VR2 station is located approximately one mile downstream of the station's former location, ME-VR. The new monitoring site is in an ideal location on the Ventura River due to the presence of a levee on the east side and bedrock on the west side of the site. The new location also provides an improved ability to secure monitoring equipment. Permanent equipment installation at ME-VR2 is scheduled for completion by October 1, 2005, for use during the 2005-2006 monitoring year. Note that the four wet weather Ventura River monitoring events described in this report took place at the ME-VR station located at Foster Park, while the two dry weather events were conducted at the new ME-VR2 site located approximately 1 mile downstream of the retired ME-VR location (see Figure 9-14).

Figure 9-20: ISCO 6700FR Refrigerated Sampler installed at Mass Emission Station ME-SCR

Figure 9-21: Photos of Ventura River Mass Emission Station, ME-VR, at Foster Park showing land slides that occurred during the heavy rains of early January 2005 (Event 4)

9.5 Precipitation and Flow

Rainfall statistics compiled for the monitoring sites were obtained from six rain gauges. The data from the gauges associated with a particular monitoring site and events are identified in Figure 9-22 through Figure 9-27. With the exception of Land Use sites R-1 and I-2 and Mass Emission site ME-VR, each monitoring site is equipped with an automatic tipping bucket rain gauge. As mentioned previously, monitoring sites may have two different rain gauges, a tipping bucket and a standard gauge. All precipitation data presented herein are from tipping bucket measurements. As shown in Figure 9-14, these gauges are located nearby associated monitoring stations or within the tributary watershed. The Ventura County Watershed Protection District currently operates and maintains these gauges.

Historical average annual rainfall in the monitored area varies from 14 to 16 inches per year (based on data for the period between 1950 and 1989). The rainfall totals from October 2004 through June 2005 ranged from 29.73 inches at the Camarillo-Adohr gauge to 44.53 inches at the Ojai-Stewart Canyon gauge. The 2004-2005 rain year has produced above normal precipitation totals due to unusual rains in October and very heavy rains in January, February, and March. As of the end of April 2005, area rainfall totals set various records: Ventura – 4th wettest year on record; Port Hueneme – 8th wettest year on record; Ojai – 5th wettest year on record; Santa Paula – 2nd wettest year on record; and Piru – 2nd wettest year on record. Daily precipitation during the 2004/2005 monitoring year and the corresponding monitored storm event dates are shown in Figure 9-22 through Figure 9-27. Dry weather monitoring was conducted during the 2004/05 monitoring season at each of the three Mass Emission sites. While the dates of all six monitoring events are noted on each precipitation graph, it should be noted that as few as one event (at Land Use and Receiving Water stations) and as many as six events (at Mass Emission stations) were monitored at any given site.

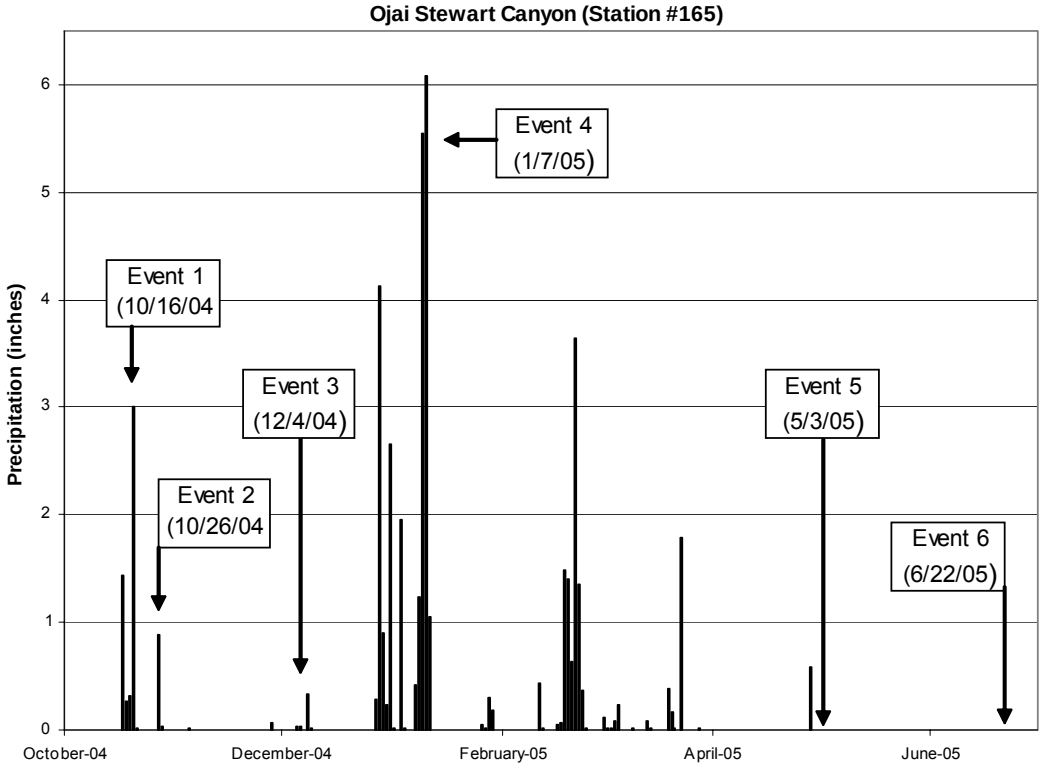

Figure 9-22: Ojai-Stewart Canyon Rain Gauge (ME-VR and ME-VR2 Monitoring Stations)

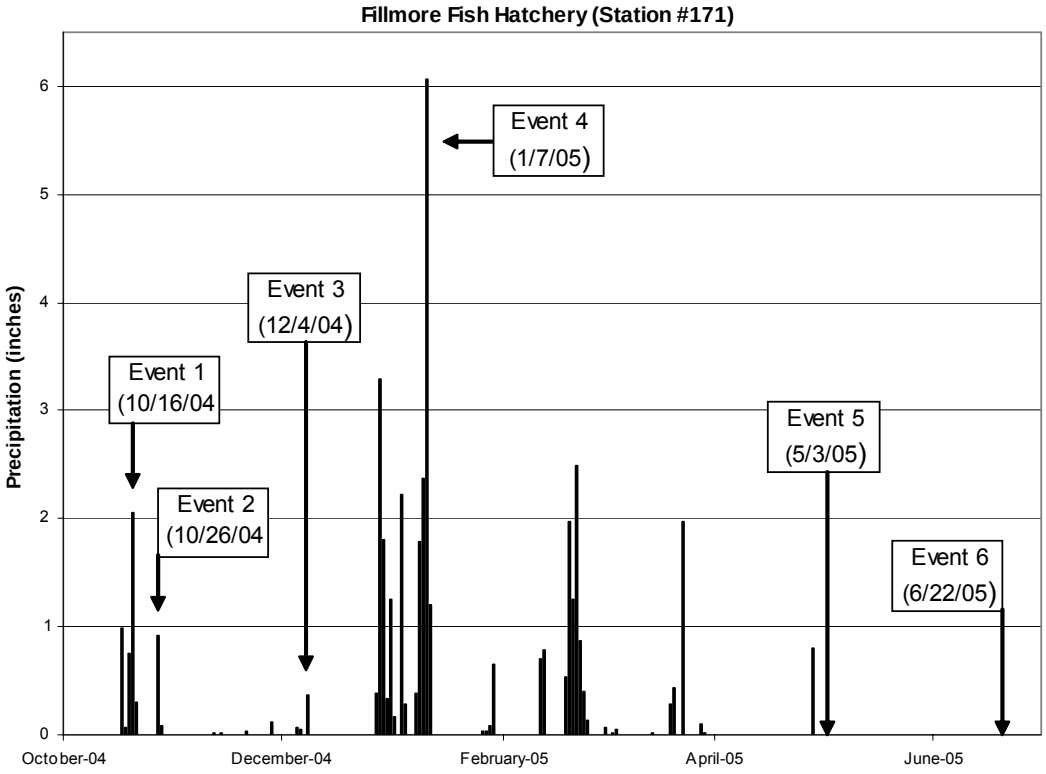

Figure 9-23: Fillmore Fish Hatchery Rain Gauge (ME-SCR Monitoring Station)

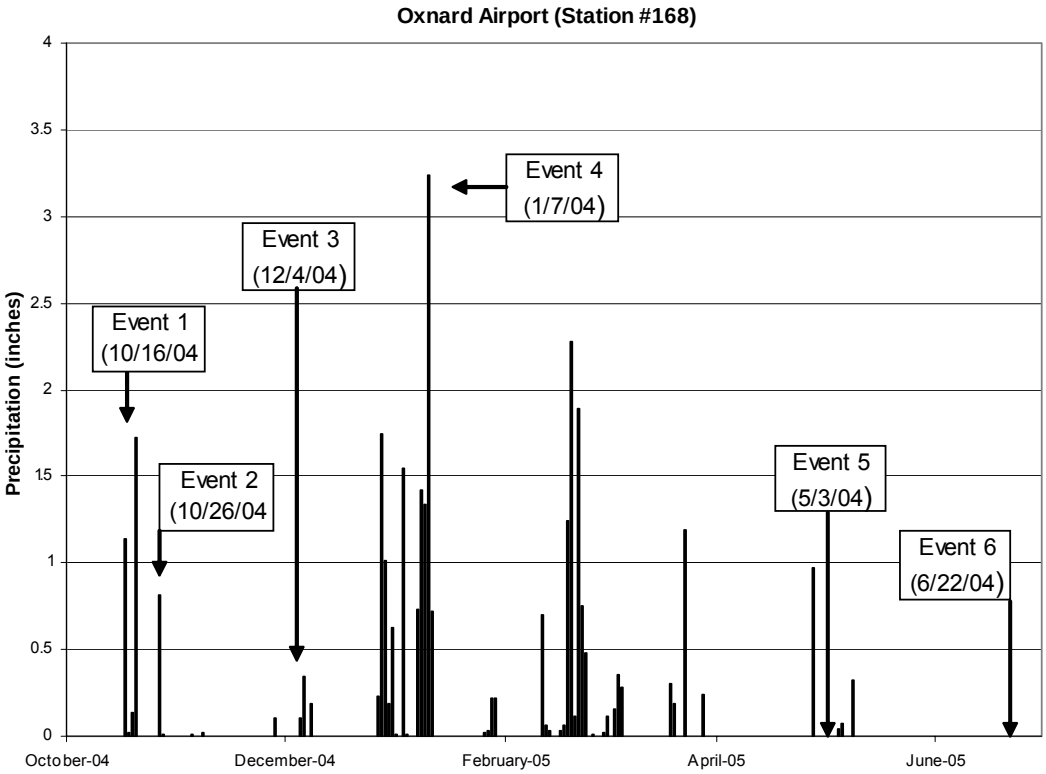

Figure 9-24: Oxnard Airport Rain Gauge (W-4 and A-1 Monitoring Stations)

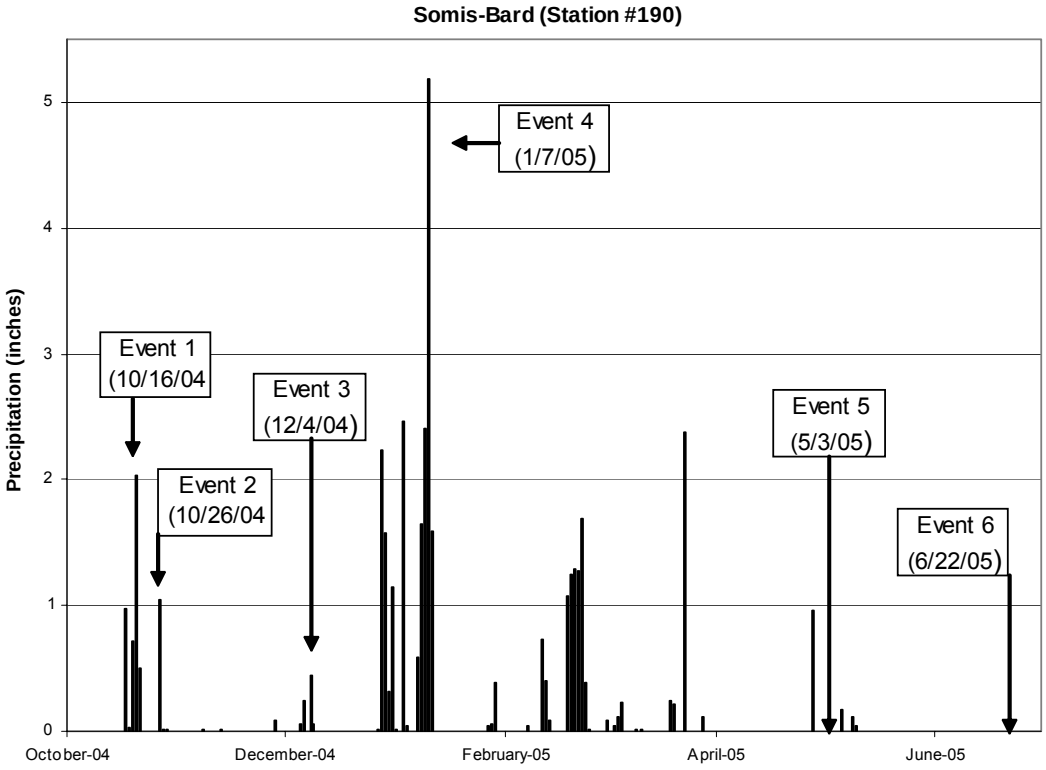

Figure 9-25: Somis-Bard Rain Gauge (W-3 Monitoring Station)

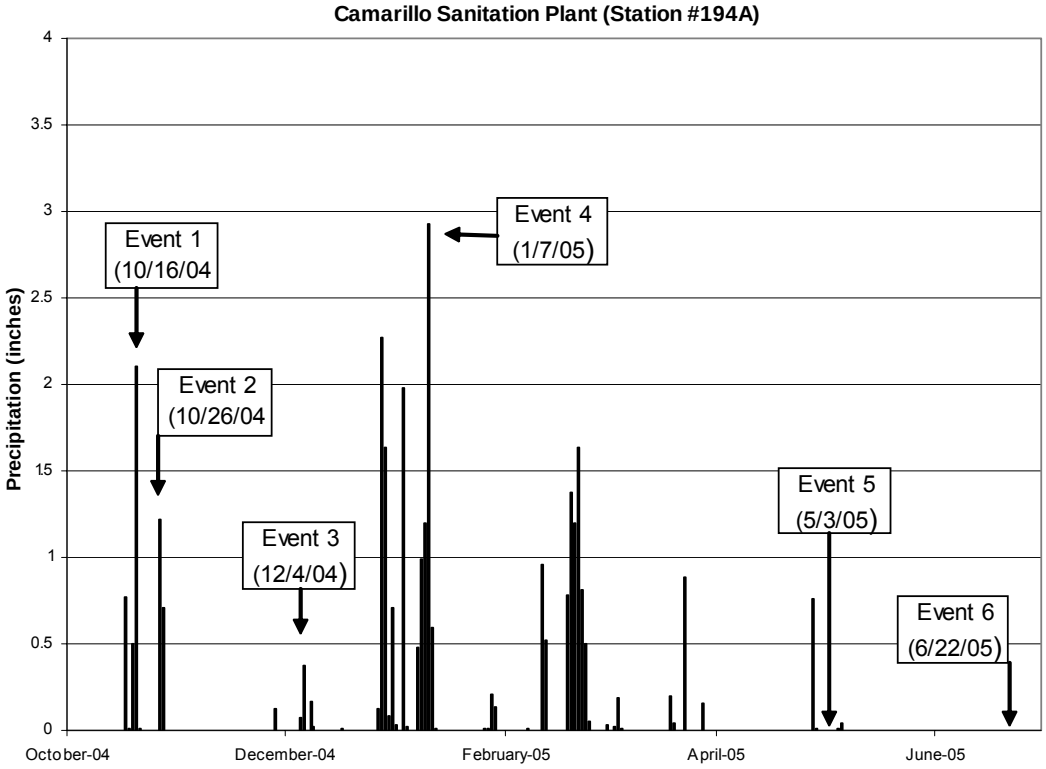

Figure 9-26: Camarillo-Adohr Rain Gauge (ME-CC Monitoring Station)

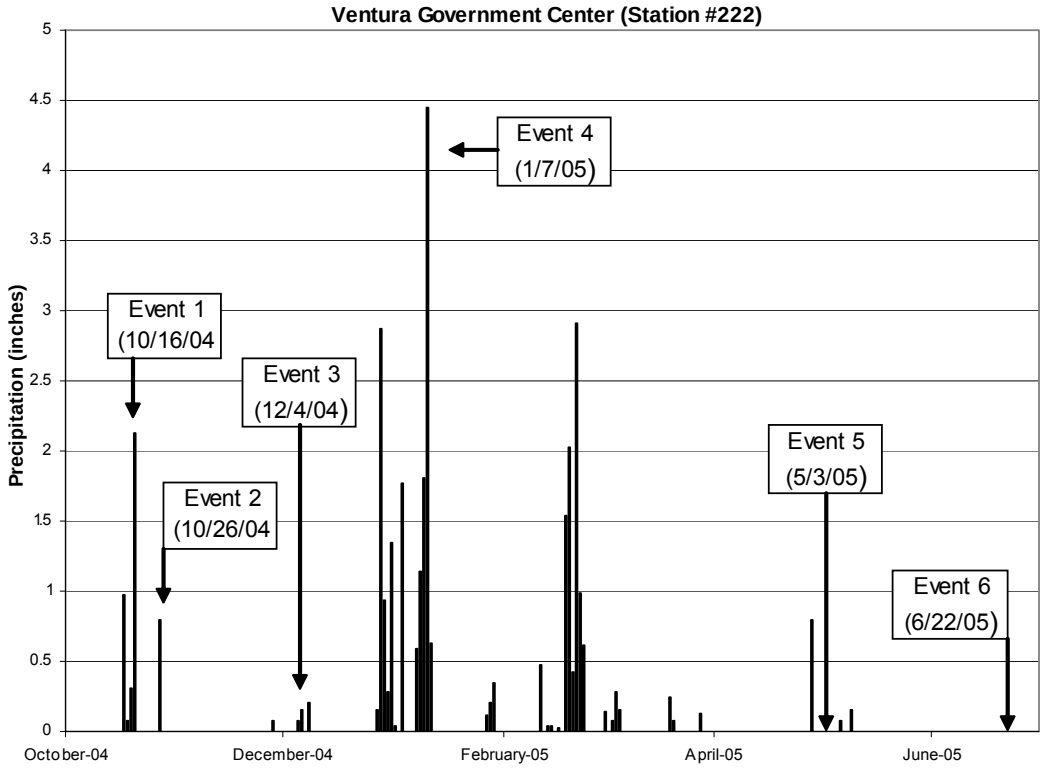

Figure 9-27: Ventura County Government Center Rain Gauge (R-1 and I-2 Monitoring Stations)

Rainfall variability among all rain gauges employed by the Stormwater Monitoring Program is shown in a graph of cumulative rainfall from October 1, 2004, through July 1, 2005 (see Figure 9-28). This cumulative rainfall graph nicely illustrates the rainfall variability throughout Ventura County, and hence among the Stormwater Monitoring Program's sites. Unique rainfall and runoff patterns exhibited by each of the monitoring sites adds to the complexity of sample collection for the Stormwater Monitoring Program in terms of capturing the first flush runoff or peak of the hydrograph at a site for any given monitoring event.

9.5.1 Flow Rates

Flow rates were calculated at each of the Mass Emission sites to establish baseline conditions and load estimates. The automated composite sampling equipment collects information on flow rates (in cubic feet per second, CFS) and volumes (in cubic feet, CF) passing by the composite sampler during the monitoring period. Flowlink software, provided by Teledyne/ISCO, the manufacturer of the sampling equipment, allows the user to analyze the data collected by the sampling equipment to calculate flow rates and volumes over any designated time period. This software was used to calculate average flow rates for the four wet weather monitoring events conducted at all sites, and for the two dry weather events monitoring at Mass Emission station ME-CC. Mean daily flow values from two United States Geological Survey (USGS) gauges were used to calculate an average event flow (in CFS) for dry weather Events 5 and 6 at Mass Emission stations ME-SCR (USGS Gauge #11114000 – Santa Clara River at Montalvo) and ME-VR2 (USGS Gauge #11118500 – Ventura River near Ventura) due to damage sustained to the flow meters installed at the ME-SCR and ME-VR sites during the high flows of January and February, 2005.

A new rating table showing the relationship between stage and discharge has been developed by VCWPD Hydrology staff for the ME-VR2 station and will be used during the upcoming 2005-2006 monitoring season. The rating table uses stage data collected by the USGS Ventura River gauge mentioned above (USGS Gauge #11118500). The rating table will be adjusted in the future, as necessary, based on the range of flows observed in the Ventura River at the USGS gauge upstream of the ME-VR2 site.

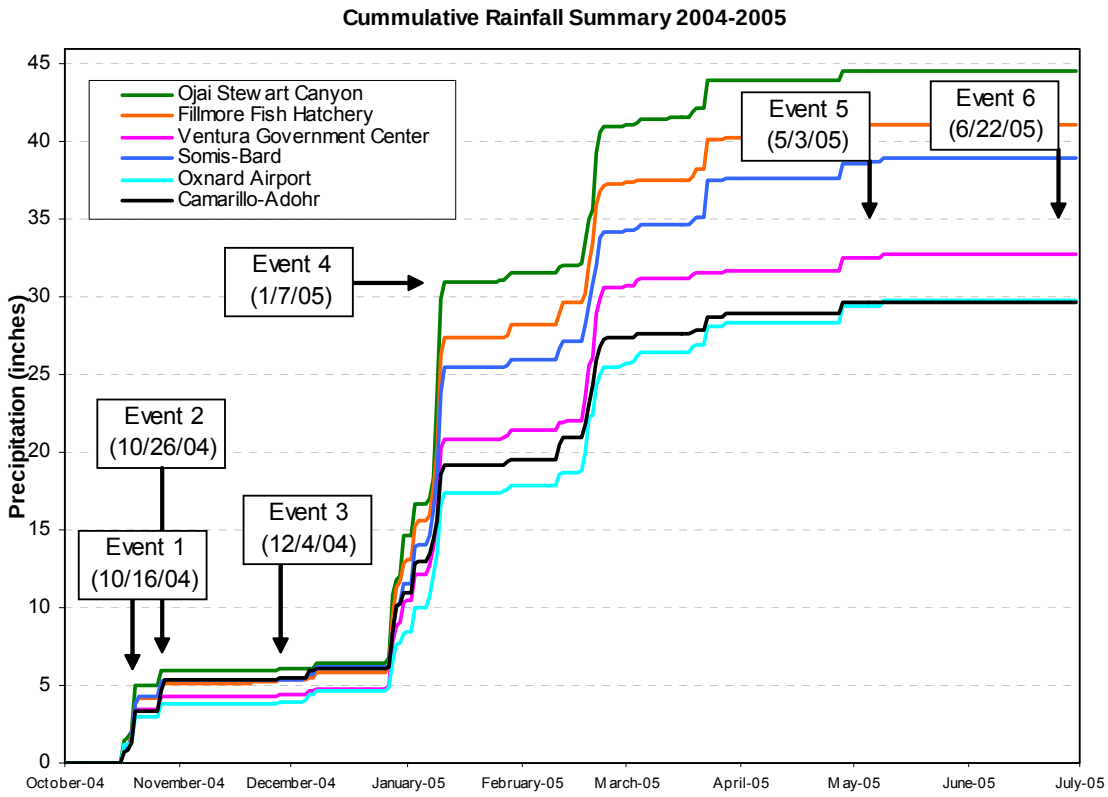

Figure 9-28: 2004-2005 Cumulative Rainfall Summary for all VCWPD Rain Gauges

The Stormwater Monitoring Program's composite samples are made up of multiple sub-samples (aliquots) collected over a temporal range. Such temporal composite samples can be collected on a flow-proportional basis or time-paced basis. Flow-proportional composite samplers are programmed prior to the monitoring event to collect samples over certain flow volume increments. During flow-proportional sampling, samples are collected on a volumetric-flow interval basis, with a set aliquot volume collected at passage of each equal, pre-set flow volume. These flow volume increments are determined by predicting the duration of rainfall for a storm event and adjusting the sampler accordingly to collect samples during the course of the flow event that best represent the storm event (i.e., capture peak flow). Sample adjustment is based on the estimated volume of water passing by the monitoring station for a given size rain event. The estimate is based on 60 years of rainfall data and takes into account antecedent conditions. Time-paced composite samplers are also programmed according to the predicted duration of rainfall prior to a monitoring event. Under time-paced sampling, equal sample aliquot volumes are collected at equal time intervals. Although composite samplers are automated, VCWPD staff actively monitor storm and flow conditions during each event in order to adaptively adjust the sampler to capture the best representation of storm flow.

Flows at the Santa Clara River (ME-SCR) Mass Emission site are measured using two different meters, one for dry weather and one for wet weather sampling. The ME-SCR site is located on the Santa Clara River at the Freeman Diversion Dam which diverts water into infiltration ponds for groundwater recharge. The United Water Conservation District diverts water from the Santa Clara River during dry conditions for their infiltration facilities. An area velocity flow meter is installed inside the dry weather diversion channel downstream of the infiltration channel gate and is used for measuring dry weather flows (See Figure 9-29 and Figure 9-30). No water flows over the diversion dam during dry weather conditions. During wet weather, the Santa Clara River primarily flows through a river diversion gate, shown in Figure 9-30, in order to maintain connectivity between the diversion structure and the river. However, during higher wet weather flows, water flows through the river diversion gate and over the diversion dam itself. A flow gauge is presently installed at the top of the diversion dam for wet weather monitoring. There is no flow meter installed at the river diversion gate. VCWPD plans on installing a flow meter at the river diversion gate in the future in order to allow the collection of flow-proportional composite samples at the ME-SCR site. However, there are technical challenges involved in placing a non-intrusive flow meter (ultrasonic) at the river diversion gate due to equipment limitations and debris in the flow. Debris present in wet weather flows, such as trees, vegetation or sediment, could cause inaccurate flow readings and damage this type of meter. VCWPD is currently investigating the use of a Marsh-McBirney Flo-Dar flow meter for measuring flow at this gate. This meter uses a new radar sensing technology with ultrasonic level sensing to remotely measure open channel flows that may contain debris. As mentioned previously, composite samples at ME-SCR are collected on a time-paced basis. Figure 9-29 through Figure 9-31 show the configuration of the different flow channels at ME-SCR.

Figure 9-29: ME-SCR Diversion Dam (Facing Upstream)

Flow measurement in the infiltration channel during dry weather monitoring can also be problematic in that there is no fixed time schedule for diverting water from the river into the infiltration channel which makes it difficult to determine a daily average flow in the infiltration channel. The aforementioned challenges associated with measuring wet and dry weather flows preclude the complete measurement of flows at ME-SCR at this time. However, the VCWPD is working to overcome these difficulties and develop methods for

measuring all wet and dry weather flows at the ME-SCR site. Figure 9-30 through Figure 9-32 show the river diversion gate, infiltration channel, and diversion dam at ME-SCR.

Figure 9-30: ME-SCR Diversion Dam (Facing Downstream)

Figure 9-31: River Diversion Gate (Facing Downstream)

Figure 9-32: Infiltration Channel (Facing Upstream)

Table 9-13 summarizes flow rates at the Mass Emission, Land Use, and Receiving Water stations for each of the monitoring events conducted in 2004/05. It should be noted that the heavy rains of the 2004/05 season produced larger runoff events than are typically observed in Ventura County, and hence monitored by the Stormwater Monitoring Program. Average flows measured at the Mass Emission stations during Event 4 (January 7, 2005) were two times greater than the highest flows measured during 2003/04 monitoring events at ME-CC and ME-SCR, and almost 13 times greater than the highest flow measured during a monitoring event last season at the ME-VR site. As evidenced by the extremely high total suspended solids concentrations measured during Event 4, along with measured elevated concentrations of metals, organics, and pesticides (see Section 9.9), it is reasonable to assume that the large precipitation and runoff event acted to flush out watersheds and scour streambeds and adjacent riparian habitat.

Event duration is defined as the number of hours elapsed between the first aliquot distributed into the first sample bottle collected through the last aliquot distributed into the last sample bottle collected by a composite sampler. Average flow is determined by averaging all available flow data over the event duration time period. It should be noted that all wet weather flows listed for ME-SCR in Table 9-13 do not include flow at the river diversion gate, and depending on the flow volume of a particular wet weather event, may represent only a fraction of the total wet weather flow.

Table 9-13: Site Flow and Event Duration

ME-CC	Event	Date	Average Flow (CFS)	Start Date, Time	End Date, Time	Event Duration
Wet	1	10/16/04	129.36	10/16/2004 23:58	10/18/2004 23:10	47:12:00
Wet	2	10/26/04	565.10	10/26/2004 11:59	10/28/2004 10:36	46:37:00
Wet	3	12/4/04	43.90	12/4/2004 23:58	12/5/2004 17:12	17:14:00
Wet	4	1/7/05	3819	1/7/2005 00:01	1/10/2005 11:58	83:57:00
Dry	5	5/3/05	48.93	5/3/2005 00:01	5/4/2005 11:33	35:32:00
Dry	6	6/22/05	9.80	6/22/2005 00:01	6/22/2005 23:46	23:45:00
ME-VR	**Event**	**Date**	**Average Flow (CFS)**	**Start Date, Time**	**End Date, Time**	**Event Duration**
Wet	1	10/16/04	0.86	10/16/2004 23:58	10/19/2004 02:21	50:23:00
Wet	2	10/26/04	3.31	10/26/2004 11:59	10/28/2004 10:44	46:45:00
Wet	3	12/4/04	1.81	12/4/2004 23:58	12/6/2004 06:12	30:14:00
Wet	4	1/7/05	11599	1/7/2005 00:00	1/11/2005 06:29	102:29:00
ME-VR2	**Event**	**Date**	**Average Flow (CFS)**	**Start Date, Time**	**End Date, Time**	**Event Duration**
Dry	5	5/3/05	41.75	5/3/2005 00:01	5/4/2005 01:37	25:36:00
Dry	6	6/22/05	11.75	6/22/2005 00:01	6/22/2005 23:35	23:34:00
ME-SCR	**Event**	**Date**	**Average Flow (CFS)**	**Start Date, Time**	**End Date, Time**	**Event Duration**
Wet*	1	10/16/04	0.01	10/16/2004 23:54	10/19/2004 00:26	48:32:00
Wet*	2	10/26/04	4.69	10/26/2004 11:55	10/28/2004 11:24	47:29:00
Wet*	3	12/4/04	**	12/4/2004 23:58	12/6/2004 07:28	31:30:00
Wet*	4	1/7/05	6916	1/7/2005 00:00	1/9/2005 12:00	60:00:00
Dry	5	5/3/05	104	5/3/2005 00:01	5/3/2005 20:19	20:18:00
Dry	6	6/22/05	8.38	6/22/2005 00:01	6/22/2005 23:46	23:45:00
A-1	**Event**	**Date**	**Average Flow (CFS)**	**Start Date, Time**	**End Date, Time**	**Event Duration**
Wet	1	10/16/04	1.61	10/16/2004 23:59	10/19/2004 00:31	48:32:00
I-2	**Event**	**Date**	**Average Flow (CFS)**	**Start Date, Time**	**End Date, Time**	**Event Duration**
Wet	1	10/16/04	1.86	10/16/2004 23:59	10/19/2004 00:09	48:10:00
R-1	**Event**	**Date**	**Average Flow (CFS)**	**Start Date, Time**	**End Date, Time**	**Event Duration**
Wet	1	10/16/04	0.14	10/16/2004 23:59	10/18/2004 23:58	47:59:00
W-3	**Event**	**Date**	**Average Flow (CFS)**	**Start Date, Time**	**End Date, Time**	**Event Duration**
Wet	1	10/17/04	0.73	10/17/2004 02:08	10/18/2004 23:18	45:10:00
W-4	**Event**	**Date**	**Average Flow (CFS)**	**Start Date, Time**	**End Date, Time**	**Event Duration**
Wet	1	10/16/04	604.42	10/16/2004 23:57	10/19/2004 00:29	48:32:00

*During wet weather, the Santa Clara River flows through the river diversion gate and over the diversion dam. Currently, there is no flow meter installed at the river diversion gate where a majority of the wet weather flow passes. It should be noted that until a flow meter is installed at the river diversion gate, these values only represent a portion of the total wet weather flow at ME-SCR (see Flow Rates section above for further information).

**Event 3 (12/4/04) at the ME-SCR station produced insufficient flows to be measured by the flow meter located at the top of the diversion dam. Ostensibly, all flows produced during this event were redirected through the river diversion gate and into the infiltration channel.

9.6 Sample Collection

Sampling conducted by the Stormwater Monitoring Program during the 2004/05 monitoring season consisted of the capturing of the first flush storm event in Ventura County on October 16, 2004, followed by the monitoring of two early-season and one mid-season storm. A total of four wet weather events were monitored during the months of October 2004 (Events 1 and 2), December 2004 (Event 3), and January 2005 (Event 4). Storm event sampling criteria contained in the NPDES permit specify that not more than 0.1 inch of rain shall occur during the 72 hours preceding a monitored event. Storms are selected for monitoring based on the antecedent conditions (72-hour dry period), fulfillment of the dry period, and predicted precipitation. The two dry weather events were monitored during the months of May (Event 5) and June (Event 6). Dry weather events are monitored when there has been at least a 72-hour antecedent dry period without measurable rainfall (< 0.01 inches).

At the Calleguas Creek (ME-CC) and Ventura River (ME-VR) sites automated composite samplers are programmed to collect flow-proportional samples based on water volume passing by the station during wet weather monitoring. The flow volume necessary to trigger sample collection is determined based on the predicted amount of precipitation over a specific period of time and the estimated volume of runoff from the watershed. These values are based on 60 years of historic precipitation data used to develop runoff tables included in the Standard Operating Procedures. Samples at ME-SCR are collected on a time-paced basis during wet weather monitoring because flow-proportional compositing is not possible due to the diversion of Santa Clara River water by the United Water Conservation District. The Stormwater Monitoring Program has installed a flow gauge in the diversion channel to monitor flow diverted to infiltration ponds during dry weather, as well as a flow meter on top of the Freeman Diversion Dam to measure flow during wet weather. As mentioned previously, the two dry weather events monitoring in the Ventura River at the new ME-VR2 station were sampled using a portable sampler programmed to collect composite samples on a time-paced basis. Time-paced composite samples were also collected at the Land Use (A-1, I-2, R-1) and Receiving Water (W-3, W-4) sites. Receiving Water site W-4 collects samples on a time interval basis because sample to volume (runoff) tables are not available.

The Santa Clara River (ME-SCR), Ventura River (ME-VR), Wood Road (A-1), and both Receiving Water (La Vista, W-3, and Revolon Slough, W-4) monitoring sites have hard line phone and electrical connections and refrigerated sampling units. The Calleguas Creek (ME-CC) station possesses a cellular phone connection and runs on solar/battery power. The Ortega Street (I-2) and Swan Street (R-1) Land Use sites do not possess phone or power connections, and utilize portable refrigerated samplers for sample collection. Automated data logging is available at all sites, while tipping bucket rain gauges are installed at all sites except for I-2, R-1, and ME-VR. Additionally, all sites except for I-2 and R-1 can be remotely accessed via telemetry, including the area velocity flow meter installed in the infiltration channel at ME-SCR. The new relocated Ventura River (ME-VR2) Mass Emission station will feature an automated refrigerated sampler, automated data logging, a tipping bucket rain gauge, and electric power supplied by the Ojai Valley Sanitation District once equipment installation is complete. Hard line phone access is still being investigated for this site.

The sampling methods and sample handling procedures used during the 2004/05 monitoring year are based on EPA Method 1669 and are described in the revised *Ventura Countywide Stormwater Monitoring Program: Water Quality Monitoring Standard Operating Procedures 2000-2005 Stormwater Monitoring* (LWA, 2001) – a document also referred to as the *Land Use and Receiving Water Guide*. The sampling methods and sample handling procedures employed at Mass Emission monitoring sites are also based on EPA Method 1669 and are described in *Ventura Countywide Stormwater Monitoring Program: Mass Emission Stations Water Quality Monitoring Standard Operating Procedures 2000-2005* (VCWPD,

2003) – a document also referred to as the *Mass Emission Guide*. The parameters required to be monitored by the Stormwater Monitoring Program are described as a part of NPDES Permit No. CAS004002 Section No. CL 7388.

At Mass Emission, Receiving Water, and Land Use sites, both composite and grab samples are collected. Composite samples are collected in glass containers and then delivered to the lab where they are split by pouring off with a tipper. When the splitting of a composite sample is performed, the composite sample is continually rocked in a sample-pouring stand to provide as much "non-invasive" mixing as possible. Sample splitting allows homogeneous aliquots of a single large water sample to be divided into several smaller samples for the purpose of delivering these smaller volumes of water to individual analytical laboratories as necessary. The volume of sample collected depends upon the volume required by the lab to perform requested water quality and QA/QC analyses.

In an effort to maintain quality control for the sampling program, the sampling crew, in cooperation with the analytical laboratories, has minimized the number of laboratories and sample bottles used for analysis. This has minimized bottle breakage, increased efficiency, and reduced the chances for contamination of the samples. Also, a dedicated monitoring team is used to provide consistent sample collection and better quality control. All sites now feature automated flow measurement and sample collection that help to streamline the monitoring program and centralize sample collection. Remote access capability at all but two Land Use monitoring sites (I-2 and R-1) also provides data-on-demand which allows immediate onsite evaluation of stream conditions.

For constituents analyzed from samples required to be collected as “grabs”, samples are ideally taken at the peak runoff flow to provide the best estimate for an event mean concentration (EMC). In practice it is difficult to both predict the peak flow and to allocate manpower such that all sites are grab-sampled at the storm event peak flow. It should be noted that peak flow times vary for each monitoring station due to the size and inherent characteristics of the watershed in which the site is located. All grab and composite wet weather samples collected during the 2004/2005 monitoring season are considered best available estimates of storm EMCs. During dry weather, time-paced composite samples are collected at each site over a 24 to 48-hour period. Dry weather grab samples are collected during this composite sample period. Table 9-14 summarizes the samples collected at each of the monitoring locations during the 2004/05 monitoring season.

Table 9-14: 2004/05 Monitoring Event Summary

(Storm/ Dry) Event Number	*(Storm/ Dry) Event Date*	*A-1 Wood Road*	*I-2 Ortega Street*	*R-1 Swan Street*	*W-3 La Vista Avenue*	*W-4 Revolon Slough*	*ME-CC Calleguas Creek-CSUCI*	*ME-SCR Santa Clara River*	*ME-VR Ventura River-Foster Park*
1	10/16/04	CGT	CGT	CGT	CGT	CGT	CGT	CGT	CGT
2	10/26/04	-	-	-	-	-	CGT	CGT	CGT
3	12/4/04	-	-	-	-	-	CG	CG	CG
4	1/7/05	-	-	-	-	-	CG	CG	CG
5	5/3/05	-	-	-	-	-	CGT	CGT	CGT*
6	6/22/05	-	-	-	-	-	CG	CG	CG*

Notes

*Event 5 (5/3/2005) and Event 6 (6/22/2005) water quality samples were collected at monitoring site ME-VR2, Ventura River at Ojai Valley Sanitation District Treatment Plant.

“C” indicates that composite samples were collected.

“G” indicates that grab samples were collected.

“T” indicates that toxicity samples were collected.

“-“ indicates that no samples were collected.

Figure 9-33: Grab Sample Collection in the Ventura River using EPA Sampling Protocols

Figure 9-34: Grab Sample Collection in Calleguas Creek using EPA Sampling Protocols

9.7 Analyses Performed

Stormwater Monitoring Program analyses include those for anions, bacteriologicals, conventionals, hydrocarbons, trace metals, nutrients, semi- and non-volatile organics, PCBs, various pesticides, including chlorinated and organophosphorus compounds, acute and chronic toxicity, and bioassessment.

- CRG Marine Laboratories, Inc. of Torrance, CA performed all tests except for perchlorate, BOD, TOC, MTBE, mercury (Events 1 – 3), toxicity, bioassessment, bacteria, and some pesticides;
- Calscience Environmental Laboratories, Inc. performed the following analyses: perchlorate, BOD, TOC, MTBE, 2,4,5-T, 2,4,5-TP (Silvex), 2,4-D, 2,4-DB,Dalapon, Dicamba, Dichlorprop, Dinoseb, MCPA, and MCPP;
- Brooks Rand Laboratory performed low detection limit analysis for mercury samples (except Event 4 – 6 when samples were analyzed by CRG);
- Ventura County Health Care Agency Laboratory performed bacteriological tests for E.Coli, Enterococcus, and Total and Fecal Coliforms;
- Soil Control Lab was used to perform Total Kjeldahl Nitrogen (TKN) analyses for Events 1 – 5;
- Thomas Analytical Laboratory was used to perform Total Kjeldahl Nitrogen (TKN) analyses for Event 6;
- MWH Laboratories was used to analyze for Glyphosate for Events 1 – 4 and 6;
- Weck Laboratories, Inc. was used to analyze for Glyphosate for Event 5; and
- Aquatic Bioassay & Consulting Laboratories, Inc. performed all toxicity tests.

Analytical methods employed by all laboratories comply with those outlined in the permit. The methods allow the laboratories to achieve the lowest possible detection limits.

The aquatic toxicity tests were conducted by Aquatic Bioassay & Consulting Laboratories, Inc. of Ventura, CA under the guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA 600/4-85/013). The toxicity tests included acute *Ceriodaphnia dubia* survival and chronic red abalone (*Haliotus rufescens*) shell development bioassays. Aquatic Bioassay & Consulting also performed the macroinvertebrate bioassessment testing (including taxonomic identification and data analysis) discussed in Section 9.2 in addition to toxicity bioassays.

Table 9-15 provides a complete listing of the constituents and associated analytical methods for all water quality analyses conducted by the Stormwater Monitoring Program during the 2004/05 monitoring year.

Table 9-15: Constituents and Analytical Methods for Water Quality Analyses Conducted by the Stormwater Monitoring Program 2004/05

Classification	*Constituent*	*Fraction*	*Method*	*Analytical Laboratory*
Anion Analyses	Bromide	n/a	SM 4500-Br	CRG
	Chloride	n/a	SM 4500-Cl E	CRG
	Perchlorate	n/a	EPA 314.0	Calscience
Bacteriological Analyses	E. Coli	n/a	MMO-MUG	VCHCA
	Enterococcus	n/a	Enterolert	VCHCA
	Fecal Coliform	n/a	SM 9221E	VCHCA
	Total Coliform	n/a	MMO-MUG	VCHCA
Conventional Analyses	BOD	n/a	EPA 405.1	Calscience
	Conductivity	n/a	SM 2510	CRG
	Hardness as CaCO3	Total	SM 2340B	CRG
	pH	n/a	EPA 150.1	CRG
	Total Dissolved Solids	n/a	SM 2540C	CRG
	Total Organic Carbon	n/a	EPA 415.1	Calscience
	Total Suspended Solids	n/a	SM 2540D	CRG
	Turbidity	n/a	EPA 180.1	CRG
Hydrocarbon Analyses	Oil and Grease	n/a	EPA 1664A	CRG
	TRPH	n/a	EPA 418.1	CRG
Metals Analyses	Aluminum	Dissolved	EPA 200.8	CRG
	Aluminum	Total	EPA 200.8	CRG
	Arsenic	Dissolved	EPA 200.8	CRG
	Arsenic	Total	EPA 200.8	CRG
	Cadmium	Dissolved	EPA 200.8	CRG
	Cadmium	Total	EPA 200.8	CRG
	Chromium	Dissolved	EPA 200.8	CRG
	Chromium	Total	EPA 200.8	CRG
	Chromium VI	Total	SM 3500-Cr	CRG
	Copper	Dissolved	EPA 200.8	CRG
	Copper	Total	EPA 200.8	CRG
	Lead	Dissolved	EPA 200.8	CRG
	Lead	Total	EPA 200.8	CRG
	Mercury	Dissolved	EPA 1631E	BR/CRG
	Mercury	Total	EPA 1631E	BR/CRG
	Nickel	Dissolved	EPA 200.8	CRG
	Nickel	Total	EPA 200.8	CRG
	Selenium	Dissolved	EPA 200.8	CRG
	Selenium	Total	EPA 200.8	CRG
	Silver	Dissolved	EPA 200.8	CRG
	Silver	Total	EPA 200.8	CRG
	Thallium	Dissolved	EPA 200.8	CRG
	Thallium	Total	EPA 200.8	CRG
	Zinc	Dissolved	EPA 200.8	CRG
	Zinc	Total	EPA 200.8	CRG

Table 9–15 (Continued): Constituents and Analytical Methods for Water Quality Analyses Conducted by the Stormwater Monitoring Program 2004/05

Classification	*Constituent*	*Fraction*	*Method*	*Analytical Laboratory*
Nutrient Analyses	Ammonia as N	n/a	SM 4500-NH3 F	CRG
	Nitrate as N	n/a	SM 4500-NO3 E / EPA 300.0	CRG
	Nitrite as N	n/a	SM 4500-NO2 B / EPA 300.0	CRG
	Orthophosphate as P	Total	SM 4500-P C / EPA 300.0	CRG
	TKN	n/a	EPA 351.3 / EPA 351.1	SCL / TA
	Total Phosphorus	Dissolved	SM 4500-P C	CRG
	Total Phosphorus	Total	SM 4500-P C	CRG
Organic Analyses	1,2,4-Trichlorobenzene	n/a	EPA 625	CRG
	1,2-Dichlorobenzene	n/a	EPA 625	CRG
	1,3-Dichlorobenzene	n/a	EPA 625	CRG
	1,4-Dichlorobenzene	n/a	EPA 625	CRG
	1-Methylnaphthalene	n/a	EPA 625	CRG
	1-Methylphenanthrene	n/a	EPA 625	CRG
	2,3,5-Trimethylnaphthalene	n/a	EPA 625	CRG
	2,4,6-Trichlorophenol	n/a	EPA 625	CRG
	2,4-Dichlorophenol	n/a	EPA 625	CRG
	2,4-Dimethylphenol	n/a	EPA 625	CRG
	2,4-Dinitrophenol	n/a	EPA 625	CRG
	2,4-Dinitrotoluene	n/a	EPA 625	CRG
	2,6-Dimethylnaphthalene	n/a	EPA 625	CRG
	2,6-Dinitrotoluene	n/a	EPA 625	CRG
	2-Chloronaphthalene	n/a	EPA 625	CRG
	2-Chlorophenol	n/a	EPA 625	CRG
	2-Methyl-4,6-dinitrophenol	n/a	EPA 625	CRG
	2-Methylnaphthalene	n/a	EPA 625	CRG
	2-Nitrophenol	n/a	EPA 625	CRG
	3,3'-Dichlorobenzidine	n/a	EPA 625	CRG
	4-Bromophenyl phenyl ether	n/a	EPA 625	CRG
	4-Chloro-3-methylphenol	n/a	EPA 625	CRG
	4-Chlorophenyl phenyl ether	n/a	EPA 625	CRG
	4-Nitrophenol	n/a	EPA 625	CRG
	Acenaphthene	n/a	EPA 625	CRG
	Acenaphthylene	n/a	EPA 625	CRG
	Anthracene	n/a	EPA 625	CRG
	Azobenzene	n/a	EPA 625	CRG
	Benzidine	n/a	EPA 625	CRG
	Benzo(a)anthracene	n/a	EPA 625	CRG
	Benzo(a)pyrene	n/a	EPA 625	CRG
	Benzo(b)fluoranthene	n/a	EPA 625	CRG

Table 9–15 (Continued): Constituents and Analytical Methods for Water Quality Analyses Conducted by the Stormwater Monitoring Program 2004/05

Classification	*Constituent*	*Fraction*	*Method*	*Analytical Laboratory*
Organic Analyses	Benzo(e)pyrene	n/a	EPA 625	CRG
	Benzo(g,h,i)perylene	n/a	EPA 625	CRG
	Benzo(k)fluoranthene	n/a	EPA 625	CRG
	Biphenyl	n/a	EPA 625	CRG
	Bis(2-chloroethoxy)methane	n/a	EPA 625	CRG
	Bis(2-chloroethyl)ether	n/a	EPA 625	CRG
	Bis(2-chloroisopropyl)ether	n/a	EPA 625	CRG
	Bis(2-ethylhexyl)phthalate	n/a	EPA 625	CRG
	Butyl benzyl phthalate	n/a	EPA 625	CRG
	Chrysene	n/a	EPA 625	CRG
	Dibenz(a,h)anthracene	n/a	EPA 625	CRG
	Dibenzothiophene	n/a	EPA 625	CRG
	Diethyl phthalate	n/a	EPA 625	CRG
	Dimethyl phthalate	n/a	EPA 625	CRG
	Di-n-butylphthalate	n/a	EPA 625	CRG
	Di-n-octylphthalate	n/a	EPA 625	CRG
	Fluoranthene	n/a	EPA 625	CRG
	Fluorene	n/a	EPA 625	CRG
	Hexachlorobenzene	n/a	EPA 625	CRG
	Hexachlorobutadiene	n/a	EPA 625	CRG
	Hexachlorocyclopentadiene	n/a	EPA 625	CRG
	Hexachloroethane	n/a	EPA 625	CRG
	Indeno(1,2,3-cd)pyrene	n/a	EPA 625	CRG
	Isophorone	n/a	EPA 625	CRG
	Methyl tert-butyl ether (MTBE)	n/a	EPA 8260B	Calscience
	Naphthalene	n/a	EPA 625	CRG
	Nitrobenzene	n/a	EPA 625	CRG
	N-Nitrosodimethylamine	n/a	EPA 625	CRG
	N-Nitrosodi-N-propylamine	n/a	EPA 625	CRG
	N-Nitrosodiphenylamine	n/a	EPA 625	CRG
	Pentachlorophenol	n/a	EPA 625	CRG
	Perylene	n/a	EPA 625	CRG
	Phenanthrene	n/a	EPA 625	CRG
	Phenol	n/a	EPA 625	CRG
	Pyrene	n/a	EPA 625	CRG
	Total Detectable PAHs	n/a	EPA 625	CRG
PCB Analyses	Aroclor 1016	n/a	EPA 625	CRG
	Aroclor 1221	n/a	EPA 625	CRG
	Aroclor 1232	n/a	EPA 625	CRG
	Aroclor 1242	n/a	EPA 625	CRG
	Aroclor 1248	n/a	EPA 625	CRG

Table 9–15 (Continued): Constituents and Analytical Methods for Water Quality Analyses Conducted by the Stormwater Monitoring Program 2004/05

Classification	*Constituent*	*Fraction*	*Method*	*Analytical Laboratory*
PCB Analyses	Aroclor 1254	n/a	EPA 625	CRG
	Aroclor 1260	n/a	EPA 625	CRG
	PCB 018	n/a	EPA 625	CRG
	PCB 028	n/a	EPA 625	CRG
	PCB 031	n/a	EPA 625	CRG
	PCB 033	n/a	EPA 625	CRG
	PCB 037	n/a	EPA 625	CRG
	PCB 044	n/a	EPA 625	CRG
	PCB 049	n/a	EPA 625	CRG
	PCB 052	n/a	EPA 625	CRG
	PCB 066	n/a	EPA 625	CRG
	PCB 070	n/a	EPA 625	CRG
	PCB 074	n/a	EPA 625	CRG
	PCB 077	n/a	EPA 625	CRG
	PCB 081	n/a	EPA 625	CRG
	PCB 087	n/a	EPA 625	CRG
	PCB 095	n/a	EPA 625	CRG
	PCB 097	n/a	EPA 625	CRG
	PCB 099	n/a	EPA 625	CRG
	PCB 101	n/a	EPA 625	CRG
	PCB 105	n/a	EPA 625	CRG
	PCB 110	n/a	EPA 625	CRG
	PCB 114	n/a	EPA 625	CRG
	PCB 118	n/a	EPA 625	CRG
	PCB 119	n/a	EPA 625	CRG
	PCB 123	n/a	EPA 625	CRG
	PCB 126	n/a	EPA 625	CRG
	PCB 128 + 167	n/a	EPA 625	CRG
	PCB 138	n/a	EPA 625	CRG
	PCB 141	n/a	EPA 625	CRG
	PCB 149	n/a	EPA 625	CRG
	PCB 151	n/a	EPA 625	CRG
	PCB 153	n/a	EPA 625	CRG
	PCB 156	n/a	EPA 625	CRG
	PCB 157	n/a	EPA 625	CRG
	PCB 158	n/a	EPA 625	CRG
	PCB 168 + 132	n/a	EPA 625	CRG
	PCB 169	n/a	EPA 625	CRG
	PCB 170	n/a	EPA 625	CRG
	PCB 177	n/a	EPA 625	CRG
	PCB 180	n/a	EPA 625	CRG
	PCB 183	n/a	EPA 625	CRG

Table 9–15 (Continued): Constituents and Analytical Methods for Water Quality Analyses Conducted by the Stormwater Monitoring Program 2004/05

Classification	*Constituent*	*Fraction*	*Method*	*Analytical Laboratory*
PCB Analyses	PCB 187	n/a	EPA 625	CRG
	PCB 189	n/a	EPA 625	CRG
	PCB 194	n/a	EPA 625	CRG
	PCB 200	n/a	EPA 625	CRG
	PCB 201	n/a	EPA 625	CRG
	PCB 206	n/a	EPA 625	CRG
	Total Detectable PCBs	n/a	EPA 625	CRG
Pesticide Analyses	2,4,5-T	n/a	EPA 8151A	Calscience
	2,4,5-TP (Silvex)	n/a	EPA 8151A	Calscience
	2,4-D	n/a	EPA 8151A	Calscience
	2,4-DB	n/a	EPA 8151A	Calscience
	2,4'-DDD	n/a	EPA 625	CRG
	2,4'-DDE	n/a	EPA 625	CRG
	2,4'-DDT	n/a	EPA 625	CRG
	4,4'-DDD	n/a	EPA 625	CRG
	4,4'-DDE	n/a	EPA 625	CRG
	4,4'-DDT	n/a	EPA 625	CRG
	Aldrin	n/a	EPA 625	CRG
	BHC-alpha	n/a	EPA 625	CRG
	BHC-beta	n/a	EPA 625	CRG
	BHC-delta	n/a	EPA 625	CRG
	BHC-gamma (Lindane)	n/a	EPA 625	CRG
	Bolstar	n/a	EPA 625	CRG
	Chlordane-alpha	n/a	EPA 625	CRG
	Chlordane-gamma	n/a	EPA 625	CRG
	Chlorpyrifos	n/a	EPA 625	CRG
	Dalapon	n/a	EPA 8151A	Calscience
	Demeton-O	n/a	EPA 625	CRG
	Diazinon	n/a	EPA 625	CRG
	Dicamba	n/a	EPA 8151A	Calscience
	Dichlorprop	n/a	EPA 8151A	Calscience
	Dichlorvos	n/a	EPA 625	CRG
	Dieldrin	n/a	EPA 625	CRG
	Dimethoate	n/a	EPA 625	CRG
	Dinoseb	n/a	EPA 8151A	Calscience
	Disulfoton	n/a	EPA 625	CRG
	Endosulfan sulfate	n/a	EPA 625	CRG
	Endosulfan-I	n/a	EPA 625	CRG
	Endosulfan-II	n/a	EPA 625	CRG
	Endrin	n/a	EPA 625	CRG
	Endrin aldehyde	n/a	EPA 625	CRG

Table 9–15 (Continued): Constituents and Analytical Methods for Water Quality Analyses Conducted by the Stormwater Monitoring Program 2004/05

Classification	*Constituent*	*Fraction*	*Method*	*Analytical Laboratory*
Pesticide Analyses	Endrin ketone	n/a	EPA 625	CRG
	Ethoprop	n/a	EPA 625	CRG
	Fenchlorophos (Ronnel)	n/a	EPA 625	CRG
	Fensulfothion	n/a	EPA 625	CRG
	Fenthion	n/a	EPA 625	CRG
	Glyphosate	n/a	EPA 547	MWH / WL
	Heptachlor	n/a	EPA 625	CRG
	Heptachlor epoxide	n/a	EPA 625	CRG
	Malathion	n/a	EPA 625	CRG
	MCPA	n/a	EPA 8151A	Calscience
	MCPP	n/a	EPA 8151A	Calscience
	Merphos	n/a	EPA 625	CRG
	Methoxychlor	n/a	EPA 625	CRG
	Methyl parathion	n/a	EPA 625	CRG
	Mevinphos	n/a	EPA 625	CRG
	Mirex	n/a	EPA 625	CRG
	Oxychlordane	n/a	EPA 625	CRG
	Phorate	n/a	EPA 625	CRG
	Tetrachlorovinphos (Stirofos)	n/a	EPA 625	CRG
	Tokuthion	n/a	EPA 625	CRG
	Total Detectable DDTs	n/a	EPA 625	CRG
	Toxaphene	n/a	EPA 625	CRG
	trans-Nonachlor	n/a	EPA 625	CRG
	Trichloronate	n/a	EPA 625	CRG

9.7.1 Land Use and Receiving Water Characterization Sites

A summary of the composite and grab samples (including field duplicates, lab duplicates, and matrix spike samples) collected and analyzed during the 2004/05 monitoring year for the Land Use and Receiving Water sites are shown in Table 9-16 and Table 9-17, respectively.

Table 9-16: Environmental and QA/QC Samples Collected at Land Use Sites

Event	***Event 1***		
Monitoring Site	***A-1***	***R-1***	***I-2***
Date	***10/16/2004***	***10/16/2004***	***10/16/2004***
Composite Constituents			
Bromide	✓	✓ (LD)	✓
Chloride	✓	✓ (LD)	✓
BOD[1]	✓	✓ (LD)	✓
Hardness as $CaCO_3$	✓	✓ (LD)	✓
Total Dissolved Solids	✓	✓ (LD)	✓
Total Organic Carbon[1]	✓	✓ (LD)	✓
Total Suspended Solids	✓	✓ (LD)	✓
Metals, Total Recoverable	✓	✓ (LD)	✓
Metals, Dissolved	✓	✓ (LD)	✓
Chromium VI	✓	✓ (LD, MD/MSD)	✓
Nitrate as N	✓	✓ (LD, MD/MSD)	✓
Nitrite as N	✓	✓ (LD, MD/MSD)	✓
Orthophosphate as P	✓	✓ (LD, MD/MSD)	✓
TKN[2]	✓	✓ (LD)	✓
Total Phosphorus, Total	✓	✓ (LD, MD/MSD)	✓
Total Phosphorus, Dissolved	✓	✓ (LD)	✓
Organic – EPA 625	✓	✓ (LD)	✓
PCB – EPA 625	✓	✓ (LD)	✓
Pesticide – EPA 547[3]	✓	✓ (LD R)	R
Pesticide – EPA 625	✓	✓ (LD)	✓
Pesticide – EPA 8151A[1]	✓	✓ (LD)	✓
Grab Constituents			
Perchlorate[1]	✓	✓ (FD)	✓
Bacteriological[4]	✓	✓ (FD)	✓
pH/Conductivity	✓	✓ (FD)	✓
Hydrocarbons	✓	✓ (FD)	✓
Mercury, Total Recoverable[5]	✓	✓ (FD)	✓
Mercury, Dissolved[5]	✓	✓ (FD, MD/MSD)	✓
Ammonia as N	✓	✓ (FD, MD/MSD)	✓
MTBE – EPA 8260B[1]	✓	✓ (FD)	✓
Aquatic Toxicity Bioassay[6]	✓	✓	✓

Notes

"✓" indicates that the analysis was performed; "—" indicates that no sample was collected.
"R" indicates that the environmental or QA/QC analysis was performed, but subsequently rejected.
"FD" indicates that a field duplicate analysis was performed.
"LD" indicates that a laboratory duplicate analysis was performed.
"MS/MSD" indicates that a matrix spike/matrix spike duplicate analysis was performed.
Hydrocarbons include: Oil & Grease, TRPH; Metals include: Al, As, Cd, Cr, Cu, Pb, Ni, Se, Ag, Tl, & Zn.
Unless noted otherwise, all analyses performed by CRG Marine Laboratories, Inc.

1. Performed by Calscience Environmental Laboratories, Inc.
2. Performed by Soil Control Lab
3. Performed by MWH Laboratories
4. Performed by Ventura County HCA Laboratories
5. Performed by Brooks Rand Laboratory.
6. Performed by Aquatic Bioassay & Consulting Labs, Inc.

Table 9-17: Environmental and QA/QC Samples Collected at Receiving Water Sites

Event	***Event 1***	
Monitoring Site	***W-3***	***W-4***
Date	***10/17/2004***	***10/16/2004***
Composite Constituents		
Bromide	✓	✓
Chloride	✓	✓
BOD[1]	✓	✓
Hardness as $CaCO_3$	✓	✓
Total Dissolved Solids	✓	✓
Total Organic Carbon[1]	✓	✓
Total Suspended Solids	✓	✓
Metals, Total Recoverable	✓	✓
Metals, Dissolved	✓	✓
Chromium VI	✓	✓
Nitrate as N	✓	✓
Nitrite as N	✓	✓
Orthophosphate as P	✓	✓
TKN[2]	✓	✓
Total Phosphorus, Total	✓	✓
Total Phosphorus, Dissolved	✓	✓
Organic – EPA 625	✓	✓
PCB – EPA 625	✓	✓
Pesticide – EPA 547[3]	✓	✓
Pesticide – EPA 625	✓	✓
Pesticide – EPA 8151A[1]	✓	✓
Grab Constituents		
Perchlorate[1]	✓	✓
Bacteriological[4]	✓	✓
pH/Conductivity	✓	✓ (LD)
Hydrocarbons	✓	✓
Mercury, Total Recoverable[5]	✓	✓
Mercury, Dissolved[5]	✓	✓
Ammonia as N	✓	✓
MTBE – EPA 8260B[1]	✓	✓
Aquatic Toxicity Bioassay[6]	✓	✓

Notes

"✓" indicates that the analysis was performed; "—" indicates that no sample was collected.
"R" indicates that the environmental or QA/QC analysis was performed, but subsequently rejected.
"FB" indicates that a field blank analysis was performed.
"FD" indicates that a field duplicate analysis was performed.
"LD" indicates that a laboratory duplicate analysis was performed.
"MS/MSD" indicates that a matrix spike/matrix spike duplicate analysis was performed.
Hydrocarbons include: Oil & Grease, TRPH
Metals include: Al, As, Cd, Cr, Cu, Pb, Ni, Se, Ag, Tl, & Zn.
Unless noted otherwise, all analyses performed by CRG Marine Laboratories, Inc.
1. Performed by Calscience Environmental Laboratories, Inc.
2. Performed by Soil Control Lab
3. Performed by MWH Laboratories
4. Performed by Ventura County HCA Laboratories
5. Performed by Brooks Rand Laboratory.
6. Performed by Aquatic Bioassay & Consulting Labs, Inc.

9.7.2 Mass Emission Sites

A summary of the composite and grab samples (including field blanks, field duplicates, lab duplicates, and matrix spike samples) collected and analyzed during the 2004/05 monitoring year at the Mass Emission monitoring sites are shown in Table 9-18 through Table 9-23.

Table 9-18: Composite Environmental and QA/QC Samples Collected at the Mass Emission Site ME-CC

	ME-CC Calleguas Creek					
Event	***Event 1***	***Event 2***	***Event 3***	***Event 4***	***Event 5***	***Event 6***
Date	***10/16/04***	***10/26/04***	***12/4/04***	***1/7/05***	***5/3/05***	***6/22/05***
Composite Constituents						
Bromide	✓	✓	✓ (LD)	✓	✓	✓ (LD)
Chloride	✓	✓	✓ (MD/MSD)	✓	✓	✓ (MD/MSD)
BOD[1]	✓	✓	✓	✓	✓	
Hardness as $CaCO_3$	✓	✓ (FB)	✓ (LD)	✓	✓ (FB)	✓ (LD)
Total Dissolved Solids	✓	✓	✓ (LD)	✓	✓	✓
Total Organic Carbon[1]	✓	✓	✓	✓	✓	✓
Total Suspended Solids	✓	✓	✓ (LD)	✓	✓	✓
Turbidity	—	—	—	—	✓	✓
Metals, Total Recoverable	✓ (MD/MSD)	✓ (FB)	✓ (LD, MD/MSD)	✓ (LD, MD/MSD)	✓ (FB)	✓ (LD)
Metals, Dissolved	✓	✓	✓ (LD)	✓ (LD)	✓	✓ (LD)
Chromium VI	✓	R	✓ (MD/MSD)	✓ (MD/MSD)	✓	✓ (MD/MSD)
Nitrate as N	✓	✓	✓ (MD/MSD)	✓	✓ (MD/MSD)	✓ (MD/MSD)
Nitrite as N	✓	✓	✓	✓	✓ (MD/MSD)	✓ (MD/MSD)
Orthophosphate as P	✓	✓	✓ (MD/MSD)	✓	✓	✓ (MD/MSD)
TKN[2,7]	✓	✓	✓ (MD/MSD)	✓	✓	✓ (LD)[TA]
Total Phos., Total	✓	✓	✓ (MD/MSD)	✓	✓	✓
Total Phos., Dissolved	✓	✓	✓ (MD/MSD)	✓	✓	✓
Organic – EPA 625	✓ (MD/MSD)	✓ (FB)	✓ (MD/MSD)	✓ (MD/MSD)	✓ (FB)	✓
PCB – EPA 625	✓ (MD/MSD)	✓ (FB)	✓ (MD/MSD)	✓ (MD/MSD)	✓ (FB)	✓
Pesticide – EPA 547[3,8]	✓	✓	✓	✓	✓ [WL]	✓
Pesticide – EPA 625	✓ (MD/MSD)	✓ (FB)	✓ (MD/MSD)	✓ (MD/MSD)	✓ (FB)	✓
Pesticide – EPA 8151A[1]	✓ (MD/MSD)	✓	✓ (MD/MSD)	✓ (MD/MSD)	✓	✓

Notes – See bottom of Table 9-19.

Table 9-19: Grab Environmental and QA/QC Samples Collected at Mass Emission Site ME-CC

	ME-CC Calleguas Creek					
Event	***Event 1***	***Event 2***	***Event 3***	***Event 4***	***Event 5***	***Event 6***
Date	***10/16/04***	***10/26/04***	***12/4/04***	***1/7/05***	***5/3/05***	***6/22/05***
Grab Constituents						
Perchlorate[1]	✓	✓ (MD/MSD)	✓	✓	✓ (MD/MSD)	✓
Bacteriological[4]	✓	✓ (FB)	✓	✓	✓ (FB)	✓
pH/Conductivity	✓	✓	✓	✓	✓	✓ (LD)
Hydrocarbons	✓	✓	✓	✓	✓	✓
Mercury, Total Recoverable[5]	✓ (MD/MSD)	✓ (FB)	✓ (MD/MSD)	✓ CRG	✓ (FB) CRG	✓ CRG
Mercury, Dissolved[5]	✓	✓ (FB)	✓	✓ (MD/MSD) CRG	✓ CRG	✓ CRG
Ammonia as N	✓	✓	✓	✓	✓	✓
Aquatic Toxicity Bioassay[6]	✓	✓	—	—	✓	—

Notes

"✓" indicates that the analysis was performed; "—" indicates that no sample was collected.
"R" indicates that the environmental or QA/QC analysis was performed, but subsequently rejected.
"FB" indicates that a field blank analysis was performed.
"LD" indicates that a laboratory duplicate analysis was performed.
"MS/MSD" indicates that a matrix spike/matrix spike duplicate analysis was performed.
Hydrocarbons include: Oil & Grease, TRPH
Metals include: Al, As, Cd, Cr, Cu, Pb, Ni, Se, Ag, Tl, & Zn.
Unless noted otherwise, all analyses performed by CRG Marine Laboratories, Inc.

1. Performed by Calscience Environmental Laboratories, Inc.
2. Performed by Soil Control Lab
3. Performed by MWH Laboratories
4. Performed by Ventura County HCA Laboratories
5. Performed by Brooks Rand Laboratory.
6. Performed by Aquatic Bioassay & Consulting Labs, Inc.
7. Performed by Thomas Analytical Laboratory
8. Performed by Weck Laboratories, Inc.

Table 9-20: Composite Environmental and QA/QC Samples Collected at the Mass Emission Sites ME-VR and ME-VR2

Ventura River	*ME-VR*				*ME-VR2*	
Event	*Event 1*	*Event 2*	*Event 3*	*Event 4*	*Event 5*	*Event 6*
Date	*10/16/04*	*10/26/04*	*12/4/04*	*1/7/05*	*5/3/05*	*6/22/05*
Composite Constituents						
Bromide	✓	✓ (FD, LD)	✓	✓ (LD)	✓ (LD)	✓
Chloride	✓	✓ (FD, MD/MSD)	✓	✓ (LD, MD/MSD)	✓ (MD/MSD)	✓
BOD[1]	✓	✓ (FD)	✓	✓	✓	✓ (LD)
Hardness as $CaCO_3$	✓ (FB)	✓ (FD, LD)	✓	✓ (LD)	✓	✓
Total Dissolved Solids	✓	✓ (FD)	✓	✓	✓ (LD)	✓ (LD)
Total Organic Carbon[1]	✓	✓ (FD)	✓ (MD/MSD)	✓	✓	✓
Total Suspended Solids	✓	✓ (FD)	✓	✓	✓	✓
Turbidity	—	—	—	—	✓ (LD)	✓ (LD)
Metals, Total Recoverable	✓ (FB)	✓ (FD, LD)	✓	✓	✓ (LD)	✓ (MD/MSD)
Metals, Dissolved	✓ (FB)	✓ (FD, LD)	✓	✓	✓ (LD)	✓
Chromium VI	✓	✓ (FD)	✓	✓ (MD/MSD)	✓ (MD/MSD)	✓
Nitrate as N	✓	✓ (FD, MD/MSD)	✓	✓ (MD/MSD)	✓	✓
Nitrite as N	✓	✓ (FD, MD/MSD)	✓	✓ (MD/MSD)	✓	✓
Orthophosphate as P	✓	✓ (FD, MD/MSD)	✓	✓ (MD/MSD)	✓ (MD/MSD)	✓
TKN[2,7]	✓	✓ (FD)	✓ (LD)	✓	✓	✓ [1A]
Total Phos., Total	✓	✓ (FD)	✓	✓ (MD/MSD)	✓ (MD/MSD)	✓
Total Phos., Dissolved	✓	✓ (FD, MD/MSD)	✓	✓	✓ (MD/MSD)	✓
Organic – EPA 625	✓ (FB)	✓ (FD)	✓	✓	✓	✓ (MD/MSD)
PCB – EPA 625	✓ (FB)	✓ (FD)	✓	✓	✓	✓ (MD/MSD)
Pesticide – EPA 547[3,8]	✓	✓ (FD)	✓	✓	✓ [WL]	✓
Pesticide – EPA 625	✓ (FB)	✓ (FD)	✓	✓	✓	✓ (MD/MSD)
Pesticide – EPA 8151A[1]	✓	✓ (FD)	✓	✓	✓	✓

Notes – See bottom of Table 9-21.

Table 9-21: Grab Environmental and QA/QC Samples Collected as Mass Emission Sites ME-VR and ME-VR2

Ventura River	*ME-VR*				*ME-VR2*	
Event	***Event 1***	***Event 2***	***Event 3***	***Event 4***	***Event 5***	***Event 6***
Date	***10/16/04***	***10/26/04***	***12/4/04***	***1/7/05***	***5/3/05***	***6/22/05***
Grab Constituents						
Perchlorate[1]	✓	✓ (FD)	✓	✓	✓	✓
Bacteriological[4]	✓ (FB)	✓ (FD)	✓	✓	✓	✓
pH/Conductivity	✓	✓ (FD, LD)	✓ (LD)	✓	✓ (LD)	✓
Hydrocarbons	✓	✓ (FD)	✓	✓	✓	✓
Mercury, Total Recoverable[5]	✓ (FB)	✓ (FD)	✓	✓ CRG	✓ CRG	✓ (MS/MSD) CRG
Mercury, Dissolved[5]	✓ (FB)	✓ (FD)	✓	✓ CRG	✓ CRG	✓
Ammonia as N	✓	✓ (FD, MD/MSD)	✓	✓	✓ (MD/MSD)	✓ (MD/MSD)
Aquatic Toxicity Bioassay[6]	✓	✓	—	—	✓	—

Notes

"✓" indicates that the analysis was performed; "—" indicates that no sample was collected.
"R" indicates that the environmental or QA/QC analysis was performed, but subsequently rejected.
"FB" indicates that a field blank analysis was performed.
"FD" indicates that a field duplicate analysis was performed.
"LD" indicates that a laboratory duplicate analysis was performed.
"MS/MSD" indicates that a matrix spike/matrix spike duplicate analysis was performed.
Hydrocarbons include: Oil & Grease, TRPH
Metals include: Al, As, Cd, Cr, Cu, Pb, Ni, Se, Ag, Tl, & Zn.
Unless noted otherwise, all analyses performed by CRG Marine Laboratories, Inc.

1. Performed by Calscience Environmental Laboratories, Inc.
2. Performed by Soil Control Lab
3. Performed by MWH Laboratories
4. Performed by Ventura County HCA Laboratories
5. Performed by Brooks Rand Laboratory.
6. Performed by Aquatic Bioassay & Consulting Labs, Inc.
7. Performed by Thomas Analytical Laboratory
8. Performed by Weck Laboratories, Inc.

Table 9-22: Composite Environmental and QA/QC Samples Collected at Mass Emission Site ME-SCR

	ME-SCR Santa Clara River					
Event	***Event 1***	***Event 2***	***Event 3***	***Event 4***	***Event 5***	***Event 6***
Date	***10/16/04***	***10/26/04***	***12/4/04***	***1/7/05***	***5/3/05***	***6/22/05***
Composite Constituents						
Bromide	✓	✓	✓	✓ (LD)	✓	✓ (FD)
Chloride	✓	✓	✓	✓ (LD)	✓	✓ (FD)
BOD[1]	✓	✓	✓	✓ (LD)	✓ (LD)	✓ (FD)
Hardness as $CaCO_3$	✓	✓	✓ (FB)	✓ (LD)	✓	✓ (FD)
Total Dissolved Solids	✓	✓	✓	✓ (LD)	✓	✓ (FD)
Total Organic Carbon[1]	✓	✓	✓	✓ (LD)	✓ (MD/MSD)	✓ (FD)
Total Suspended Solids	✓	✓	✓	✓ (LD)	✓	✓ (FD)
Turbidity	—	—	—	—	✓	✓ (FD)
Metals, Total Recoverable	✓	✓ (MD/MSD)	✓ (FB)	✓ (LD)	✓ (MD/MSD)	✓ (FD)
Metals, Dissolved	✓	✓	✓ (FB)	✓ (LD)	✓	✓ (FD)
Chromium VI	✓	R	✓	✓ (LD)	✓	✓ (FD)
Nitrate as N	✓	✓	✓	✓ (LD)	✓	✓ (FD)
Nitrite as N	✓	✓	✓	✓ (LD)	✓	✓ (FD)
Orthophosphate as P	✓	✓	✓	✓ (LD)	✓	✓ (FD)
TKN[2,7]	✓	✓ (LD)	✓	✓ (LD)	✓	✓ (FD)[1A]
Total Phos., Total	✓	✓	✓	✓ (LD)	✓	✓ (FD)
Total Phos., Dissolved	✓	✓	✓	✓ (LD)	✓	✓ (FD)
Organic – EPA 625	✓	✓ (MD/MSD)	✓ (FB)	✓ (LD)	✓ (MD/MSD)	✓ (FD)
PCB – EPA 625	✓	✓ (MD/MSD)	✓ (FB)	✓ (LD)	✓ (MD/MSD)	✓ (FD)
Pesticide – EPA 547[3,8]	✓	✓	✓	✓ (LD)	✓ [WL]	✓ (FD)
Pesticide – EPA 625	✓	✓ (MD/MSD)	✓ (FB)	✓ (LD)	✓ (MD/MSD)	✓ (FD)
Pesticide – EPA 8151A[1]	✓	✓ (MD/MSD)	✓	✓ (LD)	✓ (MD/MSD)	✓ (FD)

Notes – See bottom of Table 9-23.

Table 9-23: Grab Environmental and QA/QC Samples Collected at Mass Emission Site ME-SCR

	ME-SCR Santa Clara River					
Event	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Date	**10/16/04**	**10/26/04**	**12/4/04**	**1/7/05**	**5/3/05**	**6/22/05**
Grab Constituents						
Perchlorate[1]	✓	✓	✓	✓ (FD)	✓	✓ (FD)
Bacteriological[4]	✓	✓	✓ (FB)	✓ (FD)	✓	✓ (FD)
pH/Conductivity	✓	✓	✓	✓ (FD)	✓	✓ (FD)
Hydrocarbons	✓	✓	✓	✓ (FD)	✓	✓ (FD)
Mercury, Total Recoverable[5]	✓	✓ (LD, MD/MSD)	✓ (FB)	✓ (FD)[CRG]	✓ (LD, MD/MSD)[CRG]	✓ (FD, LD)[CRG]
Mercury, Dissolved[5]	✓	✓ (MD/MSD)	✓	✓ (FD)[CRG]	✓ [CRG]	✓ (FD)[CRG]
Ammonia as N	✓	✓	✓	✓	✓	✓ (FD)
Aquatic Toxicity Bioassay[6]	✓	✓	—	—	✓	—

Notes

"✓" indicates that the analysis was performed; "—" indicates that no sample was collected.
"R" indicates that the environmental or QA/QC analysis was performed, but subsequently rejected.
"FB" indicates that a field blank analysis was performed.
"LD" indicates that a laboratory duplicate analysis was performed.
"MS/MSD" indicates that a matrix spike/matrix spike duplicate analysis was performed.
Hydrocarbons include: Oil & Grease, TRPH
Metals include: Al, As, Cd, Cr, Cu, Pb, Ni, Se, Ag, Tl, & Zn.
Unless noted otherwise, all analyses performed by CRG Marine Laboratories, Inc.

1. Performed by Calscience Environmental Laboratories, Inc.
2. Performed by Soil Control Lab
3. Performed by MWH Laboratories
4. Performed by Ventura County HCA Laboratories
5. Performed by Brooks Rand Laboratory.
6. Performed by Aquatic Bioassay & Consulting Labs, Inc.
7. Performed by Thomas Analytical Laboratory
8. Performed by Weck Laboratories, Inc.

Table 9-16 through Table 9-23 include information related to QA/QC samples scheduled for collection and analysis by the Stormwater Monitoring Program, as well as results from unsolicited QA/QC analyses provided by various analytical laboratories. Unsolicited QA/QC analyses received by the Stormwater Monitoring Program during the 2004-2005 monitoring season took the forms of non-requested matrix spike and lab duplicate analyses provided by most laboratories. Since these additional QA/QC analyses provide valuable information related to the laboratory's ability to accurately (matrix spike analyses) and precisely (lab duplicate analyses) evaluate water quality samples, they were included in the Stormwater Monitoring Program's database and considered along with all requested QA/QC analyses during the Stormwater Monitoring Program's QA/QC evaluation.

9.8 Quality Assurance and Quality Control (QA/QC)

The following is a discussion of the results of the quality assurance and quality control (QA/QC) analysis performed on the 2004/05 stormwater quality monitoring data. The data were evaluated for overall sample integrity, holding time exceedances, contamination, accuracy, and precision using field- and lab-initiated QA/QC sample results according to EPA data evaluation guidance. QA/QC sample results are presented in Appendix D.

QA/QC sample collection and analysis relies upon QA/QC samples collected in the field (such as equipment blank, field blank, field duplicate, and matrix spike samples), as well as QA/QC samples prepared and analyzed by the analytical laboratory (i.e., lab-initiated samples, such as method blanks, filter blanks, and laboratory control spikes) performing the analysis. The actual chemical analysis of lab-initiated QA/QC samples is conducted in an identical manner as the analysis of field-collected environmental samples. After all analyses are complete, the results of the field-initiated and lab-initiated QA/QC sample results are compared to particular Data Quality Objectives (DQOs), also commonly referred to as QA/QC limits. These limits are typically established by the analytical laboratory based on EPA protocols and guidance. However, in some cases, the Stormwater Monitoring Program will set a particular DQO, such as the QA/QC limit for field duplicate results.

QA/QC sample results are evaluated in order to compare them to their appropriate QA/QC limits and identify those results that fall outside of these limits. This QA/QC evaluation occurs in two separate steps as the laboratory will review those results that fall outside of their QA/QC limits and typically label these results with some type of qualification or note. If a QA/QC sample result falls grossly outside of its associated QA/QC limit, and thus indicates that there is a major problem with the lab's instrumentation and/or analytical process, then the laboratory should re-run both the affected QA/QC and environmental samples as necessary. The second step in the QA/QC evaluation process occurs when the Stormwater Monitoring Program performs the overall sample integrity, holding time, contamination, accuracy, and precision checks mentioned above. This second evaluation step provides an opportunity to thoroughly review the Stormwater Monitoring Program's data to identify potential errors in a laboratory's reporting of analytical data and/or recognize any significant data quality issues that may need to be addressed. After this evaluation the Stormwater Monitoring Program is ready to qualify their environmental data as necessary based on the findings of the QA/QC assessment.

Environmental sample results are qualified in order to provide the user of the data with information regarding the quality of the data. Depending on the planned use of the data, qualifications may help to determine whether or not the data are appropriate for a given analysis. In general, data that are qualified with anything other than an "R" (meaning a rejected data point) are suitable for most analyses. However, the qualifications assigned to the data allow the user to assess the appropriateness of the data for a given use. The 2004/05 monitoring season marks the second time that the Stormwater Monitoring Program has used its NDPES Stormwater Quality Database to conduct a semi-automated QA/QC evaluation of the current season's data contained in the database. The use of the database allows the Stormwater Monitoring Program to expedite and standardize the QA/QC evaluation of its monitoring data. After reviewing the qualifications assigned to each qualified data point in the 2004/05 monitoring year data set, the environmental data are considered to be of high quality and sufficient for all future general uses. However, all data qualifiers should be reviewed and considered prior to the use of the data in a specific analysis or application. Environmental data from the 2004/05 monitoring season are presented in Appendix C.

This section provides a discussion of (1) the sample collection procedure for field-initiated QA/QC samples, (2) the QA/QC samples analyzed by the Stormwater Monitoring Program, along with a remark on QA/QC issues of significance observed during the 2004/05 season,

and (3) a summary of the 2004/05 QA/QC sample results presented in Table 9-33 through Table 9-39 at the end of this section.

9.8.1 Field-Initiated QA/QC Sample Collection

Both environmental and field-initiated QA/QC samples are collected in the field using clean sampling techniques. To minimize the potential for contamination, CRG Marine Laboratories, Inc. cleans all bottles used for grab and composite samples. Intake lines for the automated samplers are cleaned using nitric acid (30% dilution) and distilled water. A dedicated sampling crew is provided by VCWPD to ensure that consistent sample collection and handling techniques are followed.

Field-initiated QA/QC samples include equipment blanks, field blanks, and field duplicates. Equipment blanks are typically prepared prior to the start of the monitoring season to check that tubing and strainers, and sample containers – especially composite bottles – aren't sources of contamination for the Stormwater Monitoring Program's environmental samples. Automated sampler intake lines (i.e., sample tubing) are cleaned using nitric acid (30% dilution) prior to equipment blank correction. Equipment blanks are collected by passing blank water through cleaned tubing and into brand new sample bottles. Equipment blanks are collected using clean techniques, prior to on-site collection, before the equipment has been contaminated by environmental sample water or other sources. After collection, equipment blanks are submitted to the analytical laboratory and analyzed using the same methods as those used for routine, environmental sample analysis. CRG supplied new, clean sample bottles and blank water for equipment blanks analyzed for total recoverable and dissolved metals (EPA 200.8) and trace organic compounds (EPA 625). Brooks Rand Laboratory provided new sample containers and blank water for the analysis of total recoverable mercury (EPA 1631E).

Field blanks are collected using the same techniques as used for environmental sample collection, but instead of sample water, blank water is poured into the sample bottle while in the field. CRG supplied sample bottles and blank water for all field blank analyses except for those associated with bacteriological and mercury analyses. In these instances, VCHCA provides sample bottles and blank water for bacteriological analyses, while Brook Rand Laboratory (Events 1 – 3) and CRG (Events 4 – 6) provide sample bottles and blank water for mercury analyses. For metals (EPA 200.8) and organics, the blank water is de-ionized water. The de-ionized water is purified to 18 megOhm quality by CRG by passing it through de-ionized resin beads to remove ionic compounds, such as metals, and then through a carbon filter to remove organics.

Duplicates are collected in the field using the same techniques as used for all environmental sample collection. For composite samples a larger volume of water is sampled during the monitoring event, and then the duplicates are split in the lab while constantly mixing the contents of the composite containers. For grab samples two samples are collected side-by-side or in immediate succession into separate sample bottles.

9.8.2 QA/QC Sample Analysis and Issues of Significance

The QA/QC evaluation process identifies isolated incidents of out-of-range QA/QC results, but more importantly, identifies potential trends in laboratory and sampling performance. An important and ongoing component of the QA/QC evaluation program is to identify, report, and correct these problems as they arise. The types of QA/QC analyses and evaluations of these results performed during the 2004/05 monitoring season are described below, along with identified QA/QC issues associated with a particular QA/QC sample type.

As a member of Southern California Coastal Water Research Program's Stormwater Monitoring Coalition (SMC), VCWPD jointly sponsored the Stormwater Laboratory Intercalibration Study that was conducted by the SMC in 2003. Four analytical laboratories currently employed by the Stormwater Monitoring Program took part in the intercalibration

study: CRG Marine Laboratories, CalSceince Environmental Laboratories, MWH Laboratories, and Aquatic Bioassay & Consulting Laboratories. The goal of the study was to establish performance-based guidelines for the analysis of stormwater samples through the setting of minimum standards for sensitivity, precision, and accuracy across different analytical laboratories so that individual data sets can be combined with estimated levels of confidence for making regional assessments of stormwater quality. The study's performance-based guidelines are considered key in achieving comparability across laboratories.

In brief, the intercalibration study focused on inter-laboratory comparability between a core group of 15 target analytes including total suspended solids, nutrients, and trace metals. The study set reporting levels for its target constituents that were sufficient to assess if environmental samples contained pollutant concentrations below relevant water quality objectives, such as the California Toxics Rule. The study's authors believed that reporting levels should be technologically achievable, but far enough below water quality objectives that observed exceedances cannot be attributable to methodological uncertainty. The study also set accuracy and precision data quality objectives (DQOs) for the analysis of stormwater matrices. Laboratory precision was based on the reproducibility of replicate sample analyses, while laboratory accuracy was judged via the analysis of spike environmental samples and reference materials. It is believed that the study's performance-based guidelines will be useful to stormwater programs in establishing specifications for work assignments or requests for proposals (RFPs) to conduct stormwater analyses.

Currently the Stormwater Monitoring Program uses generally established QA/QC limits and information provided by the laboratories to evaluate the QA/QC sample results. With regard to the 2004/05 monitoring season, it should be noted that all laboratories analyzing the 15 target analytes considered in the intercalibration study were able to meet or go below the reporting levels set forth by the study. It is believed that the results of the Stormwater Laboratory Intercalibration Study, along with information gathered from the Stormwater Monitoring Program will help to refine QA/QC limits for the Ventura Countywide Stormwater Quality Management Program in the future.

For each type of QA/QC analysis conducted, a percent success rate is calculated. The success rate is defined as the total number of QA/QC samples of a given type minus the number of samples that fall outside of QA/QC limits divided by the total number of samples, multiplied by 100%.

$$Success\ Rate = \left(\frac{TNS - NSO}{TNS} \right) * 100\%$$

where: TNS is the total number of QA/QC samples of a given type

NSO is the number of QA/QC samples of a given type that fall outside of specific QA/QC limits

9.8.3 Field and Laboratory Duplicates

When duplicates are run, a sample is split into two separate samples and analyzed independently of one another within the laboratory. Field duplicates are split by the sampling crew and provide a measure of the variability of the field sampling techniques. Laboratory duplicates are split by the laboratory and provide information on the reproducibility of results by the lab.

The success of a duplicate is measured by the relative percent difference (RPD) between the environmental sample result and the duplicate result. The RPD is calculated using the following equation:

$$RPD = \left(\frac{|ES - D|}{(ES + D)/2} \right) * 100\%$$

where: ES is the environmental sample result

D is the duplicate sample result

Field Duplicate Check – This precision analysis checks the relative percent difference (RPD) between the measured concentration of an analyte in an environmental sample and the measured concentration of the same analyte in its associated field duplicate sample. Calculated RPD values greater than 30% (that also possess an absolute difference greater than or equal to their associated detection limit) are considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type. This QA/QC limit was set by the Stormwater Monitoring Program at 30% because the limit could be no more restrictive than the QA/QC limit set for laboratory duplicates (see discussion below). Only 18 of 477 total field duplicates analyzed in 2004/05 fell outside of QA/QC limits, for an overall success rate of 96.2%. Field duplicate results are summarized in Table 9-24.

Field duplicate results were reviewed to determine if any reasons for observed success rates lower than 75% for some classes of constituents could be identified. In general, it is sometimes difficult to maintain a homogeneous mixture when splitting composite sample duplicates. Composite field duplicate samples were collected at ME-VR (Event 2) and ME-SCR (Event 6), with only minor, common field duplicate exceedance issues observed among both events (e.g., Bis(2-ethylhexyl)phthalate and Butyl benzyl phthalate). Exceedances associated with methods EPA 200.8 (total and dissolved metals), EPA 351.1 (TKN), EPA 405.1 (BOD), EPA 625 (organics), and SM 4500-P C (Total Phosphorus) were observed collectively during Event 2 (wet event) and Event 6 (dry event). Grab field duplicate samples were collected at R-1 (Event 1), ME-VR (Event 2), and ME-SCR (Events 4 and 6), with no common field duplicate exceedances observed. Exceedances associated with methods EPA 1631E (Total Mercury), EPA 418.1 (TRPH), SM 4500-NH3 F (Ammonia as N), and SM 9221E (Fecal Coliform) were observed collectively during Event 2 (wet event), Event 4 (wet event), and Event 6 (dry event). No trends in either composite or grab field duplicate data quality objective exceedances were observed when comparing wet and dry monitoring events. It should be noted that differences in duplicate sample results are often observed when there is more solid material in one sample of the duplicate pair. When the splitting of a composite sample is performed, the composite sample is continually rocked in a sample pouring stand to provide as much "non-invasive" mixing as possible. However, the splitting process can still result in some variation in the solids content of duplicate samples.

Additionally, it should be noted that water quality samples collected from storm events typically have higher concentrations of suspended solids than do water samples collected during dry weather events. As a result, the splitting of homogeneous duplicate samples could have been further encumbered due to the high solids content of these environmental samples. Figure 9-35 shows a typical, turbid, wet weather sample collected at ME-SCR during January 2005. The lower success rates observed for hydrocarbons (87.5%) and nutrients (75%) were not considered significant enough to warrant follow-up investigation with the analyzing laboratories. However, all affected data were qualified as "estimated".

Table 9-24: Field Duplicate Success Rates

Classification	*Total Number*	*Number Outside DQO*	*Success Rate*
Anion	8	0	100%
Bacteriological	16	1	93.8%
Conventional	19	1	94.7%
Hydrocarbon	8	1	87.5%
Metal	54	4	92.6%
Nutrient	16	4	75%
Organic	131	7	94.7%
PCB	106	0	100%
Pesticide	113	0	100%

Figure 9-35: Wet weather composite sample collected at Mass Emission Station ME-SCR during January 2005 (Event 4) showing high suspended solids content

Lab Duplicate Check – This precision analysis checks the relative percent difference (RPD) between the original measured concentration of an analyte in a sample and a replicate measured concentration of the analyte in the same sample. The original and replicate analyses are the result of "sample splitting" by the laboratory. Calculated RPD values greater than 20 – 30% (depending on laboratory) are considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type. CRG Marine Laboratories, Inc. maintains a lab duplicate, RPD QA/QC limit of 30%, while Brooks Rand Laboratory maintains a limit of 25%. Calscience Environmental Laboratories, Inc., Soil Control Lab, and Thomas Analytical each set their lab duplicate, RPD QA/QC limit at 20%. The Ventura County Health Care Agency Laboratory does not maintain a QA/QC limit for lab duplicate analyses performed on bacteriological samples. In this instance, the Stormwater Monitoring Program log-transformed bacteriological sample results before calculating RPD values and comparing this to a QA/QC limit of 30%. Only 29 of 569 total lab duplicates analyzed during the current monitoring season fell outside of QA/QC limits, for an overall success rate of 94.9%. Of the 29 lab duplicates falling outside of data quality objectives, 21 samples were associated with Event 4. The highly turbid samples collected during the extremely high flows of this wet weather event likely impacted the laboratory's ability to evaluate completely homogeneous sample aliquots. Lab duplicate results are summarized in Table 9-25.

Table 9-25: Laboratory Duplicate Success Rates

Classification	*Total Number*	*Number Outside DQO*	*Success Rate*
Anion	10	0	100%
Conventional	32	2	93.8%
Metal	159	13	91.8%
Nutrient	15	2	86.7%
Organic	130	11	91.5%
PCB	106	0	100%
Pesticide	111	1	99.1%

Lab duplicate results were reviewed to determine if any reasons for observed success rates lower than 90% for some classes of constituents could be identified. Placing a higher burden of success on lab duplicate analyses (90%) than field duplicate analyses (75%) is common due to the much higher variability inherent in the collection of field duplicate samples. Differences among the calculated RPD values of lab duplicate pairs can be attributed to both sample variation, as described above, as well as analytical variation. The lower success rate observed nutrients (above 85%) was not considered significant enough to warrant follow-up investigation with the analyzing laboratories. However, all affected data were qualified as "estimated". It should be noted that success rates for all other classifications of constituents were greater than 90%.

9.8.4 Field Blanks

Field blank analyses are performed to test for contamination of environmental samples by field sample collection activities. Field blanks use blank water – water that is assumed to be void of all constituents for which a given set of analyses are to be performed. Filtered and purified de-ionized water is used for metals and trace organics field blanks, while standard de-ionized water is used for all other field blanks. Any constituents detected in field blanks are considered to be sources of contamination in the field. Field blanks are "collected" by pouring water from a laboratory-provided bottle directly into a sample container using clean sampling techniques and without the use of any extraneous equipment. This minimizes the possibility of any contamination of the field blanks.

Field Blank Check – This contamination analysis checks for a "hit" or the detection of an analyte in a field blank. A detected concentration is an indication that contamination has occurred at some point during the field sampling or analytical process. If a detected field blank result is greater than five times the concentration measured in an environmental sample, then the field blank is considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type. As shown Table 9-26, the majority of field blanks posted a 100% success rate with the exception of a handful of method EPA 200.8 (Metals) and method EPA 625 (Organics) blanks having success rates of approximately 95%, and a single occurrence of method EPA 1631E posting a 0% success rate (Event 5).

Since the detection of an analyte in a field blank sample does not necessarily mean that the contamination impacts a particular environmental result, one must look further to determine if the detected field blank concentration is greater than five times the concentration measured in the associated environmental sample. Put another way, one must determine if the analyte concentration measured in the blank is greater than 20% of the analyte concentration measured in the associated environmental sample. Only if the blank contamination is greater than 20% of the measured environmental concentration would the environmental sample get qualified. For example, a dissolved zinc field blank hit of 0.2 µg/L that is associated with an environmental sample with a measured concentration of 8.0 µg/L would not result in the qualification of the environmental sample because its concentration is 40 times greater than that of the field blank.

Field blank samples were collected at ME-VR (Event 1), ME-CC (Event 2 and Event 5), and ME-SCR (Event 3) during the 2004/05 monitoring season. Field contamination of Stormwater Monitoring Program environmental samples as evaluated through field blank analyses is minimal with only 23 hits out of 758 total field blank samples. This corresponds to an overall "non-detection" success rate of 97%; that is, no analyte was detected in 97% of the field blank samples. Only 10 of 758 total field blank samples analyzed in 2004/05 fell outside of QA/QC limits, for an overall success rate of 98.7%. Of the 10 field blanks showing contamination and having concentrations greater than five times that of their associated environmental sample, one was from Event 1 (wet), three were from Event 2 (wet), one was from Event 3 (wet), and five were from Event 5 (dry). The Event 1 and Event 3 blank hits were for Total Chromium and Dissolved Zinc, respectively. Event 2 blank hits included three organics detections (Bis(2-ethylhexyl)phthalate, Dimethyl phthalate, and Di-n-butylphthalate). Event 5 blank hits included four organics (Butyl benzyl phthalate, Dimethyl phthalate, Di-n-butylphthalate, and 1-Methylnaphthalene) and Total Mercury. These 10 field blank detections were not considered indicative of any type of reoccurring contamination issue present during sample collection in the field. However, as discussed in the method blank section below, phthalate contamination in the laboratory appears to be an issue. Furthermore, it should be noted that Dissolved Zinc, Bis(2-ethylhexyl)phthalate, and Dimethyl phthalate were also detected by CRG in pres-season equipment blanks. The 10 field blank samples falling outside of data quality objectives resulted in 10 affected environmental samples being qualified as "upper limit" due to field blank contamination.

Table 9-26: Field Blank Success Rates

Event ID	Classification	Method	Total Number	Number Detected	Number Outside DQO	Success Rate
2004/05-1	Bacteriological	Enterolert	1	0	0	100%
	Bacteriological	MMO-MUG	2	0	0	100%
	Bacteriological	SM 9221E	1	0	0	100%
	Conventional	SM 2340B	1	0	0	100%
	Metal	EPA 1631E	2	2	0	100%
	Metal	EPA 200.8	22	3	1	95.5%
	Organic	EPA 625	65	0	0	100%
	PCB	EPA 625	53	0	0	100%
	Pesticide	EPA 625	45	0	0	100%
2004/05-2	Bacteriological	Enterolert	1	0	0	100%
	Bacteriological	MMO-MUG	2	0	0	100%
	Bacteriological	SM 9221E	1	0	0	100%
	Metal	EPA 1631E	2	2	0	100%
	Metal	EPA 200.8	11	1	0	100%
	Organic	EPA 625	65	4	3	95.4%
	PCB	EPA 625	53	0	0	100%
	Pesticide	EPA 625	45	0	0	100%
2004/05-3	Bacteriological	Enterolert	1	0	0	100%
	Bacteriological	MMO-MUG	2	0	0	100%
	Bacteriological	SM 9221E	1	0	0	100%
	Conventional	SM 2340B	1	0	0	100%
	Metal	EPA 1631E	1	1	0	100%
	Metal	EPA 200.8	22	2	1	95.5%
	Organic	EPA 625	65	0	0	100%
	PCB	EPA 625	53	0	0	100%
	Pesticide	EPA 625	45	0	0	100%
2004/05-5	Bacteriological	Enterolert	1	0	0	100%
	Bacteriological	MMO-MUG	2	0	0	100%
	Bacteriological	SM 9221E	1	0	0	100%
	Conventional	SM 2340B	1	0	0	100%
	Metal	EPA 1631E	1	1	1	0%
	Metal	EPA 200.8	11	0	0	100%
	Organic	EPA 625	66	7	4	93.9%
	PCB	EPA 625	53	0	0	100%
	Pesticide	EPA 625	46	0	0	100%

9.8.5 Filter Blanks

Filter blank analyses are performed to test for contamination of filtered environmental samples by the filtration process. Filter blanks use blank water – water that is assumed to be void of all constituents for which a given set of analyses are to be performed. Typically, filter blanks are generated to test for contamination of filtered samples being evaluated for dissolved metals using analytical methods possessing low detection limits. Filter blanks are generated by pouring blank water from a laboratory-provided bottle through a 0.45 μm filter directly into a sample container using clean sampling techniques and without the use of any extraneous equipment. This minimizes the possibility of any contamination of the filter blanks. If the result for a filter blank is greater than the *reporting limit* (RL) for the particular analyte, then associated environmental sample results have the potential to be qualified.

Filter Blank Check – This contamination analysis checks for a "hit" or the detection of an analyte in a filter blank. A detected concentration is an indication that contamination has occurred at some point during the filtration or analytical process. If a detected filter blank result is greater than five times the concentration measured in an environmental sample, then the filter blank is considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type. As shown in Table 9-27, only dissolved mercury (EPA 1631E) filter blanks were analyzed for Events 1 – 3 each having a success rate of 100%.

Table 9-27: Filter Blank Success Rates

Event ID	Classification	Method	Total No.	No. Detected	No. Outside DQO	Success Rate[1]
2004/05-1	Metal	EPA 1631E	1	1	0	100%
2004/05-2	Metal	EPA 1631E	1	0	0	100%
2004/05-3	Metal	EPA 1631E	1	0	0	100%

Similar to field blanks, the detection of an analyte in a filter blank sample does not necessarily mean that the contamination impacts environmental results. One must look further to determine if the detected filter blank concentration is greater than five times the concentration measured in any associated environmental sample. Stated differently, one must determine is the analyte concentration measured in the blank is greater than 20% of the analyte concentration measured in the associated environmental samples. Only if the blank contamination is greater than 20% of the measured environmental concentration would the environmental sample get qualified. For example, a dissolved mercury filter blank hit of 0.15 ng/L would result in the qualification of all dissolved mercury environmental samples with measured concentrations of less than 0.75 ng/L. A hypothetical environmental sample with a measured concentration of 4.5 ng/L would not be qualified because this concentration far overshadows the 0.15 ng/L contamination measured in the filter blank; in fact, the hypothetical environmental concentration is 30 times greater than that detected in the blank.

Filter blanks were prepared during Events 1 – 3 by CRG Marine Laboratories, Inc. because dissolved mercury samples needed to be filtered before they were shipped to Brooks Rand Laboratory in Seattle, Washington, in order to meet the EPA 48-hour sample filtration time limit. Only one of the three analyzed filter blanks contained mercury at a detectable level. However, the detected concentration (0.145 ng/L) in the Event 1 filter blank was below the practical quantitation limit (PQL) for the analysis (0.25 ng/L) and did not result in the filter blank falling outside of its data quality objective (DQO). Additionally, the lowest dissolved mercury concentration measured in an environmental sample (1.0 ng/L at ME-SCR) was approximately 7 times greater than the concentration measured in the filter blank.

9.8.6 Method Blanks

Method blanks are prepared by the laboratory using blank water, and then analyzed for every batch of environmental samples analyzed. A detected concentration or "hit" in a method blank is an indication of contamination in the analytical process; that is, contamination occurring somewhere in the laboratory. If the result for a single method blank is greater that the *method detection limit* (MDL), or if the average method blank concentration plus two standard deviations of three or more blanks is greater than the *reporting limit* (RL) for a particular analyte, then associated environmental sample results, depending on their measured concentrations, have the potential to be qualified.

Method Blank Check – This contamination analysis checks for "hits" or the detection of an analyte in a method blank. A detected concentration is an indication of contamination in the analytical process. If a detected method blank value is greater than five times the concentration measured in associated environmental samples, then the method blank is

considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type. Table 9-28 below summarizes only those method blank results having less than 100% success rates. A summary of all method blanks analyzed during the 2004/05 monitoring season is presented in Appendix E. All method blanks except for those for trace organic compounds posted a 100% success rate. On average, trace organic blanks for method EPA 625 possess a success rate of close to 95% across Events 1 – 6. Method blank success rates for individual 2004/05 monitoring events are shown in Table 9-28.

Table 9-28: Method Blank Success Rates

Event ID	Classification	Method	Total Number	Number Detected	Number Outside DQO	Success Rate[1]
2004/05-1	Organic	EPA 625	65	4	4	93.8%
2004/05-2	Organic	EPA 625	65	4	4	93.8%
2004/05-3	Organic	EPA 625	65	3	3	95.4%
2004/05-4	Organic	EPA 625	65	2	2	96.9%
2004/05-5	Organic	EPA 625	66	5	5	92.4%
2004/05-6	Organic	EPA 625	65	3	3	95.4%

1. Only method blanks having less than 100% success rates are summarized in this table. A summary of all method blanks analyzed during the 2004/05 monitoring season is presented in Appendix E.

Similar to field and filter blanks, the detection of an analyte in a method blank sample does not necessarily mean that the contamination impacts environmental results. One must look further to determine if the detected method blank concentration is greater than five times the concentration measured in any associated environmental sample. Stated differently, one must determine if the analyte concentration measured in the blank is greater than 20% of the analyte concentration measured in the associated environmental samples. Only if the blank contamination is greater than 20% of the measured environmental concentration would the environmental sample get qualified. For example, a Butyl benzyl phthalate method blank hit of 0.02 µg/L would result in the qualification of all Butyl benzyl phthalate environmental samples with measured concentrations of less than 0.1 µg/L. A hypothetical environmental sample with a measured concentration of 0.7 µg/L would not be qualified because this concentration far overshadows the 0.02 µg/L contamination measured in the method blank.

The vast majority of method blanks run by the various analytical laboratories employed by the Stormwater Monitoring Program detected no analytes in the method blanks they analyzed. However, trace organic method blanks analyzed by CRG Marine Laboratories, Inc. using method EPA 625 did show contamination. Specifically, five phthalate compounds (Bis(2-ethylhexyl)phthalate, Butyl benzyl phthalate, Diethyl phthalate, Dimethyl phthalate, and Di-n-butylphthalate) were detected in each EPA 625 base/neutral extractable compound method blank analyzed by CRG during the course of monitoring Events 1 – 5. The Event 6 EPA 625 method blank only showed contamination by Bis(2-ethylhexyl)phthalate, Diethyl phthalate, and Di-n-butylphthalate. It should be noted that three of the phthalate compounds (Bis(2-ethylhexyl)phthalate, Diethyl phthalate, and Dimethyl phthalate) were also detected by CRG in pre-season equipment blanks. In total, phthalate compounds were detected in pre-season equipment blanks, field blanks, method blanks, and environmental samples. Phthalate contamination is common in analytical laboratories and is most often associated with exposure to plastic materials. CRG, the laboratory performing EPA 625 analysis for the Stormwater Monitoring Program, maintains that all measures have been taken to avoid sample contact with plastics. CRG's low detection limits (0.005 µg/L for the detected phthalates) also lend themselves to the identification of constituents that would not be detected by laboratories having higher detection limits. The relatively high detected concentration of phthalates in environmental samples also indicates that these constituents are indeed present in the environment as well. In response to the observed phthalate contamination issue, all affected data were qualified as "upper limit" due to method blank contamination. This

translates into approximately 35% of all associated phthalate samples analyzed (38 of 109 total samples) receiving a qualification due to method blank contamination.

9.8.7 Matrix Spikes and Matrix Spike Duplicates

A matrix spike (MS) is an environmental sample that is spiked by the laboratory with a known amount of the constituent being analyzed. Once the analysis is run, the analysis results are compared to the spike amount to determine how much of the spike was detected through the analytical process. The amount of the spike recovered is described as the "percent recovery". A matrix spike duplicate (MSD) is a duplicate of this analysis that checks whether or not the lab is able to duplicate the results of the initial matrix spike analysis. These analyses help to confirm that the laboratory's instrumentation and procedures are accurate and compliant with typical laboratory performance standards.

For both matrix spikes and matrix spike duplicates, lower and upper limits are placed on the recovery of the spike by the laboratory performing the analysis. Once percent recoveries are available for both matrix spike and matrix spike duplicate analyses, a relative percent difference (RPD) can be calculated for the two results. Table 9-29 below summarizes the matrix spike recovery and matrix spike RPD qualification limits (QA/QC limits) established by the laboratories employed by the Stormwater Monitoring Program. Unless specifically identified in EPA analytical guidance for a particular method, QA/QC limits are usually developed by laboratories using the average percent recovery for an analyte and setting lower and upper limits at two or three standard deviations below and above the average recovery, respectively. Trace organic compound recovery rates vary widely among these constituents, and therefore no single recovery acceptance range (i.e., 70 – 130%) can be used for these analytes. Instead each constituent's recovery is compared to a unique acceptance range.

Table 9-29: Matrix Spike Qualification Limits

Classification	*MS Percent Recovery Limits*		*MS RPD Percent Limit*
	Lower Limit	*Upper Limit*	*Maximum RPD*
Anion (Calscience)	80%	120%	15%
Anion (CRG)	70%	130%	30%
Conventional (Calscience)	70%	130%	15%
Conventional (CRG)	70%	130%	30%
Hydrocarbon	70%	130%	30%
Metals*	75%	125%	30%
Arsenic	65%	135%	30%
Cadmium	60%	140%	30%
Chromium VI	70%	130%	30%
Mercury (Brooks Rand)	71%	125%	24%
Mercury (CRG)	75%	125%	30%
Selenium	40%	160%	30%
Nutrient	70%	130%	30%
TKN	75%	125%	20%
Organic EPA 625	variable	variable	30%
PCB EPA 625	65%	135%	30%
Pesticide EPA 625	variable	variable	30%
Pesticide EPA 8151A	30%	130%	30%

RPD = Relative Percent Difference

*Metals include: Al, Cr, Cu, Pb, Ni, Ag, Tl, & Zn.

Matrix Spike Recovery Check – This accuracy analysis verifies that secondary spike analyses (such as matrix spike recovery analyses) performed by the laboratory show that the laboratory's instrumentation and procedures are accurate and compliant with typical laboratory performance standards. Matrix spike recovery values (for both MS and MSD analyses) outside of laboratory-determined QA/QC ranges (set with lower and upper limits) are considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type.

Matrix spike recovery success rates ranged from 53% (Event 4, EPA 625 organics) to 100% for the majority of matrix spike recovery analyses performed across wet weather Events 1 – 4. Dry weather Events 5 and 6 posted 100% success rates for all matrix spike recoveries performed. A summary of success rates for matrix spike recovery samples analyzed during the 2004/05 monitoring season is presented in Appendix F. No particular classifications of constituents or analytical methods appear to be more prone to recovery problems than any other classification or method. Likewise, particular monitoring sites showed no tendency toward recovery problems. Recoveries below the lower QA/QC limit or above the upper QA/QC limit are generally attributed to matrix interference. Matrix interference occurs when substances contained in the sample water, or *matrix*, interfere with the ability of the laboratory instrumentation to accurately detect a compound being analyzed. Stormwater matrices tend to be "dirtier" than other matrices and are prone to contain substances that cause matrix interference. The large number of upper limit matrix spike recovery exceedances observed for EPA 625 organics at ME-CC during Event 4 is likely due to the elevated amount of suspended solids (4940 mg/L) contained in the water samples collected at the site during the extremely large runoff event (average flow = 3819 cfs). The differences in observed matrix spike recovery success rates when comparing wet and dry monitoring events can like be explained by the "less dirty" matrices associated with water quality samples collected during dry weather monitoring. Matrix spike recoveries above their upper limit resulted in affected environmental samples being qualified as "high biased" due to matrix interference. No matrix spike recoveries below their lower limits were observed for Events 1 – 6.

Matrix Spike RPD Check – This precision analysis checks the relative percent difference (RPD) between two related matrix spike recovery results. RPD values greater than 20 – 30% (depending on constituent and analytical method) are considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type.

Matrix spike relative percent difference (RPD) success rates ranged from 42.1.7% (Event 4, EPA 625 organics) to 100% for the majority of matrix spike RPD analyses performed. A summary of success rates for matrix spike RPD values calculated during the 2004/05 monitoring season is presented in Appendix G. Matrix spike RPD values calculated from trace organic compound (organics, PCBs, and pesticides) matrix spike recoveries for Event 4 posted success rates ranging from 42.1 – 97.6%, likely due to the high suspended solids contents of ME-CC water samples mentioned above. However, success rates for trace organic matrix spike RPD calculations posted 100% for Events 2 – 6, and nearly 100% for Event 1. In general, the greater the matrix interference in individual matrix spike recoveries, especially if one recovery leans low and the other lean high, the greater their relative percent difference. Calculated matrix spike RPD values in excess of their associated QA/QC limit resulted in affected environmental samples being qualified as "estimated".

9.8.8 Surrogate Spikes

Surrogate spikes are compounds added to all trace organics samples by the laboratory to check the efficiency of the organics extraction process when testing samples using gas chromatography (GC) or gas chromatography-mass spectroscopy (GC/MS) analytical methods. Surrogates are compounds that are chemically and analytically similar to the compounds for which the analysis is being performed. They are added to both laboratory blank water and environmental samples undergoing analyses for trace organic compounds. The success of a particular sample extraction is based on the amount of the surrogate that is

found through the analytical process. The amount of the spike recovered is described as the "percent recovery". Different analytical methods, as well as individual constituents analyzed by those methods, possess different QA/QC limits for the recovery of surrogates. Table 9-30 summarizes the lower and upper QA/QC limits for the recovery of surrogate compounds via three analytical methods used to measure trace organic compounds. Limits displayed in the table represent the lowest and highest possible recoveries for a particular analytical method.

Table 9-30: Surrogate Spike Recovery Limits

Analytical Method	*Surrogate Recovery Limits*	
	Lower Limit	*Upper Limit*
EPA 8151A	0%	123%
EPA 8260B*	82%	142%
EPA 625*	11%	162%

*Upper and Lower Limits vary – widest possible range presented.

Results coming from the analysis of surrogate compounds are not used to directly qualify environmental samples when a surrogate result is found to fall outside of its associated QA/QC limits. Instead, surrogate results are used to elucidate trends in a laboratory's analysis of organic constituents. High and low surrogate recoveries can inform the laboratory that a particular analytical process is out of control or moving toward that state, and prompt the laboratory to take corrective measures as necessary. For the current monitoring season, surrogate method blank success rates were all 100%. Likewise, surrogate matrix spike recovery success rates were all 100%. Surrogate environmental recovery results – evaluated in conjunction with matrix spike recovery results – showed an overall 99.3% success rate. Surrogate recoveries outside of QA/QC limits were all associated with method EPA 625, but did not show any discernable pattern with regard to matrix, in the cases of surrogate matrix spike and surrogate environmental analyses, or associated monitoring event.

9.8.9 Laboratory Control Spikes

Laboratory control spike (LCS) analyses are used to test the accuracy of the entire laboratory analytical process. These primary spike analyses are performed by the laboratory to certify that the instrumentation and laboratory procedures are accurate and compliant with typical laboratory performance. LCS recovery samples can also be run in duplicate similar to matrix spike duplicate analyses. LCS samples are standards prepared internally by the laboratory using a known amount of analyte. A laboratory can also purchase pre-prepared standards called standard reference material (SRM) or certified reference material (CRM). Regardless of how the standard is prepared, it is run through the entire analytical process as if it was an environmental sample. Since the standard contains a known amount of a compound, the results of the analysis can be compared to the expected result and a percent recovery calculated. LCS recoveries are reviewed to determine if the percent recovery is within control limits provided by the laboratory. Because a laboratory control spike analysis checks the entire analytical process, a LCS result outside of QA/QC limits would supersede any qualification made to an environmental sample based on secondary spike (i.e., matrix spike) analyses. The only instance when this isn't true is the case where LCS results are within limits, but matrix spike recoveries are not. In this case the affected environmental samples would be qualified as either low biased or high biased due to matrix spike interference. Table 9-31 shows the lower and upper LCS recovery limits associated with those constituents for which laboratory control spike analyses were performed during the current monitoring season.

Laboratory Control Spike Check – This accuracy analysis verifies that primary spike analyses, such as LCS, SRM, and CRM recovery analyses, performed by a laboratory show that the lab's instrumentation and procedures are accurate and compliant with typical laboratory performance standards. LCS, SRM, and CRM recovery values outside of

laboratory-determined ranges are considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type.

The success rate of all laboratory control spike recoveries (including LCS and LCS duplicate recoveries) analyzed in the 2004/05 monitoring season is 100%. No environmental samples were biased either low or high due to LCS recoveries, and therefore no environmental samples were qualified based on this particular QA/QC evaluation. A summary of success rates for LCS recovery analyses performed during the 2004/05 monitoring season is presented in Appendix H.

Laboratory Control Spike RPD Check – This precision analysis checks the relative percent difference (RPD) between two related laboratory control spike (LCS), standard reference material (SRM), or certified reference material (CRM) recovery analyses. RPD values greater than 10 – 30% (depending on constituent and analytical method) are considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type.

All calculated LCS RPD values posted success rates of 100%. No environmental samples were qualified based on this particular QA/QC evaluation. A summary of success rates for LCS RPD values calculated during the 2004/05 monitoring season is presented in Appendix I.

Table 9-31: Laboratory Control Spike Recovery Limits

Classification	*Constituent(s)*	*LCS Recovery Limits*	
		Lower Limit	*Upper Limit*
Anion	Chloride	70	130
Anion	Perchlorate	85	115
Conventional	Total Dissolved Solids	70	130
Conventional	Total Organic Carbon	80	120
Hydrocarbon	Oil and Grease	70	130
Hydrocarbon	TRPH	70	130
Metal	Al, Cr, Cu, Pb, Ni, Ag, Tl, Zn	75	125
Metal	Arsenic	65	135
Metal	Cadmium	60	140
Metal	Chromium VI	70	130
Metal	Mercury	79	121
Metal	Selenium	40	160
Nutrient	Ammonia as N, Nitrate as N, Nitrite as N, Orthophosphate as P, Total Phosphorus	70	130
Nutrient	TKN	75	125
Organic	Methyl tert-butyl ether (MTBE)	85	121
Pesticide	2,4,5-T	30	130
Pesticide	2,4-D	30	130
Pesticide	2,4-DB	30	130
Pesticide	Glyphosate	70	130

9.8.10 Holding Time Exceedances

The large majority of analytical methods used to analyze water quality samples specify a certain time period in which an analysis must be performed in order to ensure confidence in the result provided from the analysis. A sample that remains unanalyzed for too long a period of time sometimes shows analytical results different from those that would have been observed had the sample been analyzed earlier in time. This difference is due to the breakdown, transformation, and/or dissipation of substances in the sample over time. A

holding time can be either the time between sample collection and sample preparation (the preparation holding time limit) or between the sample preparation and sample analysis (the analysis holding time limit). If a particular sample doesn't require any pre-analysis preparation, then the analysis holding time is the time between sample collection and sample analysis.

Holding Time Exceedance Check – This analysis determines the elapses time between sample collection and sample analysis, the elapsed time between sample collection and sample preparation, and the elapsed time between sample preparation and sample analysis. These elapsed times are then compared to holding time values (typically provided in EPA guidance for analytical methods) to determine if a holding time exceedance has occurred. Elapsed times greater than specified holding time limits are considered to exceed the Stormwater Monitoring Program's data quality objective (DQO) for this QA/QC sample type.

All holding times were met by laboratories during the current monitoring season. Samples evaluated for holding time exceedances during the 2004/05 monitoring season are presented in Appendix J.

9.8.11 Data Qualification Codes

As discussed above, the Stormwater Monitoring Program's QA/QC evaluation process looked for and found various environmental and QA/QC sample results that fell outside of particular data quality objectives or QA/QC limits. In some instances these exceedances of QA/QC limits resulted in the qualification of affected environmental data. Data are literally qualified by attaching specific qualification codes used by the Stormwater Monitoring Program to individual data points as necessary. The various qualification codes assigned to environmental data during the current monitoring season are presented in Table 9-32.

Table 9-32: Program Data Qualification Codes

Qualification Code	*Qualification Description*
EST-FD	Result is considered "estimated" due to field duplicate DQO exceedance.
EST-HT	Result is considered "estimated" due to holding time limit exceedance.
EST-LD	Result is considered "estimated" due to laboratory duplicate DQO exceedance.
EST-MSRPD	Result is considered "estimated" due to matrix spike, RPD DQO exceedance.
HB-MSR	Result is considered "high biased" due to a matrix spike recovery greater than the established upper limit for the analyte. Both matrix spike and matrix spike duplicate results can exceed the upper limit due to matrix interference and therefore result in qualification of environmental data.
LB-MSR	Result is considered "low biased" due to a matrix spike recovery less than the established lower limit for the analyte. Both matrix spike and matrix spike duplicate results can fall below the lower limit due to matrix interference and therefore result in qualification of environmental data.
UL-FB	Result is considered an "upper limit" of its true concentration due to field blank DQO exceedance (i.e., field blank contamination).
UL-FLTRB	Result is considered an "upper limit" of its true concentration due to filter blank DQO exceedance (i.e., filter blank contamination).
UL-MB	Result is considered an "upper limit" of its true concentration due to method blank DQO exceedance (i.e., method blank contamination).
EST*	Result is estimated; numeric value below the RL and above the MDL.

*The EST qualification code is assigned by the analytical laboratory that analyzed the sample, not by the Program.

The codes listed in Table 9-32 appear in the "Qualifier" data field included in Appendix C that presents all environmental sample results generated by the Stormwater Monitoring Program during the 2004/05 monitoring season. It should be noted that with the exception of holding time exceedances for field blank and field duplicate results, the Stormwater Monitoring Program does not assign qualifications to QA/QC samples. Appendix D presents all QA/QC results generated by the Stormwater Monitoring Program during the 2004/05 monitoring season.

In summary, a total of 5670 environmental samples (including 477 field duplicate results) were analyzed during the 2004/05 monitoring season. Field duplicate analyses are considered to be surrogates of environmental analyses and are therefore included in the calculation of environmental sample totals. The Stormwater Monitoring Program's QA/QC evaluation process identified 142 environmental samples in need of qualification. An additional 59 environmental results were reported as "estimated" by the laboratory upon completion of its sample analysis. In total, there are 201 qualified environmental samples from the current monitoring season, which translates into the Stormwater Monitoring Program achieving a 96.5% success rate in meeting program data quality objectives. Additionally, three data points were rejected from the current monitoring season's data set: two Glyphosate results (Event 1: environmental result at the I-2 station, and lab duplicate result at the R-1 station) and one Chromium VI result (Event 2 at the ME-CC station). Letters of explanations as to why the Glyphosate and Chromium VI results are not considered reliable, and thus are appropriate to reject from the current season's data set are provided by the laboratory responsible for the particular analysis and included in Appendix L. Overall, the four wet weather and two dry weather events monitored during the current season produced a high quality data set in terms of the low percentage of qualified data, as well as the low reporting levels achieved by all laboratories analyzing the Stormwater Monitoring Program's water quality samples.

Table 9-33 through Table 9-39 present the success rates observed for each QA/QC evaluation performed by the Stormwater Monitoring Program during the 2004/05 monitoring season on a classification-by-classification basis.

Table 9-33: QA/QC Success Rates for Anions

QAQC Sample Type	*Total Number*	*Number Successful*	*Success Rate*
Holding Time (HT)*	77	77	100%
Method Blank (MB)	18	18	100%
Laboratory Control Spike (LCS)	12	12	100%
Laboratory Control Spike Duplicate (LCSD)	12	12	100%
Laboratory Control Spike, RPD (LSCRPD)	12	12	100%
Matrix Spike (MS)	7	7	100%
Matrix Spike Duplicate (MSD)	7	7	100%
Matrix Spike, RPD (MSRPD)	7	7	100%
Laboratory Duplicate (LD)	10	10	100%
Field Duplicate (FD)	8	8	100%

*Holding Time is not a specific type of QA/QC sample, rather a specific QA/QC evaluation performed by the Stormwater Monitoring Program.

Table 9-34: QA/QC Success Rates for Bacteriologicals

QAQC Sample Type	*Total Number*	*Number Successful*	*Success Rate*
Holding Time (HT)*	124	124	100%
Field Blank (FB)	16	16	100%
Field Duplicate (FD)	16	15	93.8%

*Holding Time is not a specific type of QA/QC sample, rather a specific QA/QC evaluation performed by the Stormwater Monitoring Program.

Table 9-35: QA/QC Success Rates for Conventionals

QAQC Sample Type	*Total Number*	*Number Successful*	*Success Rate*
Holding Time (HT)*	190	190	100%
Method Blank (MB)	39	39	100%
Field Blank (FB)	4	4	100%
Laboratory Control Spike (LSC)	9	9	100%
Laboratory Control Spike Duplicate (LCSD)	3	3	100%
Laboratory Control Spike, RPD (LCSRPD)	3	3	100%
Matrix Spike (MS)	2	2	100%
Matrix Spike Duplicate (MSD)	2	2	100%
Matrix Spike, RPD (MSRPD)	2	2	100%
Laboratory Duplicate (LD)	32	30	93.8%
Field Duplicate (FD)	19	18	94.7%

*Holding Time is not a specific type of QA/QC sample, rather a specific QA/QC evaluation performed by the Stormwater Monitoring Program.

Table 9-36: QA/QC Success Rates for Hydrocarbons

QAQC Sample Type	*Total Number*	*Number Successful*	*Success Rate*
Holding Time (HT)*	54	54	100%
Method Blank (MB)	12	12	100%
Laboratory Control Spike (LSC)	6	6	100%
Laboratory Control Spike Duplicate (LCSD)	6	6	100%
Laboratory Control Spike, RPD (LCSRPD)	6	6	100%
Field Duplicate (FD)	8	7	87.5%

*Holding Time is not a specific type of QA/QC sample, rather a specific QA/QC evaluation performed by the Stormwater Monitoring Program.

Table 9-37: QA/QC Success Rates for Nutrients

QAQC Sample Type	*Total Number*	*Number Successful*	*Success Rate*
Holding Time (HT)*	177	177	100%
Method Blank (MB)	42	42	100%
Laboratory Control Spike (LCS)	40	40	100%
Laboratory Control Spike Duplicate (LCSD)	35	35	100%
Laboratory Control Spike, RPD (LCSRPD)	35	35	100%
Matrix Spike (MS)	31	30	96.8%
Matrix Spike Duplicate (MSD)	31	31	100%
Matrix Spike, RPD (MS RPD)	31	30	96.8%
Laboratory Duplicate (LD)	15	13	86.7%
Field Duplicate (FD)	16	12	75.0%

*Holding Time is not a specific type of QA/QC sample, rather a specific QA/QC evaluation performed by the Stormwater Monitoring Program.

Table 9-38: QA/QC Success Rates for Metals

QAQC Sample Type	*Total Number*	*Number Successful*	*Success Rate*
Holding Time (HT)*	700	700	100%
Method Blank (MB)	116	116	100%
Filter Blank (FLTRB)	3	3	100%
Field Blank (FB)	72	69	95.8%
Laboratory Control Spike (LCS)	22	22	100%
Laboratory Control Spike Duplicate (LCSD)	17	17	100%
Laboratory Control Spike, RPD (LCSRPD)	17	17	100%
Matrix Spike (MS)	79	79	100%
Matrix Spike Duplicate (MSD)	79	79	100%
Matrix Spike, RPD (MSRPD)	79	77	97.5%
Laboratory Duplicate (LD)	159	146	91.8%
Field Duplicate (FD)	54	50	92.6%

*Holding Time is not a specific type of QA/QC sample, rather a specific QA/QC evaluation performed by the Stormwater Monitoring Program.

Table 9-39: QA/QC Success Rates for Trace Organics

Method	*QAQC Sample Type*	*Total Number*	*Number Successful*	*Success Rate*
EPA 547	Holding Time (HT)*	24	24	100%
	Method Blank (MB)	6	6	100%
	Laboratory Control Spike (LCS)	7	7	100%
	Laboratory Duplicate (LD)	1	1	100%
	Field Duplicate (FD)	2	2	100%
EPA 625	Holding Time (HT)*	4826	4826	100%
	Method Blank (MB)	981	960	97.9%
	Surrogate Method Blank (SMB)	67	67	100%
	Field Blank (FB)	654	647	98.9%
	Matrix Spike (MS)	767	748	97.5%
	Matrix Spike Duplicate (MSD)	767	742	96.7%
	Matrix Spike, RPD (MSRPD)	767	741	96.6%
	Surrogate Matrix Spike (SMS)	62	62	100%
	Surrogate Matrix Spike Duplicate (SMSD)	62	62	100%
	Environmental Sample Surrogates (ESS)	311	307	98.7%
	Laboratory Duplicate (LD)	326	314	96.3%
	Field Duplicate (FD)	327	320	97.9%
EPA 8151A	Holding Time (HT)*	250	250	100%
	Method Blank (MB)	60	60	100%
	Surrogate Method Blank (SMB)	6	6	100%
	Laboratory Control Spike (LCS)	18	18	100%
	Laboratory Control Spike Duplicate (LCSD)	18	18	100%
	Laboratory Control Spike, RPD (LCSRPD)	18	18	100%
	Matrix Spike (MS)	15	15	100%
	Matrix Spike Duplicate (MSD)	15	15	100%
	Matrix Spike, RPD (MSRPD)	15	15	100%
	Environmental Sample Surrogates (ESS)	27	27	100%
	Laboratory Duplicate (LD)	20	20	100%
	Field Duplicate (FD)	20	20	100%
EPA 8260B	Holding Time (HT)*	6	6	100%
	Method Blank (MB)	1	1	100%
	Surrogate Method Blank (SMB)	4	4	100%
	Laboratory Control Spike (LCS)	1	1	100%
	Laboratory Control Spike Duplicate (LCSD)	1	1	100%
	Laboratory Control Spike, RPD (LCSRPD)	1	1	100%
	Environmental Sample Surrogates (ESS)	24	24	100%
	Field Duplicate (FD)	1	1	100%

*Holding Time is not a specific type of QA/QC sample, rather a specific QA/QC evaluation performed by the Stormwater Monitoring Program.

9.9 Water Quality Results

This section provides a brief description of the Stormwater Monitoring Program's new NPDES Stormwater Quality Database, as well as presents the 2004/05 monitoring results from the Land Use, Receiving Water, and Mass Emission monitoring locations. All environmental sample results, as exported from the NPDES Stormwater Quality Database, are included in Appendix C. As mentioned earlier, these data include qualifiers that were assigned to them based on the outcome of the QA/QC evaluation process.

9.9.1 NPDES Stormwater Quality Database

Monitoring results for the 2004/05 monitoring year were reported by laboratories in the form of hard copy laboratory reports. Data were then entered into the Stormwater Monitoring Program's water quality database (built using Microsoft Access XP Version 2002) and checked for accuracy against the lab reports. In the past two years VCWPD has spent approximately $150,000 to develop and upgrade a water quality database to further expedite, standardize, and enhance the Stormwater Monitoring Program's data management and data analysis activities. The database stores the Stormwater Monitoring Program's environmental and QA/QC data results and includes the following features.

- Key data entry screens for single and multiple record manual data entry
- Automated importation of environmental and QA/QC data that are contained in a laboratory electronic data deliverable (EDD)
- Data viewing/editing screens for the evaluation of newly entered data
- Semi-automated QA/QC evaluation
- Data querying screens
- Automated comparison to the Stormwater Monitoring Program's data to water quality objectives (Los Angeles Region 4 Basin Plan, California Toxics Rule, and California Ocean Plan).
- Additional hard copy and electronic data reporting features

The database has allowed the Stormwater Monitoring Program to improve its overall data management effort by providing staff with a robust data management tool for the storage, analysis, and reporting of monitoring data. The VCWPD envisions that the NPDES Stormwater Quality Database will serve as a model example for watershed planning efforts throughout Ventura County. Additionally, the database was recently used in the literature review element of the Santa Clara River Data Gap Analysis Project by AMEC Earth and Environmental in support of the Santa Clara River Enhancement and Management Plan.

There are plans to expand the database beyond the capabilities listed above. Future upgrades to the database will eventually include (1) the ability to perform complex statistical analyses, such as trend analysis, and (2) the ability to store the Stormwater Monitoring Program's aquatic toxicity and bioassessment data. The addition of these features to the water quality database will provide additional tools to the Stormwater Monitoring Program that will improve data management and analysis in an effort to enhance the effectiveness of the overall program.

9.9.2 Monitoring Results

Land Use, Receiving Water, and Mass Emission water quality results for the 2004/05 monitoring year were generated from the collection and analysis of composite and grab samples. Results are reported as the concentrations measured from either flow-proportional or time-paced composite samples, or from single grab samples. As mentioned earlier, only samples collected from the ME-CC and ME-VR stations are collected as flow-proportional composite samples; all other composites are collected as time-paced samples. In either case, the results can be interpreted as the best available estimate of the event mean concentrations (EMC) for the given storm event.

The following constituents are collected as grab samples:

- Perchlorate
- E. Coli
- Enterococcus
- Fecal Coliform
- Total Coliform
- Conductivity
- pH
- Water Temperature
- Oil and Grease
- TRPH
- Mercury (total recoverable and dissolved)
- Ammonia Nitrogen
- MTBE (Land Use and Receiving Water sites)
- Toxicity

All other constituents are analyzed from composite samples.

9.9.3 Receiving Water and Land Use Station Results

Water quality results for the 2004/05 monitoring season from the Land Use and Receiving Water stations are presented in Table 9-40 through Table 9-55.

Table 9-40: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Residential Land Use Station R-1

Classification	*Constituent*	*Fraction*	*Units*	*R-1*	
				10/16/04	
Anion	Bromide	n/a	mg/L	0.01	
Anion	Chloride	n/a	mg/L	24.7	
Anion	Perchlorate	n/a	µg/L	< 2	
Conventional	BOD	n/a	mg/L	18	
Conventional	Conductivity	n/a	µmhos/cm	400	
Conventional	Hardness as CaCO3	Total	mg/L	62.8	
Conventional	pH	n/a	pH Units	7.7	
Conventional	Total Dissolved Solids	n/a	mg/L	190	
Conventional	Total Organic Carbon	n/a	mg/L	41	
Conventional	Total Suspended Solids	n/a	mg/L	71	
Hydrocarbon	Oil and Grease	n/a	mg/L	< 1	
Hydrocarbon	TRPH	n/a	mg/L	1	
Nutrient	Ammonia as N	n/a	mg/L	0.6	
Nutrient	Nitrate as N	n/a	mg/L	1.5	
Nutrient	Nitrite as N	n/a	mg/L	0.09	
Nutrient	Orthophosphate as P	n/a	mg/L	1.39	*
Nutrient	TKN	n/a	mg/L	3.1	
Nutrient	Total Phosphorus	Dissolved	mg/L	< 0.016	
Nutrient	Total Phosphorus	Total	mg/L	2.5	*

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-41: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Industrial Land Use Station I-2

Classification	Constituent	Fraction	Units	I-2
				10/16/04
Anion	Bromide	n/a	mg/L	0.51
Anion	Chloride	n/a	mg/L	42.8
Anion	Perchlorate	n/a	µg/L	< 2
Conventional	BOD	n/a	mg/L	16
Conventional	Conductivity	n/a	µmhos/cm	800
Conventional	Hardness as CaCO3	Total	mg/L	286
Conventional	pH	n/a	pH Units	7.9
Conventional	Total Dissolved Solids	n/a	mg/L	760
Conventional	Total Organic Carbon	n/a	mg/L	40
Conventional	Total Suspended Solids	n/a	mg/L	72.5
Hydrocarbon	Oil and Grease	n/a	mg/L	1.5
Hydrocarbon	TRPH	n/a	mg/L	1.3
Nutrient	Ammonia as N	n/a	mg/L	0.8
Nutrient	Nitrate as N	n/a	mg/L	1.9
Nutrient	Nitrite as N	n/a	mg/L	0.11
Nutrient	Orthophosphate as P	n/a	mg/L	1.49
Nutrient	TKN	n/a	mg/L	2.1
Nutrient	Total Phosphorus	Dissolved	mg/L	< 0.016
Nutrient	Total Phosphorus	Total	mg/L	35

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-42: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Agricultural Land Use Station A-1

Classification	Constituent	Fraction	Units	A-1
				10/16/04
Anion	Bromide	n/a	mg/L	1.1
Anion	Chloride	n/a	mg/L	18.3
Anion	Perchlorate	n/a	µg/L	< 2
Conventional	BOD	n/a	mg/L	5.3
Conventional	Conductivity	n/a	µmhos/cm	400
Conventional	Hardness as CaCO3	Total	mg/L	292
Conventional	pH	n/a	pH Units	8.0
Conventional	Total Dissolved Solids	n/a	mg/L	860
Conventional	Total Organic Carbon	n/a	mg/L	9.4
Conventional	Total Suspended Solids	n/a	mg/L	428
Hydrocarbon	Oil and Grease	n/a	mg/L	< 1
Hydrocarbon	TRPH	n/a	mg/L	0.2
Nutrient	Ammonia as N	n/a	mg/L	0.3
Nutrient	Nitrate as N	n/a	mg/L	22.7
Nutrient	Nitrite as N	n/a	mg/L	0.26
Nutrient	Orthophosphate as P	n/a	mg/L	1.89
Nutrient	TKN	n/a	mg/L	4.2
Nutrient	Total Phosphorus	Dissolved	mg/L	9.5
Nutrient	Total Phosphorus	Total	mg/L	132

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-43: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Receiving Water Stations W-3 and W-4

Classification	*Constituent*	*Fraction*	*Units*	*W-3*	*W-4*
				10/17/04	*10/16/04*
Anion	Bromide	n/a	mg/L	0.73	2.58
Anion	Chloride	n/a	mg/L	60.3	27.6
Anion	Perchlorate	n/a	µg/L	< 2	< 2
Conventional	BOD	n/a	mg/L	21	10
Conventional	Conductivity	n/a	µmhos/cm	1100	500
Conventional	Hardness as CaCO3	Total	mg/L	396	609
Conventional	pH	n/a	pH Units	7.6	7.8
Conventional	Total Dissolved Solids	n/a	mg/L	930	1500
Conventional	Total Organic Carbon	n/a	mg/L	33	14
Conventional	Total Suspended Solids	n/a	mg/L	282	482
Hydrocarbon	Oil and Grease	n/a	mg/L	< 1	1.1
Hydrocarbon	TRPH	n/a	mg/L	0.5	0.3
Nutrient	Ammonia as N	n/a	mg/L	0.8	0.7
Nutrient	Nitrate as N	n/a	mg/L	11.4	23.4
Nutrient	Nitrite as N	n/a	mg/L	0.26	0.09
Nutrient	Orthophosphate as P	Total	mg/L	1.38	0.85
Nutrient	TKN	n/a	mg/L	2.1	1.6
Nutrient	Total Phosphorus	Dissolved	mg/L	< 0.016	< 0.016
Nutrient	Total Phosphorus	Total	mg/L	< 0.016	4.5

*See Appendix C for a description of the data qualifier(s) associated with this sample result.

"<" – Constituent not detected above specified detection limit.

Table 9-44: Metals Results from the Residential Land Use Station R-1

Constituent	*Fraction*	*Units*	*R-1* *10/16/04*
Aluminum	Total	µg/L	1860
Arsenic	Total	µg/L	2.85
Cadmium	Total	µg/L	0.48
Chromium	Total	µg/L	6.91
Chromium VI	Total	µg/L	40 *
Copper	Total	µg/L	21.7
Lead	Total	µg/L	5.02
Mercury	Total	ng/L	12.2
Nickel	Total	µg/L	12.8
Selenium	Total	µg/L	1.48
Silver	Total	µg/L	< 0.1
Thallium	Total	µg/L	< 0.1
Zinc	Total	µg/L	126
Aluminum	Dissolved	µg/L	81.1
Arsenic	Dissolved	µg/L	2.07
Cadmium	Dissolved	µg/L	0.21
Chromium	Dissolved	µg/L	1.99
Copper	Dissolved	µg/L	15.2
Lead	Dissolved	µg/L	1.02
Mercury	Dissolved	ng/L	7.08
Nickel	Dissolved	µg/L	9.26
Selenium	Dissolved	µg/L	1.25
Silver	Dissolved	µg/L	< 0.1
Thallium	Dissolved	µg/L	< 0.1
Zinc	Dissolved	µg/L	68.1

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-45: Metals Results from the Industrial Land Use Station I-2

Constituent	*Fraction*	*Units*	*I-2*
			10/16/04
Aluminum	Total	µg/L	2460
Arsenic	Total	µg/L	4.03
Cadmium	Total	µg/L	0.61
Chromium	Total	µg/L	8.42
Chromium VI	Total	µg/L	30
Copper	Total	µg/L	43.5
Lead	Total	µg/L	6.75
Mercury	Total	ng/L	21.7
Nickel	Total	µg/L	16.8
Selenium	Total	µg/L	9.25
Silver	Total	µg/L	0.18
Thallium	Total	µg/L	< 0.1
Zinc	Total	µg/L	138
Aluminum	Dissolved	µg/L	16.1
Arsenic	Dissolved	µg/L	3.14
Cadmium	Dissolved	µg/L	0.33
Chromium	Dissolved	µg/L	1.37
Copper	Dissolved	µg/L	31.1
Lead	Dissolved	µg/L	< 0.1
Mercury	Dissolved	ng/L	4.71
Nickel	Dissolved	µg/L	11.7
Selenium	Dissolved	µg/L	9.3
Silver	Dissolved	µg/L	< 0.1
Thallium	Dissolved	µg/L	< 0.1
Zinc	Dissolved	µg/L	68.8

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-46: Metals Results from the Agricultural Land Use Station A-1

Constituent	*Fraction*	*Units*	*A-1*
			10/16/04
Aluminum	Total	µg/L	8630
Arsenic	Total	µg/L	6.45
Cadmium	Total	µg/L	3.09
Chromium	Total	µg/L	23.7
Chromium VI	Total	µg/L	40
Copper	Total	µg/L	42.1
Lead	Total	µg/L	10.9
Mercury	Total	ng/L	62.1
Nickel	Total	µg/L	30.7
Selenium	Total	µg/L	5
Silver	Total	µg/L	0.18
Thallium	Total	µg/L	0.15
Zinc	Total	µg/L	136
Aluminum	Dissolved	µg/L	11.2
Arsenic	Dissolved	µg/L	3.51
Cadmium	Dissolved	µg/L	0.24
Chromium	Dissolved	µg/L	0.88
Copper	Dissolved	µg/L	7.68
Lead	Dissolved	µg/L	< 0.1
Mercury	Dissolved	ng/L	1.73
Nickel	Dissolved	µg/L	6.03
Selenium	Dissolved	µg/L	3.68
Silver	Dissolved	µg/L	< 0.1
Thallium	Dissolved	µg/L	< 0.1
Zinc	Dissolved	µg/L	4.96

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-47: Metals Results from the Receiving Water Stations W-3 and W-4

Constituent	*Fraction*	*Units*	*W-3*	*W-4*
			2/2/04	*2/2/04*
Aluminum	Total	µg/L	10200	907
Arsenic	Total	µg/L	6.1	7.09
Cadmium	Total	µg/L	0.77	1.24
Chromium	Total	µg/L	18.9	20.6
Chromium VI	Total	µg/L	40	20
Copper	Total	µg/L	36.4	26.7
Lead	Total	µg/L	12.6	11.7
Mercury	Total	ng/L	162	104
Nickel	Total	µg/L	20.4	21.7
Selenium	Total	µg/L	40.4	12.2
Silver	Total	µg/L	< 0.1	0.1
Thallium	Total	µg/L	0.17	0.16
Zinc	Total	µg/L	65.6	88
Aluminum	Dissolved	µg/L	15.2	3.75
Arsenic	Dissolved	µg/L	3.67	3.54
Cadmium	Dissolved	µg/L	0.15	< 0.1
Chromium	Dissolved	µg/L	1.19	0.86
Copper	Dissolved	µg/L	17.6	3.16
Lead	Dissolved	µg/L	< 0.1	< 0.1
Mercury	Dissolved	ng/L	6.07	1.83
Nickel	Dissolved	µg/L	5.07	4.68
Selenium	Dissolved	µg/L	46.3	11.6
Silver	Dissolved	µg/L	< 0.1	< 0.1
Thallium	Dissolved	µg/L	< 0.1	< 0.1
Zinc	Dissolved	µg/L	6.38	4.81

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-48: Detected Trace Organic Results from the Residential Land Use Station R-1

Classification	*Method*	*Constituent*	*Units*	*R-1* *10/16/04*
Organic	EPA 625	1-Methylnaphthalene	µg/L	0.0106
Organic	EPA 625	1-Methylphenanthrene	µg/L	0.0229 *
Organic	EPA 625	2-Methylnaphthalene	µg/L	0.018
Organic	EPA 625	Acenaphthene	µg/L	0.0225
Organic	EPA 625	Benzo(a)anthracene	µg/L	0.0367
Organic	EPA 625	Benzo(a)pyrene	µg/L	0.0397
Organic	EPA 625	Benzo(b)fluoranthene	µg/L	0.0711
Organic	EPA 625	Benzo(e)pyrene	µg/L	0.0599
Organic	EPA 625	Benzo(g,h,i)perylene	µg/L	0.0724
Organic	EPA 625	Benzo(k)fluoranthene	µg/L	0.0541
Organic	EPA 625	Bis(2-ethylhexyl)phthalate	µg/L	5.14
Organic	EPA 625	Butyl benzyl phthalate	µg/L	0.496
Organic	EPA 625	Chrysene	µg/L	0.113
Organic	EPA 625	Diethyl phthalate	µg/L	0.361
Organic	EPA 625	Dimethyl phthalate	µg/L	0.0719
Organic	EPA 625	Di-n-butylphthalate	µg/L	0.293
Organic	EPA 625	Di-n-octylphthalate	µg/L	0.731
Organic	EPA 625	Fluoranthene	µg/L	0.155 *
Organic	EPA 625	Indeno(1,2,3-cd)pyrene	µg/L	0.0599
Organic	EPA 625	Naphthalene	µg/L	0.0328
Organic	EPA 625	Pentachlorophenol	µg/L	0.0873
Organic	EPA 625	Perylene	µg/L	0.0227
Organic	EPA 625	Phenanthrene	µg/L	0.0815
Organic	EPA 625	Phenol	µg/L	1.15
Organic	EPA 625	Pyrene	µg/L	0.147
Pesticide	EPA 625	4,4'-DDE	µg/L	0.0757 *
Pesticide	EPA 625	Diazinon	µg/L	1.06
Pesticide	EPA 625	Malathion	µg/L	1.29

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-49: Detected Trace Organic Results from the Industrial Land Use Station I-2

Classification	*Method*	*Constituent*	*Units*	*I-2*
				10/16/04
Organic	EPA 625	1-Methylnaphthalene	µg/L	0.0051
Organic	EPA 625	2,6-Dimethylnaphthalene	µg/L	0.0157
Organic	EPA 625	2-Methylnaphthalene	µg/L	0.0109
Organic	EPA 625	Acenaphthene	µg/L	0.0102
Organic	EPA 625	Anthracene	µg/L	0.011
Organic	EPA 625	Benzo(a)anthracene	µg/L	0.028
Organic	EPA 625	Benzo(a)pyrene	µg/L	0.0406
Organic	EPA 625	Benzo(b)fluoranthene	µg/L	0.0907
Organic	EPA 625	Benzo(e)pyrene	µg/L	0.0608
Organic	EPA 625	Benzo(g,h,i)perylene	µg/L	0.0442
Organic	EPA 625	Benzo(k)fluoranthene	µg/L	0.0851
Organic	EPA 625	Bis(2-ethylhexyl)phthalate	µg/L	13.4
Organic	EPA 625	Butyl benzyl phthalate	µg/L	0.365
Organic	EPA 625	Chrysene	µg/L	0.103
Organic	EPA 625	Diethyl phthalate	µg/L	0.433
Organic	EPA 625	Dimethyl phthalate	µg/L	0.0815
Organic	EPA 625	Di-n-butylphthalate	µg/L	0.2
Organic	EPA 625	Di-n-octylphthalate	µg/L	0.247
Organic	EPA 625	Fluoranthene	µg/L	0.138
Organic	EPA 625	Indeno(1,2,3-cd)pyrene	µg/L	0.0433
Organic	EPA 625	Naphthalene	µg/L	0.0139
Organic	EPA 625	Perylene	µg/L	0.0182
Organic	EPA 625	Phenanthrene	µg/L	0.0439
Organic	EPA 625	Pyrene	µg/L	0.111
Pesticide	EPA 625	4,4'-DDE	µg/L	0.0819
Pesticide	EPA 625	Chlorpyrifos	µg/L	0.0168
Pesticide	EPA 547	Glyphosate	µg/L	R

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.
"R" – Data point rejected due to irreproducibility of result caused by lab instrument calibration problems.

Table 9-50: Detected Trace Organic Results from the Agricultural Land Use Station A-1

Classification	*Method*	*Constituent*	*Units*	*A-1* *10/16/04*
Organic	EPA 625	1-Methylnaphthalene	µg/L	0.0045
Organic	EPA 625	1-Methylphenanthrene	µg/L	0.0077
Organic	EPA 625	2-Methylnaphthalene	µg/L	0.0269
Organic	EPA 625	Acenaphthene	µg/L	0.0077
Organic	EPA 625	Benzo(b)fluoranthene	µg/L	0.0074
Organic	EPA 625	Benzo(k)fluoranthene	µg/L	0.0091
Organic	EPA 625	Bis(2-ethylhexyl)phthalate	µg/L	0.249
Organic	EPA 625	Butyl benzyl phthalate	µg/L	0.048 *
Organic	EPA 625	Chrysene	µg/L	0.0094
Organic	EPA 625	Diethyl phthalate	µg/L	0.622
Organic	EPA 625	Dimethyl phthalate	µg/L	0.133
Organic	EPA 625	Di-n-butylphthalate	µg/L	0.0445 *
Organic	EPA 625	Fluoranthene	µg/L	0.0196
Organic	EPA 625	Fluorene	µg/L	0.0043
Organic	EPA 625	Naphthalene	µg/L	0.0105
Organic	EPA 625	Pentachlorophenol	µg/L	0.351
Organic	EPA 625	Phenanthrene	µg/L	0.0204
Organic	EPA 625	Pyrene	µg/L	0.0172
Pesticide	EPA 625	2,4'-DDD	µg/L	0.0612
Pesticide	EPA 625	2,4'-DDE	µg/L	0.0124
Pesticide	EPA 625	2,4'-DDT	µg/L	0.0927
Pesticide	EPA 625	4,4'-DDD	µg/L	0.0799
Pesticide	EPA 625	4,4'-DDE	µg/L	0.546
Pesticide	EPA 625	4,4'-DDT	µg/L	0.544
Pesticide	EPA 625	Chlorpyrifos	µg/L	0.0507
Pesticide	EPA 625	Ethoprop	µg/L	0.0507
Pesticide	EPA 547	Glyphosate	µg/L	133

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-51: Detected Trace Organic Results from the Receiving Water Stations W-3 and W-4

Classification	Method	Constituent	Units	W-3	W-4
				10/17/04	10/16/04
Organic	EPA 625	1-Methylnaphthalene	µg/L	0.0053	0.0065
Organic	EPA 625	2-Methylnaphthalene	µg/L	0.0119	0.033
Organic	EPA 625	Acenaphthene	µg/L	0.0188	0.0087
Organic	EPA 625	Bis(2-ethylhexyl)phthalate	µg/L	0.29	4.57
Organic	EPA 625	Butyl benzyl phthalate	µg/L	< 0.005	0.0907
Organic	EPA 625	Diethyl phthalate	µg/L	0.202 *	0.227 *
Organic	EPA 625	Dimethyl phthalate	µg/L	0.041	0.0411
Organic	EPA 625	Di-n-butylphthalate	µg/L	0.056 *	0.0568 *
Organic	EPA 625	Di-n-octylphthalate	µg/L	< 0.005	0.0243
Organic	EPA 625	Fluoranthene	µg/L	0.0083	0.0256
Organic	EPA 625	Naphthalene	µg/L	0.012	0.0141
Organic	EPA 625	Phenanthrene	µg/L	0.0192	0.0192
Organic	EPA 625	Phenol	µg/L	0.11	< 0.1
Organic	EPA 625	Pyrene	µg/L	0.009	0.0188
Pesticide	EPA 625	2,4'-DDD	µg/L	< 0.001	0.0272
Pesticide	EPA 625	2,4'-DDT	µg/L	< 0.001	0.0161
Pesticide	EPA 625	4,4'-DDD	µg/L	< 0.001	0.0337
Pesticide	EPA 625	4,4'-DDE	µg/L	0.128	0.174
Pesticide	EPA 625	4,4'-DDT	µg/L	0.0615	0.0448
Pesticide	EPA 625	Chlorpyrifos	µg/L	2.14	0.074
Pesticide	EPA 547	Glyphosate	µg/L	67.5	17.3

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-52: Bacteriological Results from the Residential Land Use Station R-1

Constituent	Units	R-1
		10/16/04
E. Coli	MPN/100 mL	31000 *
Enterococcus	MPN/100 mL	10000 *
Fecal Coliform	MPN/100 mL	16000 *
Total Coliform	MPN/100 mL	323000 *

*See Appendix C for a description of the data qualifier(s) associated with this sample result.

Table 9-53: Bacteriological Results from the Industrial Land Use Station I-2

Constituent	Units	I-2
		10/16/04
E. Coli	MPN/100 mL	288000
Enterococcus	MPN/100 mL	10000
Fecal Coliform	MPN/100 mL	50000
Total Coliform	MPN/100 mL	1935000

Table 9-54: Bacteriological Results from the Agricultural Land Use Station A-1

Constituent	*Units*	*A-1*
		10/16/04
E. Coli	MPN/100 mL	1000
Enterococcus	MPN/100 mL	20000
Fecal Coliform	MPN/100 mL	1100
Total Coliform	MPN/100 mL	2247000

Table 9-55: Bacteriological Results from the Receiving Water Stations W-3 and W-4

Constituent	*Units*	*W-3*	*W-4*
		10/17/04	*10/16/04*
E. Coli	MPN/100 mL	52000	20000
Enterococcus	MPN/100 mL	20000	10000
Fecal Coliform	MPN/100 mL	30000	30000
Total Coliform	MPN/100 mL	2382000	583000

9.9.4 Mass Emission Station Results

Water quality results for the 2004/05 monitoring season from the Mass Emission stations are presented in Table 9-56 through Table 9-67. It should be noted that the elevated concentrations of total suspended solids, metals, organics, and pesticides measured during Event 4 are likely the result of watershed flushing and streambed and riparian habitat scouring produced by the extremely high flows (see Table 9-13) that were observed at Mass Emission stations during the January 7, 2005, monitoring event.

Table 9-56: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Mass Emission Station ME-CC

Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Constituent – Fraction (mg/L except where noted)	**Event 1 10/16/04**	**Event 2 10/26/04**	**Event 3 12/4/04**	**Event 4 1/7/05**	**Event 5 5/3/05**	**Event 6 6/22/05**
Anions						
Bromide	0.36	0.2	0.058	0.13	1.04	0.88
Chloride	117	63.5	145	36.3	390	162
Perchlorate (µg/L)	< 2	< 2	< 2	< 2	< 2	< 2
Conventionals						
BOD	22	4.7	8.7	32	1	2.7
Conductivity (µmhos/cm)	900	508	1400	590	1700	1600
Hardness as $CaCO_3$ – Total	163	123	270	117	435	434
pH (pH Units)	7.4	7.55	8	7.65	8.2	8.26
Total Dissolved Solids	380	510	730	350	1140	900
Total Organic Carbon	27	8.8	8.7	12	6.4	8.1
Total Suspended Solids	384	922	150	4940	6.6	13.6
Turbidity (NTU)	NA	NA	NA	NA	7	9.5
Hydrocarbons						
Oil and Grease	8.5	1.3	< 1	< 1	< 1	< 1
TRPH	0.4	0.9	< 0.01	< 0.01	0.1	< 0.01
Nutrients						
Ammonia as N	0.5	0.16	0.13	< 0.01	0.13	0.05
Nitrate as N	3.8	2.85	12.1	7.1	11.3	12.3
Nitrite as N	0.07	< 0.02	0.14	0.19	0.09	0.13
Orthophosphate as P – Total	1.92	1.96	1.16	0.85	1.33	0.63
TKN	9.3	3	2	7.5	0.93	0.13
Total Phosphorus – Dissolved	< 0.016	2.7	1.2	0.2	0.3	1.089
Total Phosphorus – Total	85	18.6	1.2	1.07	0.3	1.092

"NA" – Analysis not performed.
*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-57: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Mass Emission Stations ME-VR and ME-VR2

	ME-VR				ME-VR2	
Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Constituent – Fraction (mg/L except where noted)	**Event 1 10/16/04**	**Event 2 10/26/04**	**Event 3 12/4/04**	**Event 4 1/7/05**	**Event 5 5/3/05**	**Event 6 6/22/05**
Anions						
Bromide	0.42	0.24	0.028	0.04	0.482	0.26
Chloride	108	76.1	62.8	7.2	160	43.6
Perchlorate (µg/L)	< 2	< 2	< 2	< 2	< 2	< 2
Conventionals						
BOD	8.8	< 1	1.8	6	< 1	< 1
Conductivity (µmhos/cm)	1100	998	1100	470	900	1000
Hardness as $CaCO_3$ – Total	323	334	322	120	400	365
pH (pH Units)	7.7	7.73	7.9	7.62	8.4	8.35
Total Dissolved Solids	790	740	740	360	820	570
Total Organic Carbon	21	5	2.7	12	3.2	4.3
Total Suspended Solids	44.5	90.5	2	7240	28	1.95
Turbidity (NTU)	NA	NA	NA	NA	29.7	1.6
Hydrocarbons						
Oil and Grease	4	3.2	< 1	< 1	< 1	< 1
TRPH	0.2	0.77	< 0.01	0.24	0.1	< 0.01
Nutrients						
Ammonia as N	0.01	0.02*	< 0.01	0.04	< 0.01	< 0.01
Nitrate as N	1.8	0.884	0.27	0.5	1.7	0.04
Nitrite as N	0.04	0.172	< 0.02	< 0.02	< 0.02	< 0.02
Orthophosphate as P – Total	0.24	0.196	< 0.01	< 0.01	0.03	<0.0075
TKN	2.3	0.88	0.32	3.5	0.47	0.16
Total Phosphorus – Dissolved	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	0.043
Total Phosphorus – Total	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016	< 0.016

"NA" – Analysis not performed.

*See Appendix C for a description of the data qualifier(s) associated with this sample result.

"<" – Constituent not detected above specified detection limit.

Table 9-58: Anion, Conventional, Hydrocarbon, and Nutrient Results from the Mass Emission Station ME-SCR

Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Constituent – Fraction (mg/L except where noted)	**Event 1 10/16/04**	**Event 2 10/26/04**	**Event 3 12/4/04**	**Event 4 1/7/05**	**Event 5 5/3/05**	**Event 6 6/22/05**
Anions						
Bromide	0.57	0.16	0.049	0.1	0.282	0.47
Chloride	53	32.8	69.8	14.7	250	58.9
Perchlorate (µg/L)	< 2	< 2	< 2	< 2	< 2	< 2
Conventionals						
BOD	6.4	6.9	6.8	22*	1	< 1*
Conductivity (µmhos/cm)	1200	618	1700	740	1200	1300
Hardness as $CaCO_3$ – Total	479	263	509	194	410	480
pH (pH Units)	7.4	7.46	8	7.71	8.3	8.31
Total Dissolved Solids	1200	590	1230	590	950	800
Total Organic Carbon	11	7.6	6.3	7.2	3.7	5.1
Total Suspended Solids	606	776	2.8	5480*	79	25.9
Turbidity (NTU)	NA	NA	NA	NA	59.7	22.6
Hydrocarbons						
Oil and Grease	< 1	3.4	< 1	1.6	< 1	< 1
TRPH	0.5	1.24	< 0.01	< 0.01*	0.1	< 0.01
Nutrients						
Ammonia as N	0.5	0.21	0.75	0.03	0.08	0.01
Nitrate as N	1.8	1.42	1.99	4.8	1.3	1.36
Nitrite as N	0.18	< 0.02	0.08	0.19	< 0.02	0.37
Orthophosphate as P – Total	0.91	0.473	< 0.01	0.14	0.09	0.07
TKN	2.3	2.8	1.8	4.5*	0.61	0.18*
Total Phosphorus – Dissolved	< 0.016	1.5	< 0.016	< 0.016	< 0.016	< 0.016*
Total Phosphorus – Total	49.5	34.5	< 0.016	0.23	< 0.016	< 0.016*

"NA" – Analysis not performed.
*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-59: Metals Results from the Mass Emission Station ME-CC

Event Type	Wet	Wet	Wet	Wet	Dry	Dry
Constituent – Fraction (µg/L except where noted)	**Event 1 10/16/04**	**Event 2 10/26/04**	**Event 3 12/4/04**	**Event 4 1/7/05**	**Event 5 5/3/05**	**Event 6 6/22/05**
Aluminum – Total	8820	24300	1400	33660	124	169
Arsenic – Total	6.49	8.19	3.71	9.99	4.02	3.13
Cadmium – Total	2	2.2	0.71	8.33	11.4	0.12
Chromium – Total	28.1	39	4.89	83.8	2.68	1.23
Chromium VI – Total	40	R	< 5	10	< 5	< 5
Copper – Total	29.1	30.4	9.83	84.7	5.47	3.86
Lead – Total	10.9	17.4	3.03	24.8	0.513	0.32
Mercury – Total (ng/L)	30.1	115	2.2	147	10.95*	3.94
Nickel – Total	31.2	37.5	10.4	130	7.48	6.15
Selenium – Total	4.01	3.67	2.76	4.85	5.3	7.67
Silver – Total	0.26	< 0.1	< 0.1	0.34	< 0.1	< 0.1
Thallium – Total	0.1	0.1	< 0.1	0.57	< 0.1	< 0.1
Zinc – Total	101	96.7	40.4	265	19.6	17.3
Aluminum – Dissolved	1.6	14.9	4.36	25.5	2.87	1.3
Arsenic – Dissolved	3.74	3.39	3.34	2.95	3.91	3.77
Cadmium – Dissolved	0.22	0.29	0.4	0.37	10.9	0.1
Chromium – Dissolved	0.89	0.97	1.08	0.53	0.84	0.56
Copper – Dissolved	3.8	2.94	5.02	3.59	5.13	3.3
Lead – Dissolved	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06
Mercury – Dissolved (ng/L)	2.78	2.07	3.56	1.9	3.21	3.4
Nickel – Dissolved	6.99	3.87	5.88	4.35	7.21	5.34
Selenium – Dissolved	2.62	2.08	3.96*	3.74	5.7	7.43
Silver – Dissolved	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thallium – Dissolved	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Zinc – Dissolved	11.9	10	22.2	3.65	17.2	14.2

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.
"R" – Data point was rejected due to suspected sample contamination.

Table 9-60: Metals Results from the Mass Emission Stations ME-VR and ME-VR2

	ME-VR				ME-VR2	
Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Constituent – Fraction (µg/L except where noted)	**Event 1 10/16/04**	**Event 2 10/26/04**	**Event 3 12/4/04**	**Event 4 1/7/05**	**Event 5 5/3/05**	**Event 6 6/22/05**
Aluminum – Total	878	1300*	27.2	30300	501	932
Arsenic – Total	1.73	1.29	0.74	4.68	0.995	0.66
Cadmium – Total	4.26	0.35	0.28	4.3	< 0.1	0.84
Chromium – Total	4.24*	4.21	0.73	55.5	2.05	2.71
Chromium VI – Total	10	< 5	< 5	< 5	< 5	< 5
Copper – Total	5.67	4.17	1.23	46.8	2.71	4.31
Lead – Total	1.78	0.99	< 0.1	26.6	0.715	1.78
Mercury – Total (ng/L)	3.18	2.37	0.782	169	1.94	7.93
Nickel – Total	6.1	5.35	2.22	107	4.65	8.43
Selenium – Total	3.1	4.54	3.91	3.05	4.73	< 0.1
Silver – Total	< 0.1	< 0.1	< 0.1	0.28	< 0.1	< 0.1
Thallium – Total	< 0.1	< 0.1	< 0.1	0.38	< 0.1	< 0.1
Zinc – Total	531	36.8	28.7	208	4.9	14.7
Aluminum – Dissolved	12.3	< 1	3.5	21.6	1.46	< 1
Arsenic – Dissolved	1.16	0.92	0.44	0.42	0.775	< 0.1
Cadmium – Dissolved	2.68	< 0.1	0.2	0.3	< 0.1	< 0.1
Chromium – Dissolved	1.07	0.53	0.54	0.16	0.22	0.11
Copper – Dissolved	3.62	1.93	1.43	1.54	1.82	1.11
Lead – Dissolved	0.13	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Mercury – Dissolved (ng/L)	1.98	1.34	2.76	1.5	2.08	2.34
Nickel – Dissolved	4.01	3	2.71	1.98	2.23	0.94
Selenium – Dissolved	2.51	4.21	2.72	2.29	5.23	2.7
Silver – Dissolved	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thallium – Dissolved	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Zinc – Dissolved	456	15.1	25.5	1.75	2.55*	1.44

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-61: Metals Results from the Mass Emission Station ME-SCR

Event Type	Wet	Wet	Wet	Wet	Dry	Dry
Constituent – Fraction (µg/L except where noted)	**Event 1 10/16/04**	**Event 2 10/26/04**	**Event 3 12/4/04**	**Event 4 1/7/05**	**Event 5 5/3/05**	**Event 6 6/22/05**
Aluminum – Total	8530	15900	22	69900*	1150*	298
Arsenic – Total	4.08	5	1.37	10.8	1.82	0.84
Cadmium – Total	0.86	1.42	0.23	8.65*	< 0.1	< 0.1
Chromium – Total	21.1	24.9	0.81	125*	2.38	0.76
Chromium VI – Total	50	< 5	< 5	< 5	< 5	< 5
Copper – Total	16.6	27.2	3.08	133*	3.96	2.43
Lead – Total	4.95	16.3	< 0.1	57.8	1.11	0.28
Mercury – Total (ng/L)	7.53	522	3.79	459	11.64	15.31*
Nickel – Total	24.8	29.5	3.21	185*	4.36	2.54
Selenium – Total	9.26	5.02	9.09	5.56*	4.87	4.3
Silver – Total	< 0.1	< 0.1	< 0.1	0.55*	< 0.1*	< 0.1
Thallium – Total	0.19	< 0.1	< 0.1	1.38*	< 0.1	< 0.1
Zinc – Total	51.3	82.1	6.06	473*	8.94	4.79
Aluminum – Dissolved	3.13	9.64	4.4	9.07	3.04	1.93
Arsenic – Dissolved	1.83	1.32	1.49	0.79	1.31	0.86*
Cadmium – Dissolved	0.16	< 0.1	0.21	0.22*	< 0.1	< 0.1
Chromium – Dissolved	0.97	0.39	0.66	0.12	0.34	0.15
Copper – Dissolved	3.77	2.36	2.72	2.28	2.8	1.86
Lead – Dissolved	< 0.05	< 0.05	< 0.05	< 0.05	0.055	< 0.05
Mercury – Dissolved (ng/L)	2.59	2.4	2.7	1	10.61	3.21
Nickel – Dissolved	5.12	2.61	3.55	2.25	2.67	1.58
Selenium – Dissolved	9.14	4.06	9.44	4.09	4.85	4.82*
Silver – Dissolved	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Thallium – Dissolved	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Zinc – Dissolved	7.4	6.17	7.35*	1.85	7.23	2.38

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-62: Detected Trace Organic Results from the Mass Emission Station ME-CC

Event Type	Wet	Wet	Wet	Wet	Dry	Dry
Constituent	Event 1 10/16/04	Event 2 10/26/04	Event 3 12/4/04	Event 4 1/7/05	Event 5 5/3/05	Event 6 6/22/05
EPA 625 Organics ~ µg/L						
1-Methylnaphthalene	0.0106	0.0064	0.0081	0.0172*	0.0025*	0.0061
1-Methylphenanthrene	< 0.001	< 0.001	< 0.001	0.0153*	< 0.001	< 0.001
2,3,5-Trimethylnaphthalene	< 0.001	0.0172	< 0.001	< 0.001	< 0.001	< 0.001
2,6-Dimethylnaphthalene	0.0125	0.00878	< 0.001	0.017*	< 0.001	0.0049
2-Methylnaphthalene	0.034	0.011	0.014	0.0361*	0.0092	0.0149
Acenaphthene	0.0197	< 0.001	< 0.001	0.0086*	< 0.001	< 0.001
Anthracene	0.0081	< 0.001	< 0.001	0.0096*	< 0.001	0.0076
Benzo(a)anthracene	0.0106	< 0.001	< 0.001	0.0542*	< 0.001	< 0.001
Benzo(a)pyrene	0.0173	< 0.001	< 0.001	0.0873*	< 0.001	< 0.001
Benzo(b)fluoranthene	0.0318	< 0.001	< 0.001	0.0762*	< 0.001	< 0.001
Benzo(e)pyrene	0.0241	< 0.001	0.0091	0.0808*	< 0.001	< 0.001
Benzo(g,h,i)perylene	0.0252	< 0.001	< 0.001	0.0648*	< 0.001	< 0.001
Benzo(k)fluoranthene	0.0222	< 0.001	< 0.001	0.0893*	< 0.001	< 0.001
Biphenyl	0.0086	0.0123	< 0.001	0.0159*	0.0053	< 0.001
Bis(2-ethylhexyl)phthalate	2.01*	0.709*	7.92	7.8*	1.53	0.975
Butyl benzyl phthalate	0.102	0.0827	0.107	0.28*	0.027*	0.0414
Chrysene	0.038	< 0.001	0.0186	0.093*	< 0.001	< 0.001
Diethyl phthalate	0.531	2.23	0.204	0.537*	0.463	1.4
Dimethyl phthalate	0.0491	0.182*	0.0295	0.0361	0.0384*	0.0731
Di-n-butylphthalate	0.0676*	0.0676*	0.0602	0.308*	0.0563*	0.0582*
Di-n-octylphthalate	0.0956	< 0.005	0.0584	0.172*	< 0.005	< 0.005
Fluoranthene	0.0057	0.0162	0.027	0.102*	< 0.001	< 0.001
Fluorene	< 0.001	0.0091	< 0.001	0.0114	< 0.001	< 0.001
Indeno(1,2,3-cd)pyrene	0.0236	< 0.001	< 0.001	0.0619*	< 0.001	< 0.001
Isophorone	< 0.05	< 0.05	< 0.05	< 0.05	0.0617	< 0.05
Naphthalene	0.0558	0.0261	0.0579	0.05*	0.0443	0.0307
Perylene	< 0.001	< 0.001	< 0.001	0.0722*	< 0.001	< 0.001
Phenanthrene	0.0433	0.0327	0.0125	0.0507*	< 0.001	0.0056
Phenol	< 0.1	< 0.1	< 0.1	0.131*	0.336	< 0.1
Pyrene	0.0506	0.0224	0.018	0.113*	< 0.001	< 0.001
EPA 547 Pesticide ~ µg/L						
Glyphosate	23.2	< 6	< 6	< 6	< 6	< 6
EPA 625 Pesticides ~ µg/L						
4,4'-DDD	0.038	< 0.001	< 0.001	0.0542	< 0.001	< 0.001
4,4'-DDE	0.127	< 0.001	0.0899	0.457	< 0.001	< 0.001
4,4'-DDT	< 0.001	< 0.001	0.0411	0.179	< 0.001	< 0.001
Aldrin	< 0.001	< 0.001	0.136	< 0.001	< 0.001	< 0.001
Chlorpyrifos	< 0.005	< 0.005	0.345	0.312	< 0.005	< 0.005
Diazinon	0.177	0.167	0.0211	< 0.005	< 0.005	< 0.005
Malathion	0.0799	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Results from remaining EPA Methods 8151A and 8260B are non-detect.						

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-63: Detected Trace Organic Results from the Mass Emission Stations ME-VR and ME-VR2

	ME-VR				ME-VR2	
Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Constituent	**Event 1 10/16/04**	**Event 2 10/26/04**	**Event 3 12/4/04**	**Event 4 1/7/05**	**Event 5 5/3/05**	**Event 6 6/22/05**
EPA 625 Organics ~ µg/L						
1-Methylnaphthalene	0.0041	0.00194	0.0031	0.115	0.0033	0.0071
1-Methylphenanthrene	< 0.001	< 0.001	< 0.001	0.134	< 0.001	< 0.001
2,3,5-Trimethylnaphthalene	< 0.001	0.00937	< 0.001	0.053	< 0.001	< 0.001
2,6-Dimethylnaphthalene	< 0.001	0.0113	< 0.001	0.162	< 0.001	< 0.001
2-Methylnaphthalene	0.0084	0.00542	0.0041	0.162	0.0076	0.0165
4-Chloro-3-methylphenol	0.104	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	< 0.001	< 0.001	< 0.001	0.0113	< 0.001	< 0.001
Anthracene	< 0.001	< 0.001	< 0.001	0.0133	< 0.001	< 0.001
Benzo(a)anthracene	< 0.001	< 0.001	< 0.001	0.0459	< 0.001	< 0.001
Benzo(a)pyrene	< 0.001	< 0.001	< 0.001	0.0515	< 0.001	< 0.001
Benzo(b)fluoranthene	< 0.001	< 0.001	< 0.001	0.156	< 0.001	< 0.001
Benzo(e)pyrene	< 0.001	< 0.001	< 0.001	0.134	< 0.001	< 0.001
Benzo(g,h,i)perylene	< 0.001	< 0.001	< 0.001	0.0408	< 0.001	< 0.001
Biphenyl	< 0.001	0.00189	< 0.001	0.0697	< 0.001	< 0.001
Bis(2-ethylhexyl)phthalate	9.5	1.09*	22.2	12	1.6	0.563
Butyl benzyl phthalate	0.0639	0.0563*	0.0342	0.0735	0.012*	< 0.005
Chrysene	< 0.001	0.0129*	< 0.001	0.273	< 0.001	< 0.001
Diethyl phthalate	0.241*	0.277*	0.726	0.0613*	0.0761*	0.179
Dimethyl phthalate	0.0257	0.0637*	0.0673	0.0409	0.0183*	0.0158
Di-n-butylphthalate	0.0502*	0.0626*	0.0346*	0.208*	0.0281*	0.0298*
Fluoranthene	0.0035	0.0191*	< 0.001	0.0808	< 0.001	< 0.001
Fluorene	< 0.001	0.00308*	< 0.001	0.0284	< 0.001	< 0.001
Naphthalene	0.0132	< 0.001	0.0093	0.0669	0.0542	0.0899
Perylene	< 0.001	< 0.001	< 0.001	0.231	< 0.001	< 0.001
Phenanthrene	0.0049	0.0161	< 0.001	0.348	< 0.001	< 0.001
Phenol	0.151	< 0.1	< 0.1	< 0.1	< 0.1	0.435
Pyrene	0.0032	0.0103	< 0.001	0.122	< 0.001	< 0.001
EPA 547 Pesticide ~ µg/L						
Glyphosate	7.08	< 6	< 6	< 6	< 6	< 6
EPA 625 Pesticides ~ µg/L						
4,4'-DDT	< 0.001	< 0.001	< 0.001	0.167	< 0.001	< 0.001
Malathion	0.409	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Results from remaining EPA Methods 8151A and 8260B are non-detect.						

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-64: Detected Trace Organic Results from the Mass Emission Station ME-SCR

Event Type	Wet	Wet	Wet	Wet	Dry	Dry
Constituent	Event 1 10/16/04	Event 2 10/26/04	Event 3 12/4/04	Event 4 1/7/05	Event 5 5/3/05	Event 6 6/22/05
EPA 625 Organics ~ µg/L						
1-Methylnaphthalene	0.0161	0.0303	0.0054	0.0586*	0.003	< 0.001
1-Methylphenanthrene	0.0116	0.0353	< 0.001	0.074	< 0.001	< 0.001
2,3,5-Trimethylnaphthalene	< 0.001	0.0486	< 0.001	0.0531	< 0.001	< 0.001
2,6-Dimethylnaphthalene	0.0105	0.0501	< 0.001	0.104	< 0.001	< 0.001
2-Methylnaphthalene	0.0188	0.0454	0.0058	0.072*	0.0051	< 0.001
Acenaphthene	0.0079	< 0.001	< 0.001	0.0104*	< 0.001	< 0.001
Benzo(a)anthracene	< 0.001	0.033	< 0.001	0.0521	< 0.001	< 0.001
Benzo(b)fluoranthene	< 0.001	< 0.001	< 0.001	0.06*	< 0.001	< 0.001
Benzo(e)pyrene	< 0.001	< 0.001	< 0.001	0.0872	< 0.001	< 0.001
Biphenyl	0.0025	0.0365	< 0.001	0.0255*	0.002	< 0.001
Bis(2-ethylhexyl)phthalate	3.34	2.47	2.66	8.61	0.836	3.4*
Butyl benzyl phthalate	0.0357*	0.0909	0.0625	0.115	0.0071*	< 0.005
Chrysene	< 0.001	0.0609	< 0.001	0.133	< 0.001	< 0.001
Diethyl phthalate	0.334	0.294*	0.143	0.392*	0.183	0.459
Dimethyl phthalate	0.0362	0.0816*	0.0178	0.0453	0.0219*	0.0449
Di-n-butylphthalate	0.0548*	0.106*	0.0103*	0.293*	0.027*	0.0387*
Fluoranthene	0.0067	0.0429	< 0.001	0.0564	< 0.001	< 0.001
Fluorene	< 0.001	0.0118	< 0.001	0.0162	< 0.001	< 0.001
Naphthalene	0.0162	0.0591	0.0122	0.0495*	0.0101	< 0.001
Perylene	0.247	< 0.001	< 0.001	0.598	< 0.001	< 0.001
Phenanthrene	0.014	0.0942	< 0.001	0.1	< 0.001	< 0.001
Phenol	< 0.1	< 0.1	0.117	0.203	< 0.1	< 0.1
Pyrene	0.0102	0.0538	< 0.001	0.0845*	< 0.001	< 0.001
EPA 547 Pesticide ~ µg/L						
Glyphosate	6.83	< 6	< 6	< 6	< 6	< 6
EPA 625 Pesticides ~ µg/L						
Malathion	< 0.005	< 0.005	< 0.005	< 0.005	0.311	0.0835
Results from remaining EPA Methods 8151A and 8260B are non-detect.						

*See Appendix C for a description of the data qualifier(s) associated with this sample result.
"<" – Constituent not detected above specified detection limit.

Table 9-65: Bacteriological Results from the Mass Emission Station ME-CC

Event Type	Wet	Wet	Wet	Wet	Dry	Dry
Constituent ~ MPN/100 mL	Event 1 10/16/04	Event 2 10/26/04	Event 3 12/4/04	Event 4 1/7/05	Event 5 5/3/05	Event 6 6/22/05
E. Coli	10000	10000	246	4100	100	100
Enterococcus	3100	20000	64	6400	42	310
Fecal Coliform	16000	16000	170	1400	50	240
Total Coliform	2359000	529000	10000	20000	9800	10000

Table 9-66: Bacteriological Results from the Mass Emission Stations ME-VR and ME-VR2

	ME-VR				ME-VR2	
Event Type	Wet	Wet	Wet	Wet	Dry	Dry
Constituent ~ MPN/100 mL	Event 1 10/16/04	Event 2 10/26/04	Event 3 12/4/04	Event 4 1/7/05	Event 5 5/3/05	Event 6 6/22/05
E. Coli	3000	4100	30	310	31	10
Enterococcus	10000	4200	75	870	31	< 10
Fecal Coliform	5000	9000	23	300	110	8
Total Coliform	74000	73000	3000	20000	520	1000

Table 9-67: Bacteriological Results from the Mass Emission Station ME-SCR

Event Type	Wet	Wet	Wet	Wet	Dry	Dry
Constituent ~ MPN/100 mL	Event 1 10/16/04	Event 2 10/26/04	Event 3 12/4/04	Event 4 1/7/05	Event 5 5/3/05	Event 6 6/22/05
E. Coli	10000	10000	200	1750	410	41
Enterococcus	1000	53000	20	3100	20	10
Fecal Coliform	16000	11000	17	1100	240	110*
Total Coliform	638000	697000	1890	74000	5200	4100

9.9.5 Toxicity Results

The NPDES permit specifies that acute toxicity monitoring must occur during at least one storm per year at Land Use and Receiving Water sites until baseline information has been collected. The permit also requires that chronic toxicity tests be conducted at Mass Emission sites for two wet weather events and one dry weather event per monitoring season. In keeping with these requirements, acute toxicity tests were performed on samples collected at Land Use and Receiving Water sites in October 2004 (Event 1); chronic toxicity testing was conducted on samples collected at Mass Emission sites during two wet weather events in October 2004 (Events 1 and 2) and one dry weather event in May 2005 (Event 5). Results for acute and chronic toxicity tests are summarized in Table 9-68 and Table 9-69, respectfully.

9.9.5.1 Acute Toxicity

Results for acute toxicity are reported as the LC50, which is the concentration of sample that produces death in 50% of test organisms exposed. Since the concentration of pollutants is unknown in environmental samples, concentration is measured as a dilution percentage of the original sample, with 100% equal to the undiluted sample. An LC50 concentration, or dilution percentage, reported as less than 100% indicates that the undiluted sample caused >50% mortality to exposed test organisms and required dilution to achieve LC50. An LC50 dilution result of greater than 100% indicates that the sample would have to be more concentrated than it was at the time of sample collection to achieve the LC50. Results are also reported in units of TUa, which is calculated as 100 divided by the LC50.

Acute toxicity (as demonstrated by a TUa >1.0) was observed at the Residential Land Use site (R-1) and both Receiving Water sites (W-3 and W-4) for water samples collected during Event 1 as shown in Table 9-68. In accordance with permit requirements, TIEs were initiated for each of these samples. The toxicity testing laboratory, Aquatic Bioassay & Consulting Laboratories, Inc., was unable to identify the toxicant(s) because the toxicity dissipated in all three samples by the time the TIEs were initiated.

Table 9-68: Acute Toxicity Test Results from the Land Use and Receiving Water Stations

Station	Event No. – Event Type	Sample Date	Acute Ceriodaphnia Survival	
			LC50 – Dilution %	TUa
A-1	Event 1 – Wet	10/17/04	>100%	0.00
I-2	Event 1 – Wet	10/17/04	>100%	0.00
R-1	Event 1 – Wet	10/17/04	47.73%	2.10
W-3	Event 1 – Wet	10/17/04	42.86%	2.33
W-4	Event 1 – Wet	10/17/04	75.00%	1.33

9.9.5.2 Chronic Toxicity

Chronic toxicity tests have been conducted historically using the Purple Sea Urchin (*Strongylocentrotus purpuratus*) for this monitoring program. Although the urchin was used for the May 2005 dry weather event, the organism was unavailable during both of the October 2004 wet weather events due to seasonal conditions. Based on the toxicity testing laboratory's recommendations, the red abalone (*Haliotus rufescens*) was used instead for the two wet weather events. Results of the red abalone larval development and purple sea urchin fertilization bioassays are summarized in Table 9-69.

Results are reported in several ways: the IC50 is the sample concentration, or dilution percentage, at which an inhibitory response (in the case, abnormal shell development) is observed in 50% of the exposed test organisms. The NOEC is the concentration of sample at which there exists no observable effect on test organisms. An IC50 dilution or NOEC dilution reported as greater than 100% indicates that the sample would have to be more concentrated than it was at the time of sample collection to achieve the indicated effect. Results are also reported in units of TUc, which is calculated as 100 divided by the NOEC.

Table 9-69: Chronic Toxicity Test Results from the Mass Emission Stations

Station	Event No. – Event Type	Sample Date	Test Organism	Chronic Bioassay		
				IC50 Dilution	NOEC Dilution	TUc
ME-CC	Event 1 – Wet	10/17/04	Red Abalone	37.50%	20%	4.00
ME-CC	Event 2 – Wet	10/27/04	Red Abalone	>100%	100%	1.00
ME-CC	Event 5 – Dry	5/3/05	Purple Sea Urchin	>100%	100%	1.00
ME-SCR	Event 1 – Wet	10/17/04	Red Abalone	75.00%	50%	2.00
ME-SCR	Event 2 – Wet	10/27/04	Red Abalone	>100%	100%	1.00
ME-SCR	Event 5 – Dry	5/3/05	Purple Sea Urchin	>100%	100%	1.00
ME-VR	Event 1 – Wet	10/17/04	Red Abalone	>100%	50%	2.00
ME-VR	Event 2 – Wet	10/27/04	Red Abalone	38.06%	25%	4.00
ME-VR2	Event 5 – Dry	5/3/05	Purple Sea Urchin	>100%	100%	1.00

The NPDES permit specifies that a TIE must be initiated if two consecutive wet weather samples (or a single dry weather sample) exhibit toxicity; however, a numeric trigger for

chronic toxicity is not specified in the permit. For the purposes of the Stormwater Monitoring Program, a numeric chronic toxicity trigger of >1.0 TUc was selected. Chronic toxicity (defined herein as a TUc >1.0) was detected in two consecutive wet weather samples collected at Mass Emission station ME-VR, triggering a TIE for this site. Although the IC50 result for the 10/17/04 ME-VR sample was reported as ">100%", the NOEC result (50%) on which the TUc result of "2.00" is based, indicated that toxic effects were observed in organisms exposed to 100% sample. The toxicity testing laboratory initiated a TIE for the 10/27/04 ME-VR sample, but was unable to identify the toxicant(s) because sample toxicity dissipated by the time the TIE was initiated.

Toxicity was not detected in any of the samples collected during the May 2005 dry weather event. ABC Lab's toxicity testing reports from the 2004/05 monitoring season are provided in Appendix K.

9.10 Data Analysis and Discussion

This section summarizes the estimated mass loadings from the ME-CC, ME-VR, ME-VR2, and ME-SCR Mass Emission stations and provides a comparison of the Stormwater Monitoring Program's 2004/05 data to water quality objectives. The purpose of stormwater monitoring is to characterize water quality conditions that can be used to assess water quality improvements and to help direct the Stormwater Management Program. Mass loadings were calculated to track conditions in the watershed. Analysis of the data is needed in order to provide a comparison with water quality objectives and assist in the identification of any pollutants or sources that may be problematic in the watershed. The applicability of relevant water quality objectives is discussed in detail later in this section.

9.10.1 Mass Loadings

Mass loadings were estimated for constituents detected at the ME-CC, ME-VR, ME-VR2, and ME-SCR Mass Emission sites during 2004/05 monitoring season. Mass loadings could not be calculated at the ME-SCR station for wet weather monitoring events because total wet weather flow could not be accurately measured, as discussed in Section 9.5. To recap, the Santa Clara River flows through two possible routes during wet weather conditions. One route is through the river diversion gate structure where the majority of wet weather flow passes. The other route is over the diversion dam, a situation which occurs only during high flow rates or large storm events. At the moment, wet weather flow can only be measured at the diversion dam because there is no flow meter installed at the river diversion gate. There are technical challenges involved with measuring flow at the river diversion gate since floating debris and sediment can interfere with flow measurement. VCWPD is currently investigating flow meters capable of measuring flow in the diversion gate structure under these conditions. Due to damage sustained to both the flow meter installed at the United Water Conservation District facility and the flow meter installed at the retired ME-VR station during January and February, 2005, dry weather monitoring mass loadings were estimated for constituents detected at ME-SCR and ME-VR2 during Events 5 and 6 using mean daily flow values from two United States Geological Survey (USGS) gauges. The ME-SCR mass loading calculation used flow data from USGS Gauge #11114000 – Santa Clara River at Montalvo, while the ME-VR2 mass loading calculation relied upon flow data from USGS Gauge #11118500 – Ventura River near Ventura.

Mass loads were calculated by using the average flow (measured in cubic feet per second, CFS) estimated over the duration of a monitoring event and the concentrations of detected constituents. Event duration is defined as the number of hours elapsed between the first aliquot distributed into the first sample bottle collected through the last aliquot distributed into the last sample bottle collected by a composite sampler. Wet weather events monitored during 2004/05 at the ME-CC and ME-VR stations lasted from less than 24 hours (Event 3 at ME-CC) to just over 100 hours (Event 4 at ME-VR). Dry weather events monitored during the current season lasted approximately 24 hours, with the exception of a 35.5-hour sampling duration at ME-CC during Event 5. Based on the average flow rate for an event, loadings were calculated in lbs/event to allow for comparisons between sites as well as between events (see example below). These mass loading estimates are presented in Table 9-70 through Table 9-72.

9.10.2 Example Mass Loading Calculation

A mass loading calculation is shown below for an Event 1 Total Lead concentration measured at ME-CC (Event Duration = 47 hours 12 minutes = 47.2 hours).

Total Lead Concentration

10.9 µg/L or 0.0109 mg/L (Table 9-59)

Average Flow Rate for Monitoring Event

129.36 CFS (Table 9-13)

129.36 CFS x 7.48 gal/CF x 3.785 liters/gal = 3662 liters/sec

Load = Concentration x Volume

3662 liters/sec x 0.0109 mg/L = 39.92 mg/sec

39.92 mg/sec x 60 sec/min x 60 min/hr x 47.2 hr/event x 1 kg/10^6 mg = 6.78 kg/event

Table 9-70: ME-CC Estimated Mass Loadings

	ME-CC					
Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Date	**10/16/04**	**10/26/04**	**12/4/04**	**1/7/05**	**5/3/05**	**6/22/05**
Event Duration ~ Hours	**47.20**	**46.62**	**17.23**	**83.95**	**35.53**	**23.75**
Constituent – Fraction	***All results reported in lbs/event***					
Anions						
Bromide	493	1180	9.8	9350	405	45.9
Chloride	160000	375000	24600	2610000	152000	8450
Conventionals						
BOD	30100	27800	1480	2300000	390	141
Hardness as $CaCO_3$ – Total	223000	727000	45800	8410000	170000	22700
Total Dissolved Solids	520000	3010000	124000	2.52E+7	444000	47000
Total Organic Carbon	37000	52000	1480	863000	2490	423
Total Suspended Solids	526000	5450000	25400	3.55E+8	2570	725
Hydrocarbons						
Oil and Grease	11600	7680	ND	ND	ND	ND
TRPH	548	5320	ND	ND	39	ND
Metals						
Aluminum – Total	12100	144000	237	2415000	48.3	8.8
Arsenic – Total	8.9	48.4	0.63	718	1.6	0.16
Cadmium – Total	2.7	13	0.12	599	4.4	0.006
Chromium – Total	38.5	230	0.83	6020	1	0.06
Chromium VI – Total	54.8	R	ND	719	ND	ND
Copper – Total	39.8	180	1.7	6090	2.1	0.2
Lead – Total	14.9	103	0.51	1780	0.2	0.02
Mercury – Total	0.04	0.68	3.73E-4	10.6	0.004	2.06E-4
Nickel – Total	42.7	222	1.8	9350	2.9	0.32
Selenium – Total	5.5	21.7	0.47	349	2.1	0.4
Silver – Total	0.36	ND	ND	24.4	ND	ND
Thallium – Total	0.14	0.59	ND	41	ND	ND
Zinc – Total	138	571	6.9	19100	7.6	0.9
Nutrients						
Ammonia as N	685	945	22	ND	50.7	2.6
Nitrate as N	5200	16900	2050	510000	4400	642
Nitrite as N	95.8	ND	23.7	13700	35.1	6.8
Orthophosphate as P – Total	2630	11600	197	61100	518	32.9
TKN	12700	17700	339	539000	363	6.8
Total Phosphorus – Total	116000	110000	204	76900	117	57
Organics						
1-Methylnaphthalene	0.02	0.04	0.001	1.2	0.001	3.18E-4
1-Methylphenanthrene	ND	ND	ND	1.1	ND	ND
2,3,5-Trimethylnaphthalene	ND	0.1	ND	ND	ND	ND
2,6-Dimethylnaphthalene	0.02	0.05	ND	1.2	ND	2.56E-4
2-Methylnaphthalene	0.05	0.07	0.002	2.6	0.004	0.001
Acenaphthene	0.03	ND	ND	0.62	ND	ND
Anthracene	0.01	ND	ND	0.7	ND	3.97E-4
Benzo(a)anthracene	0.02	ND	ND	3.9	ND	ND
Benzo(a)pyrene	0.02	ND	ND	6.3	ND	ND

ND – Constituent not detected, and therefore no estimated mass loading was calculated.

R – Sample result was rejected due to suspected sample contamination, and therefore no estimated mass loading was calculated.

Table 9–70 (Continued): ME-CC Estimated Mass Loadings

	ME-CC					
Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Date	**10/16/04**	**10/26/04**	**12/4/04**	**1/7/05**	**5/3/05**	**6/22/05**
Event Duration ~ Hours	**47.20**	**46.62**	**17.23**	**83.95**	**35.53**	**23.75**
Constituent – Fraction	***All results reported in lbs/event***					
Organics						
Benzo(b)fluoranthene	0.04	ND	ND	5.5	ND	ND
Benzo(e)pyrene	0.03	ND	0.002	5.8	ND	ND
Benzo(g,h,i)perylene	0.04	ND	ND	4.7	ND	ND
Benzo(k)fluoranthene	0.03	ND	ND	6.4	ND	ND
Biphenyl	0.01	0.07	ND	1.1	0.002	ND
Bis(2-ethylhexyl)phthalate	2.8	4.2	1.3	561	0.6	0.05
Butyl benzyl phthalate	0.14	0.49	0.02	20.1	0.01	0.002
Chrysene	0.05	ND	0.003	6.7	ND	ND
Diethyl phthalate	0.73	13.2	0.04	38.6	0.18	0.07
Dimethyl phthalate	0.07	1.1	0.005	2.6	0.02	0.004
Di-n-butylphthalate	0.09	0.4	0.01	22.1	0.02	0.003
Di-n-octylphthalate	0.13	ND	0.01	12.4	ND	ND
Fluoranthene	0.08	0.1	0.005	7.3	ND	ND
Fluorene	ND	0.05	ND	0.82	ND	ND
Indeno(1,2,3-cd)pyrene	0.03	ND	ND	4.5	ND	ND
Isophorone	ND	ND	ND	ND	0.02	ND
Naphthalene	0.08	0.15	0.01	3.6	0.02	0.002
Perylene	ND	ND	ND	5.2	ND	ND
Phenanthrene	0.06	0.19	0.002	3.6	ND	2.92E-4
Phenol	ND	ND	ND	9.4	0.13	ND
Pyrene	0.07	0.13	0.003	8.1	ND	ND
Pesticides						
4,4'-DDD	0.05	ND	ND	3.9	ND	ND
4,4'-DDE	0.17	ND	0.02	32.9	ND	ND
4,4'-DDT	ND	ND	0.007	12.9	ND	ND
Aldrin	ND	ND	0.02	ND	ND	ND
Chlorpyrifos	ND	ND	0.06	22.4	ND	ND
Diazinon	0.24	0.99	0.004	ND	ND	ND
Glyphosate	31.8	ND	ND	ND	ND	ND
Malathion	0.11	ND	ND	ND	ND	ND

ND – Constituent not detected, and therefore no estimated mass loading was calculated.

Table 9-71: ME-VR and ME-VR2 Estimated Mass Loadings

	ME-VR				ME-VR2	
Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Date	**10/16/04**	**10/26/04**	**12/4/04**	**1/7/05**	**5/3/05**	**6/22/05**
Event Duration ~ Hours	**50.38**	**46.75**	**30.23**	**102.48**	**25.60**	**23.57**
Constituent – Fraction	***All results reported in lbs/event***					
Anions						
Bromide	4.1	8.3	0.34	10700	116	16.1
Chloride	1050	2640	770	1920000	38300	2710
Conventionals						
BOD	85.5	ND	22.1	1600000	ND	ND
Hardness as $CaCO_3$ – Total	3140	11600	3950	3.20E+7	95900	22700
Total Dissolved Solids	7670	25700	9080	9.60E+7	197000	35400
Total Organic Carbon	204	173	33.1	3200000	767	267
Total Suspended Solids	432	3140	24.5	1.93E+9	6710	121
Hydrocarbons						
Oil and Grease	38.9	111	ND	ND	ND	ND
TRPH	1.9	26.7	ND	64000	24	ND
Metals						
Aluminum – Total	8.5	45.1	0.33	8080000	120	57.9
Arsenic – Total	0.02	0.05	0.009	1250	0.24	0.04
Cadmium – Total	0.04	0.01	0.003	1150	ND	0.05
Chromium – Total	0.04	0.15	0.009	14800	0.5	0.17
Chromium VI – Total	0.1	ND	ND	ND	ND	ND
Copper – Total	0.06	0.15	0.02	12500	0.65	0.27
Lead – Total	0.02	0.03	ND	7090	0.17	0.11
Mercury – Total	3.09E-5	8.22E-5	9.59E-6	45	4.65E-4	4.92E-4
Nickel – Total	0.06	0.19	0.03	28500	1.1	0.52
Selenium – Total	0.03	0.16	0.05	813	1.1	ND
Silver – Total	ND	ND	ND	74.6	ND	ND
Thallium – Total	ND	ND	ND	101	ND	ND
Zinc – Total	2.4	1.3	0.35	55400	1.2	0.91
Nutrients						
Ammonia as N	0.1	0.69	ND	10700	ND	ND
Nitrate as N	17.5	30.7	3.3	133000	407	2.5
Nitrite as N	0.39	6	ND	ND	ND	ND
Orthophosphate as P – Total	2.3	6.8	ND	ND	7.2	ND
TKN	22.3	30.5	3.9	933000	113	9.9
Organics						
1-Methylnaphthalene	3.98E-5	6.73E-5	3.80E-5	30.7	0.001	4.41E-4
1-Methylphenanthrene	ND	ND	ND	35.7	ND	ND
2,3,5-Trimethylnaphthalene	ND	3.25E-4	ND	14.1	ND	ND
2,6-Dimethylnaphthalene	ND	3.92E-4	ND	43.2	ND	ND
2-Methylnaphthalene	8.16E-5	1.88E-4	5.03E-5	43.2	0.002	0.001
4-Chloro-3-methylphenol	0.001	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	3	ND	ND
Anthracene	ND	ND	ND	3.5	ND	ND
Benzo(a)anthracene	ND	ND	ND	12.2	ND	ND
Benzo(a)pyrene	ND	ND	ND	13.7	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	41.6	ND	ND

ND – Constituent not detected, and therefore no estimated mass loading was calculated.

Table 9–71 (Continued): ME-VR and ME-VR2 Estimated Mass Loadings

	ME-VR				ME-VR2	
Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Date	**10/16/04**	**10/26/04**	**12/4/04**	**1/7/05**	**5/3/05**	**6/22/05**
Event Duration ~ Hours	**50.38**	**46.75**	**30.23**	**102.48**	**25.60**	**23.57**
Constituent – Fraction	***All results reported in lbs/event***					
Organics						
Benzo(e)pyrene	ND	ND	ND	35.7	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	10.9	ND	ND
Biphenyl	ND	6.56E-5	ND	18.6	ND	ND
Bis(2-ethylhexyl)phthalate	0.09	0.04	0.27	3200	0.38	0.04
Butyl benzyl phthalate	0.001	0.002	4.20E-4	19.6	0.003	ND
Chrysene	ND	4.48E-4	ND	72.8	ND	ND
Diethyl phthalate	0.002	1	0.009	16.3	0.02	0.01
Dimethyl phthalate	2.50E-4	0.002	0.001	10.9	0.004	0.001
Di-n-butylphthalate	4.88E-4	0.002	4.25E-4	55.4	0.007	0.002
Fluoranthene	3.40E-5	0.001	ND	21.5	ND	ND
Fluorene	ND	1.07E-4	ND	7.6	ND	ND
Naphthalene	1.28E-5	ND	1.14E-4	17.8	0.01	0.006
Perylene	ND	ND	ND	61.6	ND	ND
Phenanthrene	4.76E-5	0.001	ND	92.8	ND	ND
Phenol	0.001	ND	ND	ND	ND	0.03
Pyrene	3.11E-5	3.57E-4	ND	32.5	ND	ND
Pesticides						
4,4'-DDT	ND	ND	ND	44.5	ND	ND
Glyphosate	0.07	ND	ND	ND	ND	ND
Malathion	0.004	ND	ND	ND	ND	ND

ND – Constituent not detected, and therefore no estimated mass loading was calculated.

Table 9-72: ME-SCR Estimated Mass Loadings

	ME-SCR					
Event Type	**Wet**	**Wet**	**Wet**	**Wet**	**Dry**	**Dry**
Date	**10/16/04**	**10/26/04**	**12/4/04**	**1/7/05**	**5/3/05**	**6/22/05**
Event Duration ~ Hours	**48.32**	**47.29**	**31.30**	**60.00**	**20.18**	**23.45**
Constituent – Fraction	***All results reported in lbs/event***					
Anions						
Bromide	—	—	—	—	133	21
Chloride	—	—	—	—	118000	2630
Conventionals						
BOD	—	—	—	—	473	ND
Hardness as $CaCO_3$ – Total	—	—	—	—	194000	21400
Total Dissolved Solids	—	—	—	—	450000	35700
Total Organic Carbon	—	—	—	—	1750	228
Total Suspended Solids	—	—	—	—	37400	1160
Hydrocarbons						
TRPH	—	—	—	—	47.3	ND
Metals						
Aluminum – Total	—	—	—	—	544	13.3
Arsenic – Total	—	—	—	—	0.86	0.04
Chromium – Total	—	—	—	—	1.1	0.3
Copper – Total	—	—	—	—	1.9	0.11
Lead – Total	—	—	—	—	0.53	0.01
Mercury – Total	—	—	—	—	0.006	0.001
Nickel – Total	—	—	—	—	2.1	0.11
Selenium – Total	—	—	—	—	2.3	0.19
Zinc – Total	—	—	—	—	4.2	0.21
Nutrients						
Ammonia as N	—	—	—	—	37.9	0.45
Nitrate as N	—	—	—	—	615	60.7
Nitrite as N	—	—	—	—	ND	16.5
Orthophosphate as P – Total	—	—	—	—	42.6	3.1
TKN	—	—	—	—	289	8
Organics						
1-Methylnaphthalene	—	—	—	—	0.001	ND
2-Methylnaphthalene	—	—	—	—	0.002	ND
Biphenyl	—	—	—	—	0.001	ND
Bis(2-ethylhexyl)phthalate	—	—	—	—	0.4	0.15
Butyl benzyl phthalate	—	—	—	—	0.003	ND
Diethyl phthalate	—	—	—	—	0.09	0.02
Dimethyl phthalate	—	—	—	—	0.01	0.002
Di-n-butylphthalate	—	—	—	—	0.01	0.002
Naphthalene	—	—	—	—	0.05	ND
Pesticides						
Malathion	—	—	—	—	0.15	0.004

ND – Constituent not detected, and therefore no estimated mass loading was calculated.

9.10.3 Water Quality Objective Comparisons

Pursuant to Part 2.C of the Countywide NPDES Permit the co-permittees are required to determine whether discharges from their municipal separate storm sewer system are causing or contributing to an exceedance of water quality standards. This determination is impacted by a number of factors including: duration of the storm event, averaging periods, mixing zones, representative samples, impacted beneficial uses, etc. Currently, neither USEPA nor the State has established procedures for making this type of determination. In spite of these limitations the co-permittees have in this section conducted a preliminary assessment of receiving water and discharge monitoring data to identify potential water quality issues.

There are several steps involved in analyzing data to assess water quality improvements. The first step involves comparing analytical results from Mass Emission and Receiving Water stations to the applicable surface water quality objectives established in the Los Angeles Region 4 Basin Plan (Basin Plan) and the California Toxics Rule (CTR). Each plan includes a discussion of the applicability of their objectives based on the type of water (freshwater or saltwater) and the beneficial uses that are being protected. For the purposes of this analysis, all of the water quality objectives were evaluated.

This year, unlike previous years, water quality parameter results from the Mass Emission and Receiving Water stations were compared to both surface water quality objectives (as defined in the Basin Plan and CTR) and ocean water quality objectives (as defined in the California Ocean Plan). In previous years, the comparison only included surface water quality objectives. However, this year, at the behest of the Los Angeles Regional Water Quality Control Board, comparisons of Stormwater Monitoring Program data to California Ocean Plan objectives were made. The Stormwater Management Program believes this comparison is inappropriate based on the following applicability language contained in the California Ocean Plan:

> "This plan is not applicable to discharges to enclosed bays and estuaries or inland waters, nor is it applicable to vessel wastes, or the control of dredged material."

The VCWPD, as lead co-permittee of the Stormwater Monitoring Program, is an active executive committee member of the Southern California Coastal Water Research Program (SCCWRP). One of SCCWRP's primary goals is to develop, participate in, and coordinate programs to understand ecological systems in Southern California coastal waters and to document relationships between these systems and human activities. VCWPD provides financial support to SCCWRP, as well as participates in a variety of management and technical subcommittees. Through these associations with SCCWRP the VCWPD supports an organization that develops and coordinates model monitoring programs (stormwater and POTW) that seek to better understand the impact of inland discharges to ocean waters.

Since the Stormwater Monitoring Program's monitoring sites are representative of larger drainage areas, the comparison of water quality data from Mass Emission and Receiving Water stations to water quality objectives will identify pollutants that may pose a problem to the overall watershed. More specifically, water quality data from the three Mass Emission sites are representative of water quality conditions in the three major watersheds (Calleguas Creek, Santa Clara River, and Ventura River) in Ventura County. The second step in analyzing data to assess water quality in Ventura County includes comparing Land Use data to the same objectives. The third step involves comparing Land Use water quality objective exceedances to Receiving Water and Mass Emission exceedances. Land Use sites are representative of drainage areas that are specific to either one of three land use types: residential, agricultural or industrial. These sites also allow the Stormwater Monitoring Program to identify the possible sources of problematic constituents based on the land use (i.e. agriculture, residential, industrial sources).

Based on the analysis, the beneficial uses potentially impacted by the receiving water exceedances can be identified and the impacts of stormwater discharges can be assessed. In summary, the water quality objective comparison is composed of the following three steps:

- Compare Mass Emission and Receiving Water data with water quality objectives
- Compare Land Use discharge data with water quality objectives
- Identify potentially problematic constituents

9.10.4 Mass Emission and Receiving Water Analysis

The 2004/05 monitoring data from the Mass Emission and Receiving Water stations were analyzed and compared to the water quality objectives to determine the frequency of exceedances of objectives and identify potential pollutants of concern.

The most appropriate standards for comparison to stormwater (i.e., wet weather) discharges are short-term acute freshwater objectives. Stormwater events usually occur over the span of a few hours to a day. As a result, exposure to the concentrations above the objectives only occurs for a short period of time. For this reason, longer term objectives (i.e., chronic exposure objectives) may not be as applicable for wet events. Acute criteria better reflect the short-term event exposure experienced by organisms. Additionally, freshwater objectives are the most appropriate because the monitoring stations discharge to inland, freshwater receiving waters. As noted previously, direct comparison of inland water quality data to objectives designed to protect the ocean waters only provides insight into identifying potential water quality issues, not necessarily in accessing water quality compliance with ocean water quality standards.

For the analysis of wet weather (storm) data (Events 1 – 4), the Basin Plan objectives, the acute, freshwater objectives in the CTR, and the California Ocean Plan Daily Maximum objectives were used. For some constituents, the CTR does not contain acute objectives. In these cases, the CTR Human Health (Organisms Only) objectives were used in the wet weather comparison. The CTR Human Health (Organisms Only) objectives were used here because these constituents have no other objectives for comparison. These objectives were used even though they are based on long-term risks to human health that cannot be directly correlated to stormwater discharges. CTR chronic criteria were not used for wet weather analyses because acute criteria better reflect the short-term storm event exposure experienced by organisms, as compared to the long-term exposure considered by chronic criteria. With respect to the Ocean Plan, a 30-Day Average objective (for protection of human health) was used when a Daily Maximum objective was not provided for a particular constituent.

For the analysis of dry weather data (Events 5 and 6), the Basin Plan objectives, the chronic, freshwater objectives in the CTR, and the California Ocean Plan 6-Month Median objectives were used. For some constituents, the CTR does not contain chronic objectives. In these cases, the CTR Human Health (Organisms Only) objectives were used in the dry weather comparison. The CTR Human Health (Organisms Only) objectives were used here because these constituents have no other objectives for comparison. With respect to the Ocean Plan, a 30-Day Average objective (for protection of human health) was used when a 6-Month Median objective was not provided for a particular constituent.

Objectives in the CTR for metals are calculated based on the hardness of the water. This analysis used the hardness value measured at a particular site during a particular monitoring event for calculating a certain metals objective, except when the measured hardness was greater than 400 mg/L. The CTR sets a hardness cap of 400 mg/L for calculating the objectives, so any measured hardness value above 400 mg/L was set equal to 400 mg/L for the purposes of the calculation.

The usually large mass loadings calculated for Mass Emission stations ME-CC (see Table 9-70) and ME-VR (see Table 9-71) during Event 4 are the result of (1) the extremely large average flows (see Table 9-13) calculated for these extended runoff events, and (2) the elevated concentration of most constituents (especially total suspended solids, metals, organics, and pesticides) measured in the water quality samples collected at these sites. The elevated constituent concentrations were likely produced by the flushing of watersheds and the scouring of streambeds and adjacent riparian habitat that occurred as a result of the prolonged runoff and high flows observed during Event 4. The net result of these flushing and scouring effects can be seen in the increased number of water quality objective exceedances observed during Event 4 at the Mass Emission sites as compared to the exceedances reported during Events 1–3 at these stations. Table 9-73 through Table 9-80 present water quality objective exceedances at Mass Emission and Receiving Water sites based on an analysis of the 2004/05 monitoring data. Table 9-76 through Table 9-78 specifically show water quality objective exceedances observed at Mass Emission stations during dry weather monitoring events.

Table 9-73: Water Quality Objective Exceedances from the Mass Emission Station ME-CC Observed during Wet Weather Monitoring Events

Classification	*Constituent (in µg/L except where noted)*	*10/16/04 Result*	*10/26/04 Result*	*12/4/04 Result*	*1/7/05 Result*	*L.A. Basin Plan Objtv*	*CTR FW Acute Objtv*	*Ocean Plan Daily Max Objtv*
Bacterio-logical	E. Coli (MPN/100 mL)	10000	10000	246	4100	235		
Bacterio-logical	Fecal Coliform (MPN/100 mL)	16000	16000		1400	400		
Metal	Aluminum – Total	8820	24300	1400	33600	1000		
Metal	Cadmium – Total				8.33	5		4
Metal	Chromium – Total	28.1	39		83.8	50		8
Metal	Copper – Total	29.1	30.4		84.7			12
Metal	Lead – Total	10.9	17.4		24.8			8
Metal	Mercury – Total	0.115			0.147		0.051^	
Metal	Nickel – Total	31.2	37.5		130	100		20
Metal	Zinc – Total	101	96.7		265			80
Organic	Benzo(a)-anthracene				0.0542		0.049^	
Organic	Benzo(a)-pyrene				0.0873		0.049^	
Organic	Benzo(b)-fluoranthene				0.0762		0.049^	
Organic	Benzo(k)-fluoranthene				0.0893		0.049^	
Organic	Bis(2-ethyl-hexyl)phthalate			7.92	7.8	4	5.9^	3.5
Organic	Chrysene				0.093		0.049^	
Organic	Indeno(1,2,3-cd)pyrene				0.0619		0.049^	
Organic	PAHs	0.2707	0.0642	0.0491	0.7114			0.0088
Nutrient	Nitrate as N (mg/L)			12.1		10		
Pesticide	4,4'-DDD	0.038			0.0542		0.00084^	
Pesticide	4,4'-DDE	0.127		0.0899			0.00059^	
Pesticide	Aldrin			0.136				0.000022
Pesticide	DDT	0.165		0.131	0.6902			0.00017

Blank cells denote no exceedance of a water quality objective.
"^" – CTR Human Health objective for consumption of organisms only.

Table 9-74: Water Quality Objective Exceedances from the Mass Emission Station ME-SCR Observed during Wet Weather Monitoring Events

Classification	*Constituent (in µg/L except where noted)*	*10/16/04 Result*	*10/26/04 Result*	*12/4/04 Result*	*1/7/05 Result*	*L.A. Basin Plan Objtv*	*CTR FW Acute Objtv*	*Ocean Plan Daily Max Objtv*
Bacterio-logical	E. Coli (MPN/100 mL)	10000	10000		1750	235		
Bacterio-logical	Fecal Coliform (MPN/100 mL)	16000	11000		1100	400		
Conven-tional	Total Dissolved Solids (mg/L)			1230		1200		
Metal	Aluminum – Total	8530	15900		69900	1000		
Metal	Cadmium – Total				8.65	5		4
Metal	Chromium – Total	21.1	24.9		125	50		8
Metal	Copper – Total	16.6	27.2		133			12
Metal	Lead – Total		16.3		57.8			8
Metal	Mercury – Total		0.522		0.459		0.051^	0.16
Metal	Nickel – Total	24.8	29.5		185	100		20
Metal	Zinc – Total		82.1		473			80
Organic	Benzo(a)-anthracene				0.0521		0.049^	
Organic	Benzo(b)-fluoranthene				0.06		0.049^	
Organic	Bis(2-ethyl-hexyl)phthalate				8.61	4	5.9^	3.5
Organic	Chrysene		0.0609		0.133		0.049^	
Organic	PAHs	0.0242	0.2537		0.4458			0.0088

Blank cells denote no exceedance of a water quality objective.
"^" – CTR Human Health objective for consumption of organisms only.

Table 9-75: Water Quality Objective Exceedances from the Mass Emission Station ME-VR Observed during Wet Weather Monitoring Events

Classification	*Constituent (in µg/L except where noted)*	*10/16/04 Result*	*10/26/04 Result*	*12/4/04 Result*	*1/7/05 Result*	*L.A. Basin Plan Objtv*	*CTR FW Acute Objtv*	*Ocean Plan Daily Max Objtv*
Anion	Chloride (mg/L)	108	76.1	62.8		60		
Bacterio-logical	E. Coli (MPN/100 mL)	3000	4100		310	235		
Bacterio-logical	Fecal Coliform (MPN/100 mL)	5000	9000			400		
Metal	Aluminum – Total		1300		30300	1000		
Metal	Cadmium – Total	4.26			4.3	5		4
Metal	Chromium – Total				55.5	50		8
Metal	Copper – Total				46.8			12
Metal	Lead – Total				26.6			8
Metal	Mercury – Total				0.169		0.051^	0.16
Metal	Nickel – Total				107	100		20
Metal	Zinc – Total	531			208			80
Metal	Zinc – Dissolved	456					316.32	
Organic	Benzo(a)-pyrene				0.0515		0.049^	
Organic	Benzo(b)-fluoranthene				0.156		0.049^	
Organic	Bis(2-ethyl-hexyl)phthalate	9.5		22.2	12	4	5.9^	3.5
Organic	Chrysene				0.273		0.049^	
Organic	PAHs		0.04238		1.0789			0.0088
Pesticide	DDT				0.167			0.00017

Blank cells denote no exceedance of a water quality objective.
"^" – CTR Human Health objective for consumption of organisms only.

Table 9-76: Water Quality Objective Exceedances from the Mass Emission Station ME-CC Observed during Dry Weather Monitoring Events

Classification	*Constituent (in µg/L except where noted)*	*5/3/05 Result*	*6/22/05 Result*	*L.A. Basin Plan Objtv*	*CTR FW Chronic Objtv*	*Ocean Plan 6-Month Median Objtv*
Anion	Chloride (mg/L)	390	162	150		
Conven-tional	Total Dissolved Solids (mg/L)	1140	900	850		
Metal	Cadmium – Dissolved	10.9			6.22	
Metal	Cadmium – Total	11.4		5		1
Metal	Chromium – Total	2.68				2
Metal	Copper – Total	5.47	3.86			3
Metal	Nickel – Total	7.48	6.15			5
Metal	Selenium – Total	5.3	7.67		5	
Nutrient	Nitrate as N (mg/L)	11.3	12.3	10		
Organic	PAHs		0.0132			0.0088

Blank cells denote no exceedance of a water quality objective.

Table 9-77: Water Quality Objective Exceedances from the Mass Emission Station ME-SCR Observed during Dry Weather Monitoring Events

Classification	*Constituent (in µg/L except where noted)*	*5/3/05 Result*	*6/22/05 Result*	*L.A. Basin Plan Objtv*	*CTR FW Chronic Objtv*	*Ocean Plan 6-Month Median Objtv*
Anion	Chloride (mg/L)	250		150		
Bacterio-logical	E. Coli (MPN/100 mL)	410		235		
Metal	Aluminum – Total	1150		1000		
Metal	Chromium – Total	2.38				2
Metal	Copper – Total	3.96				3

Blank cells denote no exceedance of a water quality objective.

Table 9-78: Water Quality Objective Exceedances from the Mass Emission Station ME-VR2 Observed during Dry Weather Monitoring Events

Classification	*Constituent (in µg/L except where noted)*	*5/3/05 Result*	*6/22/05 Result*	*L.A. Basin Plan Objtv*	*CTR FW Chronic Objtv*	*Ocean Plan 6-Month Median Objtv*
Metal	Chromium – Total	2.05	2.71			2
Metal	Copper – Total		4.31			3
Metal	Nickel – Total		8.43			5

Blank cells denote no exceedance of a water quality objective.

Table 9-79: Water Quality Objective Exceedances from the Receiving Water Station W-3

Classification	*Constituent (in µg/L except where noted)*	*10/17/04 Result*	*L.A. Basin Plan Objtv*	*CTR FW Acute Objective*	*Ocean Plan Daily Max Objective*
Bacteriological	E. Coli (MPN/100 mL)	52000	235		
Bacteriological	Fecal Coliform (MPN/100 mL)	30000	400		
Conventional	Total Dissolved Solids (mg/L)	930	500		
Metal	Aluminum – Total	10200	1000		
Metal	Chromium – Total	18.9			8
Metal	Copper - Total	36.4			12
Metal	Lead – Total	12.6			8
Metal	Mercury – Total	0.162		0.051^	0.16
Metal	Nickel – Total	20.4			20
Nutrient	Nitrate as N (mg/L)	11.4	10		
Organic	PAHs	0.0282			0.0088
Pesticide	4,4'-DDE	0.128		0.00059^	
Pesticide	DDT	0.1895			0.00017

Blank cells denote no exceedance of a water quality objective.
"^" – CTR Human Health objective for consumption of organisms only.

Table 9-80: Water Quality Objective Exceedances from the Receiving Water Station W-4

Classification	*Constituent (in µg/L except where noted)*	*10/16/04 Result*	*L.A. Basin Plan Objtv*	*CTR FW Acute Objective*	*Ocean Plan Daily Max Objective*
Bacteriological	E. Coli (MPN/100 mL)	20000	235		
Bacteriological	Fecal Coliform (MPN/100 mL)	30000	400		
Conventional	Total Dissolved Solids (mg/L)	1500	500		
Metal	Chromium – Total	20.6			8
Metal	Copper - Total	26.7			12
Metal	Lead – Total	11.7			8
Metal	Mercury – Total	0.104		0.051^	
Metal	Nickel – Total	21.7			20
Metal	Zinc – Total	88			80
Nutrient	Nitrate as N (mg/L)	23.4	10		
Organic	Bis(2-ethylhexyl)-phthalate	4.57	4		3.5
Organic	PAHs	0.038			0.0088
Pesticide	4,4'-DDD	0.0337		0.00084^	
Pesticide	4,4'-DDE	0.174		0.00059^	
Pesticide	DDT	0.2958			0.00017

Blank cells denote no exceedance of a water quality objective.
"^" – CTR Human Health objective for consumption of organisms only.

9.10.5 Land Use Discharge Analysis

In order to assess whether or not discharges from the stormwater system are contributing to the exceedances of objectives identified in the receiving waters, Land Use discharge data were analyzed in the same manner as the Mass Emission and Receiving Water data.

The 2004/05 monitoring data from Land Use sites (R-1, I-2, A-1) were compared to the Basin Plan, CTR, and California Ocean Plan objectives previously described. Although the Land Use stations are not always located in each of the watersheds for which Receiving Water samples are collected, the sites were chosen to provide representative data to be used to describe the water quality of discharges from urban and agricultural areas in Ventura County. As a result, for this analysis, the Land Use objective exceedances are compared to the receiving water objectives exceedances in all watersheds even if they are not specifically located in that watershed. This comparison allows the Stormwater Monitoring Program to determine whether certain land use types may be contributing to the objectives exceedances in receiving waters. Table 9-81 through Table 9-83 present water quality objective exceedances at Land Use sites based on an analysis of the 2004/05 wet weather stormwater monitoring data.

Table 9-81: Water Quality Objective Exceedances from the Land Use Station R-1

Classification	*Constituent (in µg/L except where noted)*	*10/16/04 Result*	*L.A. Basin Plan Objtv*	*CTR FW Acute Objective*	*Ocean Plan Daily Max Objective*
Bacteriological	E. Coli (MPN/100 mL)	31000	235		
Bacteriological	Fecal Coliform (MPN/100 mL)	16000	400		
Metal	Aluminum – Total	1860	1000		
Metal	Copper - Total	21.7			12
Metal	Copper - Dissolved	15.2		8.67	
Metal	Zinc – Total	126			80
Organic	Benzo(b)fluoranthene	0.0711		0.049^	
Organic	Benzo(k)fluoranthene	0.0541		0.049^	
Organic	Bis(2-ethylhexyl)-phthalate	5.14	4		3.5
Organic	Chrysene	0.113		0.049^	
Organic	Indeno(1,2,3-cd)pyrene	0.0599		0.049^	
Organic	PAHs	0.6754			0.0088
Pesticide	4,4'-DDE	0.0757		0.00059^	
Pesticide	DDT	0.0757			0.00017

Blank cells denote no exceedance of a water quality objective.
"^" – CTR Human Health objective for consumption of organisms only.

Table 9-82: Water Quality Objective Exceedances from the Land Use Station I-2

Classification	*Constituent (in µg/L except where noted)*	*10/16/04 Result*	*L.A. Basin Plan Objtv*	*CTR FW Acute Objective*	*Ocean Plan Daily Max Objective*
Bacteriological	E. Coli (MPN/100 mL)	288000	235		
Bacteriological	Fecal Coliform (MPN/100 mL)	50000	400		
Conventional	Total Dissolved Solids (mg/L)	760	500		
Metal	Aluminum – Total	2460	1000		
Metal	Chromium – Total	8.42			8
Metal	Copper - Total	43.5			12
Metal	Zinc – Total	138			80
Organic	Benzo(b)fluoranthene	0.0907		0.049^	
Organic	Benzo(k)fluoranthene	0.0851		0.049^	
Organic	Bis(2-ethylhexyl)-phthalate	13.4	4	5.9^	3.5
Organic	Chrysene	0.103		0.049^	
Organic	PAHs	0.6008			0.0088
Pesticide	4,4'-DDE	0.0819		0.00059^	
Pesticide	DDT	0.0819			0.00017

Blank cells denote no exceedance of a water quality objective.
"^" – CTR Human Health objective for consumption of organisms only.

Table 9-83: Water Quality Objective Exceedances from the Land Use Station A-1

Classification	*Constituent (in µg/L except where noted)*	*10/16/04 Result*	*L.A. Basin Plan Objtv*	*CTR FW Acute Objective*	*Ocean Plan Daily Max Objective*
Bacteriological	E. Coli (MPN/100 mL)	1000	235		
Bacteriological	Fecal Coliform (MPN/100 mL)	1100	400		
Conventional	Total Dissolved Solids (mg/L)	860	500		
Metal	Aluminum – Total	8630	1000		
Metal	Chromium – Total	23.7			8
Metal	Copper - Total	42.1			12
Metal	Lead – Total	10.9			8
Metal	Mercury – Total	0.0621		0.051^	
Metal	Nickel – Total	30.7			20
Metal	Zinc – Total	136			80
Nutrient	Nitrate as N (mg/L)	22.7	10		
Organic	PAHs	0.0678			0.0088
Pesticide	4,4'-DDD	0.0799		0.00084^	
Pesticide	4,4'-DDE	0.546		0.00059^	
Pesticide	DDT	1.3362			0.00017

Blank cells denote no exceedance of a water quality objective.
"^" – CTR Human Health objective for consumption of organisms only.

9.10.6 Potential Problematic Constituents

A review of Table 9-73 through Table 9-83 provides the following observations:

9.10.6.1 Bacteriological

All Receiving Water and Mass Emission sites recorded concentrations greater than water quality objectives for E. Coli and Fecal Coliform during wet weather events. Similarly, stormwater runoff from the R-1, I-2, and A-1 Land Use sites exceeded bacteriological objectives for E. Coli and Fecal Coliform. Dry weather concentrations of E. Coli were only greater than Basin Plan objectives during Event 5 at ME-SCR. No other bacteriological water quality objective exceedances were observed during dry events. Consistent with previous efforts by the Ventura Countywide Stormwater Quality Program (presented most recently the 2002/03 Annual Monitoring Report) bacteria pose a potential problem for water quality protection and warrant special efforts by the Program (see Pollutant of Concern Assessment below).

9.10.6.2 Metals

All Mass Emission and Land Use sites, as well as Receiving Water station W-3, showed concentrations of total aluminum in excess of Basin Plan water quality objectives during wet weather events. Dry weather concentrations of total aluminum were only greater than Basin Plan objectives during Event 5 at ME-SCR. This is the second year that aluminum has been monitored by the Stormwater Monitoring Program, and the second time that a comparison to Basin Plan objectives has revealed exceedances for total aluminum. It should be noted that aluminum is found as a ubiquitous natural element in sediments throughout Ventura County geology (Richard Gossett, CRG Marine Laboratories, Inc., personal communication). All Mass Emission stations also recorded concentrations of cadmium, chromium, copper, lead, mercury, nickel, and zinc (all total fractions) above water quality objectives during wet weather monitoring. Dry weather monitoring similarly revealed total chromium and total copper concentrations above Ocean Plan 6-Month Median objectives at all Mass Emission sites during one or more events. Total nickel concentrations exceeded Ocean Plan objectives during one or more dry events at ME-CC and ME-VR2. Additionally, Mass Emission station

ME-CC recorded a total cadmium concentration above Basin Plan and Ocean Plan objectives and a dissolved cadmium concentration above the CTR Freshwater Chronic objective during dry weather Event 5. Finally, the CTR Freshwater Chronic objective for total selenium was exceeded at ME-CC during both dry weather events.

Both Receiving Water sites exhibited exceedances for chromium, copper, lead, mercury, and nickel (all total fractions) above water quality standards during wet events. All Land Use stations showed wet weather exceedances for copper and zinc. Additionally, wet weather monitoring revealed that the Industrial Land Use station, I-2, recorded an exceedance for chromium, and the Agricultural Land Use station, A-1, recorded exceedances for chromium, lead, mercury, and nickel.

The Basin Plan total aluminum exceedances notwithstanding, it should be noted that most metals exceedances observed during 2004/05 wet and dry weather events were for metals concentrations above Ocean Plan objectives, with the exception of CTR cadmium, mercury, and selenium exceedances, and some Basin Plan exceedances observed at Mass Emission stations during the high flows of Event 4 in January 2005, and the dry events of May and June, 2005. It is reasonable to posit that the high flows generated by the large January rainfall event were responsible for streambed and riparian habitat scouring that produced elevated concentrations of metals in water quality samples collected from Mass Emission sites during Event 4. Mass Emission site ME-VR and Land Use site R-1 also recorded concentrations greater than CTR water quality objectives for dissolved zinc and dissolved copper, respectively, during Event 1. Consistent with the most recent Pollutant of Concern (POC) analysis (see 2002/03 Annual Monitoring Report), the runoff contributions of copper, lead, and zinc will be analyzed by the Stormwater Management Program in more detail via trend analyses, source identification, and potential source control measures (see Pollutant of Concern Assessment below). The Stormwater Monitoring Program will continue to monitor for metals at all of its monitoring stations to augment its 12-year metals data set.

9.10.6.3 Nutrients

Water quality objective exceedances were recorded for nitrate at one Mass Emission station, ME-CC, both Receiving Water stations, and the Agricultural Land Use station, A-1, during wet weather monitoring events. Dry weather nitrate concentrations were greater than Basin Plan objectives during Events 5 and 6 at ME-CC. No other nutrient water quality objective exceedances were observed during dry events. Given that these Basin Plan exceedances appear to be an issue more pertinent to agriculture, the Stormwater Monitoring Program will continue to monitor for nutrients at these sites to augment the database. Consistent with the most recent Pollutant of Concern (POC) analysis (see 2002/03 Annual Monitoring Report), the runoff contributions of nitrogen compounds will be analyzed by the Stormwater Management Program in more detail via trend analyses, source identification, and potential source control measures (see Pollutant of Concern Assessment below).

9.10.6.4 Organics

Organic compound exceedances observed during 2004/05 wet weather events were limited to the phthalate compound, Bis(2-ethylhexyl)phthalate, and various polynuclear aromatic hydrocarbons (PAHs). All monitoring stations except for the Receiving Water site, W-3, and the Agricultural Land Use site, A-1, recorded exceedances of the Ocean Plan objective for Bis(2-ethylhexyl)phthalate (3.5 μg/L), and often also exceeded the Basin Plan (4 μg/L) and CTR Human Health objectives (5.9 μg/L) for this constituent. As mentioned in Section 9.8, phthalate compounds originating from plastics are present in the environment at relatively high concentrations. The use of low detection limits achieved by the analytical laboratory employed by the Stormwater Monitoring Program to analyze for trace organics has resulted in the measurement of phthalate compounds at all monitoring stations in recent years.

All monitoring sites recorded concentrations of polynuclear aromatic hydrocarbons (PAHs) above the Ocean Plan's objective for PAH compounds[1] during wet weather monitoring events. Additionally, all but the Agricultural Land Use site, A-1, exhibited one or more PAH compound (see Footnote 1 for list of constituents) concentrations in excess of CTR Human Health water quality objectives. Dry weather concentrations of PAH compounds were only greater than Ocean Plan objectives during Event 6 at ME-CC. No other organic compound water quality objective exceedances were observed during dry events. The presence of individual PAH compounds above CTR objectives during wet weather events (Events 1 – 4) at particular monitoring sites are listed below:

- Benzo(a)anthracene: ME-CC and ME-SCR
- Benzo(a)pyrene: ME-CC and ME-VR
- Benzo(b)fluoranthene: ME-CC, ME-SCR, ME-VR, R-1, I-2
- Benzo(k)fluoranthene: ME-CC, R-1, I-2
- Chrysene: ME-CC, ME-SCR, ME-VR, R-1, I-2
- Indeno(1,2,3-cd)pyrene: ME-CC, R-1

PAHs are found in the combustion products of wood, coal, and internal combustion engines, and are ubiquitous in the environment. Wildfires that burned in the region in recent years could also have served as a source of PAH compounds that were measured in water quality samples. With reference to both phthalates and PAHs, the CTR Human Health criteria for which these exceedances were observed were based on long-term exposure human health protection. Comparing short-term discharges with the human health criterion is only useful as a screening tool and not for assessing the impact of the stormwater discharge on the waterbody and compliance with water quality standards.

9.10.6.5 Pesticides

Pesticide exceedances observed during 2004/05 wet weather events were limited to Aldrin and two DDT-related compounds: 4,4'-DDD and 4,4'-DDE. The Ocean Plan's Aldrin objective was exceeded at the ME-CC station during Event 4. All monitoring stations except for the Mass Emission site ME-SCR showed an exceedance of the Ocean Plan's DDT compound[2] objective. The one DDT-related compound for which CTR Human Health exceedances were recorded at all monitoring sites except for the Mass Emission stations ME-SCR and ME-VR was the legacy pesticide 4,4'-DDE. The DDT-related compound, 4,4'-DDD, was also detected at concentrations above its CTR Human Health objective at sites ME-CC, W-4, and A-1. No pesticide water quality objective exceedances were observed at Mass Emission stations during dry events. These legacy pesticides are associated with Ventura County's extensive farming history. These compounds are currently being addressed in the Calleguas Creek watershed through the development of a total maximum daily load (TMDL). The Ventura Countywide co-permittees located in the Calleguas Creek watershed

[1] The California Ocean Plan requires that the concentrations of the following individual PAH constituents be summed when comparing discharge concentrations to the Ocean Plan's 0.0088 µg/L PAH objective: Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Fluorene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene.

[2] The California Ocean Plan requires that the concentrations of the following individual DDT-related compounds be summed when comparing discharge concentrations to the Ocean Plan's 0.00017 µg/L DDT objective: 2,4'-DDD, 2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT.

are actively involved in the TMDL development and its subsequent implementation, and will ultimately be responsible for addressing this pesticide through the TMDL.

910.7 Pollutant of Concern Assessment

On an annual basis it is important for the co-permittees to review the monitoring data generated by the Stormwater Monitoring Program as a means to evaluate the effectiveness of the existing Stormwater Management Program and to help direct future resources to the appropriate problematic water quality issues. This year the co-permittees are conducting a limited review of the monitoring data to determine whether discernable trends in the concentrations of constituents contained in the 2003 Pollutant of Concern (POC) list can be identified. Water quality parameters included in the 2003 POC list are shown in Table 9-84. Furthermore, for those constituents contained in the 2003 POC list, the co-permittees will identify the likely sources of these constituents and potential management controls to reduce their contributions in runoff. A technical memorandum presenting the trend analysis of POCs, a list of potential sources of POCs, and current management practices used to address these pollutants is scheduled for completion by late fall 2005.

Table 9-84: 2003 Pollutant of Concern List

Rank	*Pollutant of Concern*
1	Total Nitrogen
2	Total DDT
3	Chlorpyrifos
4	Copper*
5	Total Coliforms
6	Ammonia
7	Zinc*
8	Lead*

*Includes both total and dissolved fractions.

9.10.8 Conclusions

This report summarizes the events of the 2004/05 monitoring season in which the Stormwater Monitoring Program met the monitoring requirements of its NPDES permit, and successfully collected and analyzed water quality samples from four wet weather storm events and two dry weather events. The Stormwater Monitoring Program subsequently conducted a thorough QA/QC evaluation of the environmental and QA/QC results generated from its analysis of water quality samples and found the resultant data set to have achieved a 96.5% success rate in meeting program data quality objectives. Overall, the six events monitored during the current season produced a high quality data set in terms of the low percentage of qualified data, as well as the low reporting levels achieved by all laboratories analyzing the Stormwater Monitoring Program's water quality samples.

The continued development of high quality monitoring data further augments the Stormwater Monitoring Program's data set and provides a firm foundation for assessing Management Program effectiveness. The results of the 2004/05 monitoring season demonstrated the need for continued implementation of the Ventura Countywide Stormwater Quality Management Program, especially as it relates to the control and elimination of bacteria. The exceptionally large precipitation events experienced in Ventura County in January 2005 mobilized pollutants in stormwater runoff at higher than normal concentrations. The elevated levels of total suspended solids, metals, organics, and pesticides measured during Event 4 are likely the result of watershed flushing and streambed and riparian habitat scouring produced by the extremely high flows that were observed at Mass Emission stations during the January 7, 2005, monitoring event.

Aquatic toxicity bioassays detected toxicity (defined in the NPDES permit as TUa >1.0) in water samples collected during wet weather Event 1 (October 16, 2004) at the Residential Land Use site (R-1) and both Receiving Water sites (W-3 and W-4). Chronic toxicity (defined by the Stormwater Monitoring Program as TUc >1.0) was detected in two consecutive wet weather samples collected at Mass Emission station ME-VR during Events 1 and 2. These exceedances of established toxicity threshold values required the Stormwater Monitoring Program to request that the toxicity testing laboratory initiate toxicity identification evaluations (TIEs) on all associated samples; however, in all cases the laboratory was unable to identify the toxicant(s) because sample toxicity dissipated by the time the TIE was initiated. The inability of the toxicity testing laboratory to identify the toxicant(s) through TIEs, presumably from the dissipation of toxic agents from samples, has been observed by the Stormwater Monitoring Program in the past, especially in cases where TUa and TUc results are slightly greater than 1.0. EPA scientists, regarded as among the top scientists in the nation in performing TIEs, acknowledge that it may be difficult to successfully conduct a TIE "when the toxic units of a sample from the Initial Toxicity Test using the most sensitive species are <2" (EPA/600/R-96-054). A chronic and acute TIE trigger established at 2 TU (rather than 1 TU) would increase the likelihood that a TIE would identify the toxicant(s). Re-evaluation of the acute and chronic trigger criteria is therefore warranted.

SECTION 10.0 PROGRAM EVALUATION

10.0 Program Evaluation

Criteria for the evaluation of the Stormwater Quality Management Program are described in the SMP. Generally, Program evaluation is conducted by assessing implementation of program elements, program compliance and participation of each Co-permittee.

As outlined in Chapters 2 through 9, the Co-permittees accomplished the following

- Stormwater Program budgets were identified for the following reporting year
- Municipal staff were trained in applicable stormwater management program areas to increase awareness about stormwater quality management and program requirements
- Permit-required activities were implemented
- Volunteers were recruited to help improve water quality throughout Ventura County
- Applicable public communities (including residents, businesses, land developers and contractors) were targeted for educational outreach on stormwater quality management and Program requirements

10.1 Performance

10.1.1 Program Management

The Principal Co-permittee (VCWPD) continued to carry out the overall management of the Stormwater Quality Management Plan: planning implementation and funding of the Stormwater Monitoring Plan; and coordination with the RWQCB. The Storm Water Monitoring Report was submitted in accordance with the Permit, in July 2004. An update Monitoring Report that includes the Ventura River Watershed Biological and Physical/Habitat Assessment is included in Chapter 9 of this annual report.

The Co-permittees continued to operate collectively under the Permit in accordance with the division of responsibilities described in the Implementation Agreement. The Implementation Agreement was developed specifically to guide activities related to the Ventura Countywide Stormwater Quality Management Program. The Management Committee has the authority to modify the Implementation Agreement, when necessary. The Implementation Agreement continues to be an effective mechanism for defining the division of responsibilities amongst the Co-permittees.

Management Committee meetings were well attended with most of the Co-permittees attending 100 percent. While all Co-permittees attended more than 90% of the meetings, ten of the twelve Co-permittees met the performance criteria established in the SMP. There is also room for improvement in subcommittee attendance. Eight out of twelve Co-permittees did attend more than 75 percent of the meetings, but only three of the Co-permittees met the performance criteria established in the SMP (for more information see **Section 2.0**). The Co-permittees are committed to improving their attendance record next permit year.

Most of the coordination of the countywide Program is accomplished in the subcommittees. This reporting period the five subcommittees contributed to: new countywide stormwater public outreach program logo; providing over five million educational outreach contacts countywide; countywide SQUIMP training; countywide post-construction BMP Database development and coordination; as well as development of Program educational materials.

The Co-permittees continue to fund their stormwater quality management program efforts through a combination of monies generated through the Benefit Assessment Program and monies from Co-permittee general funds. Program funding, while limited this year, will only continue to be a growing challenge in future years. This reporting year, faced with depleting

financial resources the Co-permittees agreed to evaluate their programs to identify appropriate funding mechanisms to augment current assessments generated through the NPDES Benefit Assessment Program. Last reporting year, a consultant was hired to assess individual Co-permittee program needs and help identify additional funding mechanisms to support this important program. This work is currently in progress.

The Co-permittees have all adopted ordinances equivalent to the model stormwater ordinance developed in 1997. These ordinances provide the Co-permittees the authority to implement the SMP in their communities.

The management structure of the Program has been highly successful because it fosters a cooperative countywide program, provides clear division of responsibilities amongst the Co-permittees (Implementation Agreement), defines the decision process for the Program (Management Committee), provides framework for developing program materials (subcommittees), and provides funding for countywide activities (Benefit Assessment Program).

10.1.2 Programs for Residents

Co-permittees made significant efforts this reporting year to assess the countywide outreach program and its effectiveness. After several surveys and focus group work, the Co-permittees selected a public relations and marketing firm to help integrate the telephone survey results and apply its findings into a comprehensive countywide outreach message and direction. The Co-permittees' plan is to not only impact immediate awareness of stormwater pollution, but to lay a foundation that, over time, can help establish an environmental ethic in Ventura County residents that will prevent stormwater pollution at its source. The Co-permittees plan to launch their new outreach media campaign next reporting year.

In addition, the Co-permittees supplied stormwater quality information to the public and used a variety of vehicles to achieve this. Public outreach efforts focused on mass media outlets (including print media, and local radio and TV) and community events. At the local level, the Co-permittees emphasized community events, volunteers programs and school presentations. In addition, the Co-permittees have expanded their educational outreach tools this reporting year, including the publishing of stormwater related articles in city quarterly newsletters. In total, the Co-permittees achieved over 5.6 million impressions, exceeding permit requirements.

Co-permittees are pleased to report that all permit-required activities (stencil program, access point sign posting, identification of staff to serve as public contact for reporting clogged catch basin inlets and illicit discharges/dumping) were accomplished with all Co-permittees exceeding the performance criteria established in the SMP.

10.1.3 Programs for Industrial/Commercial Businesses

Co-permittees continued to visit industrial and commercial businesses in an effort to discuss different ways to implement best management practices (BMPs) and to share educational materials with business owners and operators. The Co-permittees conducted follow-up visits to look for improved conditions and implemented enforcement actions when appropriate. This reporting year several joint industrial site inspections were conducted with VCWPD and the RWQCB to ensure consistency between regulatory agencies in assessment of compliance with stormwater requirements.

Those business activities that have the highest potential to contribute pollutants to the storm drain system were targeted this reporting year by the Co-permittees. The Co-permittees sought to provide additional information and guidance to the business community on practical

solutions for stormwater pollution prevention in those areas/activities that can be most problematic.

Several Co-permittees implemented innovative programs to further mitigate the potential for stormwater pollution. Both the City of Camarillo and Simi Valley continued to implement "stormwater pollution prevention permit programs" in an effort to target businesses known to pose a potential threat to water quality. By "permitting" these business facilities, the Co-permittees have created an opportunity to educate business owners on stormwater quality and better ensure that pollution prevention measures will be incorporated in their daily activities.

The Industrial/Commercial Business Program is successful because it effectively delivers pollution prevention messages to targeted businesses determined by the Co-permittees to present a significant threat for contributing pollutants to the storm drain system. While the program emphasizes education, the Co-permittees also take appropriate actions with respect to violations and illicit discharges discovered during site visits.

10.1.4 Programs for Planning and Land Development

Co-permittees continue to review planning and land development projects for stormwater quality. Conditions are placed on projects that require potential stormwater quality impacts to be mitigated through source and treatment controls. The Co-permittees conditioned a total of 416 projects for both source and treatment control measures this reporting year, exceeding the performance criteria established in the SMP.

The Co-permittees continued countywide implementation of the Technical Guidance Manual, developed in July 2002 and revised in February 2003, which addresses Permit and SQUIMP requirements for new development and redevelopment projects. This manual provides the Co-permittees with a guide for reviewing projects and an approach for selecting appropriate BMPs to minimize development impacts on water quality. This manual is a vital tool that assists the Co-permittees and the development community in their efforts to address projects in a consistent manner countywide.

Incorporating controls into development and redevelopment projects at the earliest point in the project planning process continues to be emphasized by the Co-permittees. Implementing standard conditions of approval allows the Co-permittees to effectively address water quality concerns early in the process, providing developers the ability to incorporate stormwater quality controls in the overall project site. This aggressive approach of early review and project conditioning is highly effective in mitigating water quality impacts, resulting in a comprehensive program.

The Co-permittees and the RWQCB have finalized designations of Environmentally Sensitive Areas (ESAs) throughout Ventura County. In addition, the Co-permittees created a countywide map depicting these areas and made it available to all interested parties.

During this reporting period, the Co-permittees emphasized education of the development community by making over 3000 contacts to development community representatives through public communication efforts (counter assistance, phone conservations/discussions, etc.), professional society presentations, community group presentations, workshops/seminars and educational outreach materials.

After two years of study, the Co-permittees completed the Urban Stream Erosion Prevention Report (USEP). The study's results allowed the Co-permittees to re-evaluate the use of the information available from the model on flow-duration flow velocity distributions, bed/bank shear stress calculations, etc. for assessing flood control facilities, streambed/bank protection efforts and urbanization impacts. Most significantly, the study assisted the Co-permittees in determining that the interim peak flow criteria for designing BMPs for projects subject to

SQUIMP requirements originally included in the Technical Guidance Manual is the most appropriate.

10.1.5 Programs for Construction Sites

Co-permittees continue to implement an effective construction program, which includes the review and assessment of Storm Water Pollution Control Plans (SWPCPs), the inspection of construction sites using a standard checklist, proof of filing a Notice of Intent (NOI) for projects subject to the General Construction Permit prior to issuing a grading permit, and employee training regarding stormwater quality management. In addition, the Co-permittees have made concerted efforts to educate and inform the construction community about permit requirements via pre-construction meetings and inspections, the program's website, community outreach efforts, print media and other outreach efforts. Education continues to be an indispensable tool that all Co-permittees stress as part of this program.

Co-permittees continue to implement an aggressive inspection program of construction projects countywide. During inspections, Co-permittees continue to emphasize effective erosion and sediment control. If problems are encountered, Co-permittees work with contractors to resolve problems or irregularities. When necessary or appropriate, problems may be referred to the RWQCB. This reporting year several joint construction site inspections were also conducted with VCWPD and the RWQCB to ensure consistency between regulatory agencies in assessment of compliance with stormwater requirements.

The Program for Construction Sites has been extremely effective due to countywide utilization of education, inspection and enforcement tools. Education materials and stormwater information is provided when applicants apply for grading permits, during workshops sponsored by the program and during inspections. Although education is a long-term approach that may yield some immediate rewards, the Co-permittees strongly believe that it is an effective tool to obtaining compliance. Education increases awareness of the water quality benefits of permit compliance and more significantly can reveal the benefit of compliance on fiscal costs of construction. Preventing erosion has both costs saving benefits as well eliminating the costs associated with enforcement actions.

10.1.6 Programs for Public Agency Activities

The Co-permittees continue to regularly clean drainage facilities and roadways prior to the wet season and year-round as required. 14,079 tons of debris was removed from drainage facilities (catch basin inlets, channels/ditches and detention/retention basins) this reporting year countywide. The removal of this material was essential to preventing its discharge to the storm drain system, thus mitigating impacts on water quality.

In addition, the Co-permittees inspected designated municipal corporate yards to assess current BMP implementation. During the 2002-03 reporting year, all of the Co-permittees' corporate yards were audited by the RWQCB will assistance from TetraTech, Inc., to ensure proper implementation of a SWPCP and source control BMPs. Co-permittees were required to submit a Compliance Schedule for correcting any noted deficiencies. All of the Co-permittees were in compliance with the schedule set by the RWQCB and continue to refine their SWPCP implementation through their annual corporate yard inspections.

After the adoption of the new Aquatic Pesticide Permit in May 2004, VCWPD responded by filing a Notice of Intent (NOI) to seek coverage under the permit. Furthermore, VCWPD submitted an Aquatic Pesticide Application Plan (APAP) to the RWQCB during 2002-03 reporting year, per the requirements of the updated General Permit. Implementation of the water quality monitoring program detailed in the APAP was implemented during the 2003-04 reporting period.

10.1.7 Programs for Illicit Discharges/Illegal Connections

The Co-permittees continue to respond to illicit discharge reports and ensure discharges are terminated, cleaned up and/or perform follow-up education. In addition, this reporting year, the Co-permittees targeted those communities (residential, construction sites, and industrial/commercial facilities) that have traditionally presented a problem for permit enforcement and ordinance prohibitions for additional educational outreach. These communities were targeted for workshops, educational mailings, and additional conditions on business licenses. In addition, some Co-permittees have simply prohibited certain activities within their jurisdiction.

This program is effective where all of reported illicit discharge incidents were responded to and when appropriate were cleaned up and terminated, or referred to the appropriate agency. The number of reported incidents is a testament to the success of the Co-permittees' education and outreach efforts: the high level of reports that were actual illicit discharges (93%) indicates a high level of public awareness and thus provides the Co-permittees an opportunity to respond positively to these incidents.

10.1.8 Water Quality and Monitoring Program

The SMP establishes implementation of Program elements, which are likely to lead to stormwater quality improvements. Water quality results of the monitoring program with pollutant loads for this reporting year are presented in **Section 9**. Last reporting year the Stormwater Monitoring Program implemented a new water quality database to further expedite, standardize and enhance the Stormwater Monitoring Program's data management and data analysis activities. Key attributes include semi-automated QA/QC evaluation, automated comparison of the Stormwater Monitoring Program's data to water quality objectives and a wide array of hard copy and electronic data reporting features. The new database has allowed the Stormwater Monitoring Program to improve its overall data management effort by providing staff with a robust data management tool for the storage, analysis and reporting of stormwater monitoring data.

As a means of improving the detection capability of various constituents found in the water quality samples collected by the VCWPD, the Stormwater Monitoring Program employed the services of CRG Marine Laboratories, Inc. (CRG) at the beginning of the 2003/04 monitoring year. CRG is an ELAP (Environmental Laboratory Accreditation Program) accredited laboratory known for its ability to measure analytes at concentrations much lower than most water quality laboratories.

The purpose of stormwater monitoring is to characterize water quality conditions that can be used to assess water quality improvements and to help direct the stormwater management program. Mass loadings were calculated to track water quality conditions in the County. Analysis of the data is needed in order to provide a comparison with water quality objectives identify any pollutants or sources that may be problematic in the County. This approach identifies those pollutants that exceed water quality objectives established in the California Toxics Rule and Basin Plan.

It should be recognized that some of the objectives are not directly applicable to stormwater discharges. For example, the Basin Plan includes objectives for water bodies designated as Municipal Drinking Water Supplies, but none of the water bodies from which samples were collected contain this designated use. So although all of the plans are used for comparison to evaluate possible impacts from stormwater runoff, many of the objectives used are not directly applicable to inland discharges of storm water in Ventura County.

Regardless of these circumstances, the monitoring data did allow the Co-permittees to make some general statements about water quality trends within Ventura County. When comparing

monitoring data to a water quality objective, all available data (1993 to present) was used. Elevated pollutant concentrations were observed at all monitoring sites during one or more monitored wet weather storm events, as well as at all Mass Emission sites during one or more dry weather events.

However, the data also indicates that the number of detected organic constituents have decreased significantly since the Program was implemented. More importantly, an analysis of Pollutants of Concern (POCs) shows Sediment/TSS (identified as POC in 1998) is no longer listed as a pollutant of concern. This improvement speaks volumes about the efforts of the Co-permittees to decrease sediment contributions from construction sites to stormwater runoff. In addition, Mercury and PAHs are no longer top-ranked POCs. As the Program evolves over time, the Co-permittees expect to continue to make progress in limiting stormwater pollution. For more detailed information regarding the Monitoring Program see **Section 9**.

10.2 Dated Permit Requirements

Several permit requirements were scheduled to be completed this reporting year. The following is a list of the requirements and their status:

- The Co-permittees performed a self-audit to verify implementation of the SMP through January 1 and reported the results of the self-audit to the Principal Co-permittee by February 1, 2005
- The Stormwater Monitoring Report was submitted in July 2005
- VCWPD filed a Notice of Intent (NOI) to seek coverage under the revised Aquatic Pesticide Permit, which was adopted in May 2004. Furthermore, per the requirements of the revised permit, VCWPD implemented the Aquatic Pesticide Application Plan (APAP)
- Co-permittees inspected designated Co-permittee corporate yards by permit deadline to determine if the site-specific SWPCP is adequately implemented
- Staff training requirements were completed by the permit deadline and Co-permittees continue to train staff in an on-going basis

10.3 Program Assessment

The programs developed under the SMP are evaluated for their effectiveness at regular intervals. Generally, program evaluation is conducted by assessing implementation of program elements, which are likely to improve water quality.

Programs described in the SMP include a list of implementation activities that Co-permittees follow and most have associated performance criteria. While the permit standard continues to be the MEP, the performance criteria established in the SMP is considered to be the minimum level of implementation that each Co-permittee must achieve to conduct an effective program. As outlined above, the majority of Co-permittees met or exceeded the performance criteria established for each program.

10.3.1 Countywide Program Achievements

Many of the goals and objectives of the Program have been realized. Program accomplishments include increased public awareness of stormwater quality issues, multi-agency coordination of stormwater quality management measures and establishment of working relationships with stakeholders in watershed management.

In addition to developing and implementing permit-required programs, the Co-permittees continue to participate in the following programs, which compliment the NPDES program prescribed in the Clean Water Act:

- Oxnard City Corps Storm Drain Keeper Program
- SCCWRP participation
- Santa Clara River Enhancement and Management Plan and TMDL efforts
- Calleguas Creek Watershed Management Plan and TMDL efforts
- Hillside Erosion Control Ordinance (HECO Program)
- Aquatic Pesticide NPDES Permit
- Alternative Weed Management

Although these projects go beyond the Co-permittees' permit requirements, they are part of the overall effort of the Co-permittees to develop and implement effective programs that will further permit-required efforts to improve water quality countywide. These programs compliment the Program in addition to implementing watershed management efforts.

The Program continues to be highly successful because it fosters a cooperative countywide program, provides clear division of responsibilities amongst the Co-permittees, defines the decision process for the Program, provides the framework for developing program materials and provides funding for countywide activities.

10.3.1.a *Oxnard City Corps Storm Drain Keeper Program*

In December 2001, VCWPD successfully applied for a Supplemental Environmental Project (SEP) grant to form a Storm Drain Keeper Program. This program brought together Oxnard City Corps volunteers, the cities of Oxnard, Port Hueneme, the Ventura County Harbor Department and VCWPD to address water quality concerns in the Oxnard West, "J" Street and Oxnard Industrial drains located within the City of Oxnard, California. The Oxnard City Corps is a program that seeks at-risk youth within Oxnard from the ages of 14 to 21 and provides them with needed job skills.

Money from the SEP funds went to the Oxnard City Corps to pay for teens to help protect the Channel Islands Harbor [303(d)-listed water body], Ormond Beach, and the Ormond Beach Wetlands by patrolling and cleaning the Oxnard West, "J" Street and Oxnard Industrial storm drains. Workers inspected drains and used existing equipment from City Corps (hand tools, vacuums, and boom trucks) to remove trash, vegetation, sediment and graffiti. In recognition of the potential adverse impact to these waterbodies, City Corps members did not use any herbicides, pesticides or chemicals in the course of their work.

Additionally, City Corps members met with staff with VCWPD, City of Oxnard, City of Port Hueneme, and Ventura County Harbor Department on a monthly basis for safety, technical and educational training. They learned about stormwater pollution and prevention measures.

As they become more educated, they became mentors within their own communities, thus educating friends, family and other community members about important environmentally issues. This project was a huge success, removing over nine tons of trash and debris from the channels and highlighted the impact that agencies working together can have on the community and on our most important asset, our youth.

Due to the enormous success of this program, VCWPD decided to fund the program for a further six months. Since that time the City of Oxnard has taken over the funding of this important and beneficial program. To this day, City Corps participants help their local community in providing a cleaner, safer environment for their neighbors and friends.

10.3.1.b *Southern California Coast Water Research Project (SCCWRP) Participation*

In February 2003, the Southern California Coastal Water Research Project (SCCWRP) invited VCWPD to become an Associate Member and represent the countywide stormwater program. Historically, VCWPD interacted with SCCWRP on a project-specific basis and as a signatory to a memorandum of agreement to develop a regional stormwater research agenda. The opportunity to expand and formalize this relationship was seen as a wonderful opportunity to work with a leading environmental research organization, which emphasizes scientific-based management strategies for protecting the southern California coastal environment.

In addition to participating as an Associate member and attending quarterly Commission meetings and the Technical Advisory Group, VCWPD is participating in several SCCWRP research projects. These projects will be instructive for the Program, as they will create conceptual models and develop or improve assessment tools for identifying receiving water impacts. These projects will produce the necessary groundwork for comprehensive and region-wide stormwater monitoring and an action plan that will focus on high-priority water quality problems. In addition, VCWPD's participation with SCCWRP will improve the Program's technical knowledge and their ability to successfully ascertain water quality impacts countywide.

VCWPD has been involved with a number of SCCWRP projects, including the following:

NATURAL LOADING STUDY

SCCWRP has begun initiation of a Natural Loading Study, which will include monitoring sites located in Ventura County. The goal of this project is to characterize the flow, algae, benthic macroinvertebrates, suspended solids, organic carbon, nutrients, metals, and bacteria from natural landscapes and relate these to watershed properties such as geology, soils and vegetative cover. The objective is to evaluate water quality contributions and properties of stream reaches in undeveloped catchments throughout the greater Los Angeles/Ventura areas. Ultimately, this project will provide a characterization of natural baseline loadings associated with specific geologic settings and natural land cover/habitat types that will assist environmental managers with load allocations and setting appropriate numeric targets.

The need for this study has been driven by the fact that data on potential pollutant contributions of potential pollutants from undeveloped lands during both wet and dry weather are lacking. Managers are forced to use data from other parts of the country or anecdotal data from previous time periods as an estimate of natural contributions. This is especially evident in situations where a total maximum daily load (TMDL) is required. Without information on natural contributions, TMDLs may be developed with inefficient or overly stringent waste load allocations needed to meet numeric targets.

This is the second year of the four-year project. The first year focused on coordination with stakeholders, compilation of existing data, creation of the study design, and identification of study sites. Dry and wet weather sampling was also initiated. This past reporting period, a total of fourteen wet weather-sampling events were completed. The fourteen site-events included four sites in Ventura County, five in Los Angeles County, four in Orange County and one in San Diego County. Ten watersheds are represented by these site-events.

THE STORMWATER MONITORING CONSORTIUM: DEVELOPMENT OF A MODEL STORMWATER MONITORING PROGRAM FOR SOUTHERN CALIFORNIA

VCWPD is an active member of the Stormwater Monitoring Coalition (SMC), which is an SCCWRP-developed consortium of each of the Principal Stormwater NPDES Permittees in the Southern California Bight (SCB). The goal of SMC is to interact cooperatively to resolve

important stormwater-related problems at regional scales. Collectively, they will be able to address management questions that cross local political boundaries and agency jurisdictions. The key focus of the management questions will be to develop improved methodologies and assessment tools to more effectively understand urban municipal stormwater and non-stormwater (anthropogenic) impacts to receiving waters.

Amongst the SCCWRP projects that SMC has been involved with is the development of a common, or "model" stormwater monitoring program that would be extremely beneficial for development of a monitoring infrastructure within the region. The goal is to create a basic blueprint for a monitoring program that is focused on effectively answering management questions of interest. The blueprint monitoring design, modified for site-specific issues, will be adopted by each of the regulatory agencies, thereby maintaining comparability and equity among permittees. Moreover, the commonality will ensure the ability to share data, collaborate on monitoring designs to increase efficiency, while at the same time improving overall quality. This is the second year of a two-year project.

10.3.1.c *Santa Clara River Enhancement and Management Plan and TMDL efforts*

As far back as 1991, it was apparent to various agencies within the Santa Clara River Watershed that a plan to manage the river and its resources was needed. In 1991, a group of various agencies including the cities of Fillmore and San Buenaventura (Co-permittees) and VCWPD (Principal Co-permittee) formed a Steering Committee to coordinate a management plan for the river. The resulting Santa Clara River Enhancement and Management Plan (SCREMP) is unique in that it has been developed as a set of policies and programs that promotes the preservation, enhancement and sustainability of the physical, biological and economic resources within the 500-year floodplain.

The Co-permittees participation in part was instrumental in assuring that key water quality issues were properly identified and addressed. The history of working together has provided the Co-permittees the structure and experience necessary to make such a large project like SCREMP productive. The Co-permittees were able to provide guidance and insight on known methods for coordinating preservation and enhancement programs to the other stakeholders and as such was vital to the overall success of the plan.

In addition, VCWPD has participated with other local, state and federal representatives in the development of total maximum daily loads (TMDL) for the Santa Clara River. Last reporting year, VCWPD and several Co-permittees in conjunction with the RWQCB and Los Angeles County Public Works Agency began development of a workplan to determine what if any nutrient contribution to the watershed is caused by stormwater runoff. This work is ongoing. This progressive approach by the Co-permittees to a traditionally Publicly Owned Treatment Wastewater (POTW) and agricultural problem is to be commended.

10.3.1.d *Calleguas Creek Watershed Management Plan and TMDL efforts*

Since 1998, VCWPD in coordination with other stakeholder agencies within the Calleguas Creek Watershed, has participated in several studies to characterize water quality of the creek and clarify dischargers' contributions to the quality of surface water and groundwater. These studies were developed in response to growing concerns of the impact to water quality from major point source discharges in the watershed. The study included a Coordinated Water Quality Monitoring Program (CMP), consisting of a surface water and groundwater elements.

The CMP resulted in the collection of discharge and receiving water quality data necessary to provide information for the development of a Calleguas Creek Watershed Management Plan (WMP).

During the 2002-03 reporting period, watershed stakeholders formed a Joint Powers Authority (JPA) to address how the watershed may meet Total Maximum Daily Load (TMDL) requirements through a coordinated watershed wide-approach to improve water quality through a comprehensive group of actions. These actions include a series of work plans designed to address the surface water quality impairments in the watershed. Each work plan focuses on groups of similar constituents related to the water quality impairment. Accompanying the TMDL work plans are a plan to administer the work plans and to assure broad public involvement in the process.

This plan is the first of its kind on a very complex watershed and will include overall watershed management actions, which will contribute to water quality maintenance and improvement. The WMP and TMDL efforts by VCWPD, participating Co-permittees and other watershed stakeholders are to be commended, as they require water quality solutions to rely on coordinated actions between a variety of distinct interest groups.

10.3.1.e *Hillside Erosion Control Ordinance (HECO Program)*

NPDES programs have historically exempted agriculture from obtaining stormwater permits. However, agricultural activities have long been recognized as having the potential to negatively impact water quality and increase erosion rates. In an effort to address these concerns, VCWPD has partnered with the Ventura County Resource Conservation District (VCRCD) and the County of Ventura to develop and implement the Hillside Erosion Control Ordinance Program (HECO). Established in 1989, HECO requires that new agricultural developments in critical erosion hazard areas (countywide) must develop and implement a Hillside Erosion Control Plan. The plan is subject to approval by VCRCD and VCWPD before work may begin.

VCRCD's primary role is planning, review and certifying compliance with the HECO plan, while any enforcement is done by the appropriate Ventura County Agency. This program has been a huge success with a total of 637 acres developed under the review of VCRCD, VCWPD and the County of Ventura. During the past five years there has been twenty (20) HECO applications for a total of 227 acres. Based on the Universal Soil Loss Equation (USLE), the soil loss before implementation of the HECO program was 63 tons/acre/year. Since implementation of HECO, soil loss has been reduced to 1.8 tons/acre/year. The strong teamwork of VCRCD, VCWPD and the County of Ventura remains committed to the high priority of reducing erosion and improving water quality.

10.3.1.f *Aquatic Pesticide NPDES Permit*

In March 2001, the Ninth Circuit Court of Appeals determined that discharges of pollutants from the use of aquatic pesticides to waters of the United States requires coverage under a NPDES permit. Coverage under this General Permit is for public entities that discharge pollutants to water bodies associated with the application of aquatic pesticides for resource or pest management. This permit is required regardless if the public entity is already covered by a municipal NPDES permit.

An updated version of the Aquatic Pesticide General Permit was adopted in May 2004, after which VCWPD filed an NOI to seek coverage under the new permit. Furthermore, VCWPD submitted an Aquatic Pesticide Application Plan (APAP) to the RWQCB in July 2004, and implemented the water quality monitoring program detailed in the plan during the 2004-05 aquatic pesticide application season.

10.3.1.g *Alternative Weed Management*

The requirement for a General Permit for aquatic pesticide applications prompted many of the Co-permittees to review and evaluate their current maintenance activities for maintaining their

drainage systems. Several Co-permittees attended one of the several seminars hosted by the Ventura County Environmental and Energy Resources Department (EERD) on Integrated Pest Management (IPM) approach to weed management. These seminars provided the Co-permittees alternative less toxic approached to weed control. Some of the Co-permittees found that they could incorporate these strategies with only minor modifications to their maintenance activities.

With increasing regulations on the use of pesticides and the growing awareness of environmental impacts from pesticide use, the Co-permittees will continue to explore alternatives and implement BMPs to mitigate their impacts on the local ecosystem. The Co-permittees forward, progressive approach is praiseworthy.

10.3.2 Program Activities for 2005-06 Reporting Period

Co-permittees will continue to implement the SMP, Program Management will include the management of the Benefit Assessment Program, implementation of the Stormwater Monitoring Program, reporting, meeting preparation and attendance for committees and subcommittees, production and distribution of materials for countywide program implementation, data management and management of consultant contracts.

Co-permittees will implement programs and measures in order to achieve performance goals established in the SMP for the following areas:

- Program for Residents
- Program for Industrial/Commercial Businesses
- Program for Planning and Land Development
- Program for Construction Sites
- Program for Public Agency Activities
- Program for Illicit Discharge/Illegal Connections

Data collection and compliance with monitoring requirements will continue to be a priority to allow future analysis of trends, land use contributions, pollutant source identification, BMP effectiveness and impacts on beneficial uses. The next Annual Stormwater Report will be submitted by October 1, 2006 (or otherwise directed by the RWQCB). Stormwater monitoring activities will continue and a Stormwater Monitoring Report will be submitted by July 15, 2006 (or otherwise directed by the RWQCB).

Under Program for Residents, the Co-permittees will launch their new public outreach media campaign, and continue to label or mark curb inlets and maintain signs posted at designated access points to creeks and channels, which discourage illegal dumping. Co-permittees will use their new media campaign to provide, at a minimum, 2.1 million impressions on the general public next reporting year.

Under Program for Industrial/Commercial Businesses, Co-permittees will continue to implement an educational site visit/inspection program of automobile service, food service and industrial facilities potentially subject to the General Industrial Permit. Co-permittees will distribute educational material during site visits/inspections.

Under Program for Planning and Land Development, Co-permittees will continue to implement the Technical Guidance Manual to review and condition permit-required projects. Co-permittees will also continue their efforts to modify their databases to track BMPs, installation, maintenance and performance.

SECTION 10.0 PROGRAM EVALUATION

Under Program for Construction Sites, Co-permittees will continue to perform annual inspections of construction sites to determine if SWPCPs are adequately implemented. In addition, the Co-permittees will continue construction community outreach efforts, including conducting a Joint Construction Training workshop with the RWQCB.

Under Program for Public Agency Activities, Co-permittees will continue to perform annual inspections of designated corporation yards for SWPCP implementation. In addition, the Co-permittees will continue to explore new ways to incorporate BMPs into their daily activities to further mitigate their impact on water quality.

Under Program for Illicit Discharges/Illegal Connections, Co-permittees will respond to reported illicit discharge/dumping events and either resolve the issue, including clean up/follow-up investigation/perform educational outreach or refer the incident to the appropriate responsible agency. Co-permittees will continue to eliminate illegal connections as they are reported or discovered during inspections of the storm drain system during routine maintenance activities.

The Co-permittees will follow the Monitoring and Reporting Program of the NPDES Permit CAS0004002 and CI 7388. The following monitoring elements will be performed during the 2005/2006 monitoring year.

- Land use characterization monitoring
- Receiving water and watershed characterization monitoring
- Watershed studies
- Bioassessment monitoring
- Mass emission monitoring