CITY OF LONG BEACH
STORMWATER MONITORING REPORT 2005/2006
NPDES Permit No. CAS004003 (CI 8052)

City of Long Beach

July 2006

KINNETIC LABORATORIES INCORPORATED

Cover Photograph: View of City of Long Beach after the storm. Picture was taken on October 20, 2004 just outside the entrance to Alamitos Bay. This storm event was one of the largest, most intense events since the start of the program. The storm resulted in 1.7 inches of rain in a 10-hour period.

CITY OF LONG BEACH

DEPARTMENT OF PUBLIC WORKS

333 West Ocean Boulevard • Long Beach, CA 90802

The City of Long Beach is pleased to submit their seventh annual "Stormwater Monitoring Report 2005/2006" in compliance with Order No. 99-060, for the Municipal National Pollutant Discharge Elimination System (NPDES) Permit No. CAS004003 (CI8052).

We have worked collaboratively with our contractor, Kinnetic Laboratories, Inc., and their subcontractors to produce a report that we believe contains extremely useful information for the City and the Regional Board. As required in our permit, all analyses were conducted at laboratories certified for such analyses by the Department of Health Services or approved by the Executive Officer and in accordance with current EPA guideline procedures or as specified in this Monitoring Program.

I certify under penalty of law that this document and all attachments were prepared under my directions or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.

Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility, of a fine and imprisonment for knowing violations.

Executed on the 15th day of July, 2006
at Long Beach, California.

(Signature) Mark A Christoffel (Title) City Engineer

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ACRONYMNS AND ABBREVIATIONS LIST

ASTM - American Society for Testing and Materials
BHC - Benzene hexachloride
BMP - Best Management Practice
BOD- Biological Oxygen Demand
CCC – Criterion Continuous Concentration
CD - Compact Disk
CFU - Colony Forming Units
CMC – Criterion Maximum Concentration
COD - Chemical Oxygen Demand
CRWQCB – California Regional Water Quality Control Board
CTR - California Toxics Rule
2,4 D - 2,4-dichlorophenoxy
2,4 DB - (2,4-dichlorophenoxy) butanoic acid
DDD - dichloro (p-chlorophenyl)ethane
DDE - dichloro (p-chlorophenyl)ethylene
DDT - dichlorodiphenyl trichloroethane
DF - dilution factor
DI - Deionized
DL - Detection Limit (considered the same as RL)
DO - Dissolved Oxygen
EC_{50} - Concentration causing effects to 50% of the test population
EDTA - ethylene diamine triacetic acid
EMC - Event mean concentration
GIS - Geographic Information System
IC_{25} - Concentration causing 25% inhibition in growth or reproduction
IC_{50} - Concentration causing 50% inhibition in growth or reproduction
ICP-MS - Inductively Coupled Plasma-Mass Spectrometry
Halocline – a locally steepened vertical gradient of salinity
KLASS - Kinnetic Laboratories Automated Sampling System
KLI - Kinnetic Laboratories, Inc.
LC_{50} - Bioassay concentration that produces 50% lethality
LDPE - Low Density Polyethylene
LOEC - Lowest Observed Effect Concentration
LPC - Limiting Permissible Concentration
MBAS - methylene-blue-active substances
MCPA - 2-methyl-4-chloro-phenoxy acetic acid
MCPP - 2-(4-chloro-2-methylphenoxy) propanoic acid
ML – Minimum level as defined in State Implementation Plan
MPN- Most Probable Number
MS4 - Multiple Separate Storm Sewer System
NADP - National Atmospheric Deposition Program
NCDC - National Climate Data Center
NPDES – National Pollutant Discharge Elimination System
NOEC - No observed effect concentration
NTS - Not to Scale
NTU - nephelometric turbidity units
NURP - Nationwide Urban Runoff Program

PCB - Polychlorinated biphenyls
PDF - Portable Document Format
ppb - Parts per Billion
Q - Flow
QA/QC - Quality Assurance/Quality Control
RMP - Regional Monitoring Program
RL - Reporting Limit (considered the same as DL)
RPD - Relative Percent Difference
SAP - Sampling and Analysis Plan
sf - Square Feet
SIP – State Implementation Plan
SM- Standard Methods for the Examination of Water and Wastewater
SOP - Standard Operating Procedure
SRM - Standard Reference Material
STS - sodium tetradecyl sulfate
SWRCB-State Water Resource Control Board
TDS – Total Dissolved Solids
TIE – Toxicity Identification Evaluation
TKN - Total Kjeldahl Nitrogen
TOC - Total Organic Carbons
TPH - total petroleum hydrocarbons
TSI - ToxScan, Inc.
TSS – Total Suspended Solids
TU - Toxicity Unit
TU_a – Acute Toxicity Unit ($1/LC_{50}$ or EC_{50})
TU_c – Chronic Toxicity Unit (1/NOEC)
USEPA - U.S. Environmental Protection Agency
WQO - Water Quality Objective
WQS - Water Quality Standard

1.0 EXECUTIVE SUMMARY

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CITY OF LONG BEACH
STORMWATER MONITORING REPORT 2005/2006

NPDES Permit No. CAS004003 (CI 8052)

1.0 EXECUTIVE SUMMARY

This report provides a summary of the results of the seventh year of monitoring conducted under the terms of Order No. 99-060 National Pollutant Discharge Elimination Systems Municipal Permit No. CAS004003 (CI 8052) for City of Long Beach. Included in this report is a synthesis of key elements of the data set as developed over the past seven years. The following section provides a summary of the background and purpose of the monitoring program. This is followed by a summary of key findings based upon the full seven years of monitoring.

1.1 Background and Purpose

Under the terms of Order No. 99-060, the City of Long Beach was required to conduct a water quality monitoring program for stormwater and dry weather discharges through the City's municipal separate storm sewer system (MS4) beginning in the 1999/2000 wet weather season. The permit was initially issued for the term of five years. At the end of the initial five years the City was directed by the Regional Board to continue operating under the 1999 permit until further notice. Major elements of the current monitoring and reporting program include 1) mass emission monitoring during storm events, 2) monitoring of dry weather discharges at each mass emission site, 3) receiving water quality monitoring and 4) special studies.

Mass emission monitoring is conducted at four sites during four wet weather storm events each year. Monitoring sites specified in the permit are as follows:

- Basin 14: Dominguez Gap Pump Station Monitoring Site
- Basin 20: Bouton Creek Monitoring Site
- Basin 23: Belmont Pump Station Monitoring Site
- Portions of Basins 18, 19, 27 and 29: Los Cerritos Channel Monitoring Site

This element of the program is intended to characterize stormwater discharges, identify contaminants of concern and develop pollutant load estimates for each major watershed. Monitoring is required to be conducted during the first significant rainfall event of the season. Flow-rated, whole storm composite samples are obtained at each site and analyzed for major constituents of concern which included conventionals, total and dissolved metals, organophosphate pesticides and herbicides. Toxicity testing using sea urchin fertilization tests and water flea survival and reproduction is conducted on the composite storm samples from three of the four mass emission sites. Phase 1 Toxicity Identification Evaluations (TIEs) are performed on samples with toxicity in order to determine the likely contaminants causing the observed toxicity.

Dry weather monitoring consists of inspections at each mass emission site and the collection and analysis of dry weather discharges over two different separate 24-hour periods during each dry season. This element of the program is intended to identify pollutants of concern and associated toxicity at the mass emission sites during the dry season. Dry weather discharge samples are subjected to the same chemical analysis and toxicity testing used for the stormwater monitoring program.

A receiving water quality monitoring program is conducted in association with the first storm event of the season. The purpose of this program is to map the resulting stormwater plume in Alamitos Bay and assess water quality and toxicity within the plume at locations representing a range of stormwater dilutions. The results are used to determine the extent of impact of typical stormwater discharges to Alamitos Bay.

The purpose of this present report is to submit the results of the City of Long Beach's stormwater monitoring program for the seventh year (2005/2006) under the current permit.

1.2 Summary of Results

Unlike the 2004/2005 wet weather season, which was one of the wettest in recorded history for Southern California, the 2005/2006 season saw below normal precipitation, returning Southern California back to drought conditions. Normal precipitation for October through April at the Long Beach Airport is 12.27 inches. This season, a total of 7.76 inches of rainfall was recorded at the airport during the same period, resulting in a 4.51 inch deficit for the season or 60% of normal.

A total of eight storm events were monitored during the 2005/2006 season. Five storm events were monitored for the full set of analytical constituents at the Belmont Pump Station and Bouton Creek and four events were monitored for the full analytical suite at the Los Cerritos Channel site. Low stormwater composite volumes obtained during the February 19, 2006 storm event at the Belmont Pump Station and Bouton Creek sites limited the water quality analyses to a subset of the full analytical suite. Water volumes were also insufficient to conduct the toxicity tests. This necessitated sampling a fifth event at each site. Between three and four additional events were successfully monitored the Belmont Pump Station, Bouton Creek and Los Cerritos Channel sites for TSS measurements. Low composite sample volumes at the Bouton Creek site required analyses to be limited to TSS for the first storm event of the season.

Two events subsequent to the sixth event were also sampled at these three stations for total suspended solids analyses only. Discharge did not occur at the Dominguez Gap Pump Station until a 1.1-inch rain event that began on March 27, 2006. The second event occurred soon after on April 4, 2006.

The fourth year of a receiving water study was conducted to monitor the horizontal and vertical extent of the stormwater plume in Alamitos Bay and to characterize key contaminants and toxicity within the plume. The stormwater plume investigation was conducted following the first storm of this season. This event was a much smaller event than predicted and was extended over a period of two days. Sampling locations represented a range of salinities within the plume that ranged from 10 to 20‰ (parts per thousand). Water samples were tested for toxicity and a subset of water quality parameters which included selected trace metals and TSS.

Two dry weather inspections/monitoring events were conducted during the 2005/2006 monitoring year. The first was conducted on August 17th and 18th, 2005 prior to the winter rains. The second dry weather survey was conducted on May 10th and 11th, 2006 once winter rains had subsided. Dry weather monitoring was conducted for the three mass emission sites that exhibited dry weather flows. These included Bouton Creek, the Belmont Pump Station, and the Los Cerritos Channel. Since this program started in early 2000, the Dominguez Pump Station has never been observed to have dry weather discharges due the large infiltration basin adjacent to the site.

The following provides a brief synopsis of the results of the City of Long Beach's 2005/2006 stormwater monitoring program:

Wet Weather Chemical and Bacterial Results

Numerical standards do not exist for stormwater discharges. However, water quality criteria or objectives may provide reference points for assessing the relative importance of various stormwater contaminants, though specific receiving water studies are necessary to quantify the presence and magnitude of any actual water quality impacts. The 2005 California Ocean Plan (SWRCB, 2006), the Los Angeles Region Basin Plan (CRWQCB, Los Angeles Region, 1994), California Department of Fish and Game (Siepmann and Finlayson, 2002) criteria for chlorpyrifos and diazinon, and both saltwater and freshwater criteria from the California Toxics Rule (USEPA 2000) were used as benchmarks as requested by Regional Board staff. In addition, National Recommended Water Quality Criteria (EPA, 2002) were used as benchmarks for compounds such as malathion that are not considered to be priority pollutants. Not all of these criteria are appropriate for Long Beach discharges or for comparison with stormwater runoff water quality. In fact, the State Water Resources Control Board recently assembled a panel of experts from academia and the scientific community to address this issue (Storm Water Panel, 2006). The panel concluded that it is still not practical to develop numeric criteria for stormwater. Instead the panel suggested several approaches for developing "action limits" that could be used to identify problem areas. Comparisons of stormwater concentrations with various water quality criteria are intended to provide a framework for evaluating constituents of concern and allow for identification of watersheds that could benefit from additional BMPs or source identification/reduction efforts.

- Concentrations of indicator bacteria (total coliform, fecal coliform, and enterococcus) in the Long Beach stormwater discharges routinely exceed public health criteria provided by the Basin Plan and the Ocean Plan. During the past two years, all stormwater samples were found to exceed the single sample criteria for all indicator bacteria.

- Benchmark reference values were commonly exceeded at least once for a total of four different total recoverable metals. These included aluminum, copper, lead, and zinc. The aluminum drinking water quality criteria of 1000 µg/L was exceeded in 100% of the samples from the Belmont Pump Station, Bouton Creek, and Los Cerritos Channel. Concentrations of total recoverable copper, lead and zinc in runoff from these same mass emission sites exceeded 2005 Ocean Plan criteria during all storm events. In contrast, concentrations of total copper, lead, and zinc were below Ocean Plan criteria in stormwater runoff from the two storm events monitored at the Dominguez Pump Station.

- Total nickel exceeded Ocean Plan water quality criteria during the final event of the wet season in runoff from the Los Cerritos Channel. This was associated with high concentrations of suspended solids in the stormwater.

- Benchmark reference values have been frequently exceeded for dissolved forms of the three metals throughout the life of the permit common in stormwater runoff. This year, as well as the previous, dissolved copper was found to exceed both CTR freshwater and saltwater criteria. Concentrations of dissolved lead frequently exceed the CTR freshwater criterion but typically don't exceed the CTR freshwater criteria. This year 75 percent of the stormwater samples exceeded the CTR freshwater criteria but no samples exceeded the CTR saltwater criterion. Exceedances of the CTR freshwater CCC criteria are common due to significant effect of hardness on the criteria.

- Since stormwater sampling was first implemented in 2000, runoff from the four City of Long Beach mass emission sites has typically contained very few organic compounds in excess of available reference criteria. A few chlorinated pesticides including various chlordane compounds and 4-4' DDE were detected in stormwater at very low levels this year. Chlordane compounds (alpha-chlordane, gamma chlordane, cis-nonachlor and trans-nonachlor) were detected most frequently and were most common in runoff from the Belmont Pump Station.

- The most striking trend in organic compounds during the 2005/2006 monitoring year is the lack of measurable levels of both diazinon and chlorpyrifos.

- The triazine pesticides continue to be uncommon in stormwater runoff. Prometon, simazine and cyanazine were the only triazines detected and all three typically occur at levels of less than 10 times the detection limit. The infrequent presence of these compounds in stormwater runoff and the low concentrations when they are detected suggests that this group of organic compounds should be considered for elimination from the analytical suite.

- Due to the large size differences among watersheds, loads were normalized to a unit of 1000 acres in order to provide a more meaningful comparison for key stormwater contaminants. In past years, overall total metals loading rates from the Los Cerritos Channel have tended to be among highest measured at the four mass emission sites. This year total metals loading rates were substantially lower in the Los Cerritos Channel but increased in runoff from the Belmont Pump Station. Loading rates of total copper, lead and zinc were all highest from this relatively small catchment.

Dry Weather Chemical and Bacterial Results

- Water quality of dry weather discharges has been generally consistent over the past seven years. Dry season water quality has not tended to vary greatly between sites or sampling dates. In general, the concentrations of suspended particulates and total recoverable metal concentrations are low in dry weather runoff. Trace metals are predominantly in the dissolved form. Hardness is also consistently high which tends to mitigate the effects of the dissolved metals. As a result, most trace metals were below CTR freshwater criteria during both dry weather sampling events.

- Copper is clearly the primary constituent of concern during dry weather. The CTR freshwater criterion for dissolved copper was exceeded in one of the six dry weather samples. The CTR saltwater criterion for dissolved copper was exceeded in 2/3 of the samples. Highest concentrations (12 µg/L and 15 µg/L) were encountered in dry weather flows from the Los Cerritos Channel mass emission station. In addition the Ocean Plan criterion for total copper was exceeded only in water samples from the Los Cerritos Channel site.

- Fecal indicator bacteria typically exceed 2005 Ocean Plan/Basin Plan water quality criteria during both wet and dry weather monitoring. Concentrations of indicator bacteria are often slightly less than observed during wet weather conditions. This is most apparent in Bouton Creek where the dry weather concentrations of both total and fecal coliform bacteria are below Basin Plan criteria more than 50% of the time. In open channels like Bouton Creek and the Los Cerritos Channel, one would expect lower concentrations of indicator bacteria in dry weather flows due to the effects of sunlight on these shallow, generally clear discharges

- As in all previous years, no dry weather discharges were observed from the Dominguez Gap Pump Station.

Alamitos Bay Receiving Water Program

- None of the four surveys conducted in receiving waters since the 2002/2003 monitoring season have shown no evidence of wide-spread toxicity in stormwater plumes within Alamitos Bay. During this time surveys have been conducted following both relatively small storm events (0.3 to 0.5 inches of rain) where the stormwater plume was localized at the mouth of the Los Cerritos Channel and very large events (1.6 to 1.8 inches) that impacted all of Alamitos Bay and extended out into San Pablo Bay.

- This year's plume study was conducted in association with the first significant storm event of the season. Although this event resulted in over 0.5 inches of rain, they rainfall was extended over a two day period. As a result the stormwater plume was largely restricted to a range of about one kilometer from the mouth of Los Cerritos Channel and concentrations of total suspended solids were very low (7.8 to 13 mg/L). With the low levels of TSS in the plume, concentrations of trace metals were mostly in the dissolved form. Although concentrations of dissolved copper and zinc exceeded water CTR saltwater criteria, there was evidence of toxicity based upon the sea urchin fertilization test. The four plume tracking studies conducted in Alamitos Bay continue to contrast sharply with studies in Santa Monica Bay and San Diego Bay that have shown substantial toxicity in samples containing as little as 10 to 25% stormwater.

Temporal Trends in Constituents of Concern

Each year, long term trends have been examined for selected trace metals and organic compounds, TSS, and bacteria. With one major exception, patterns identified in previous reports continue to persist as more data are obtained through the ongoing sampling efforts. Major observations include:

- Dissolved concentrations of cadmium, copper, nickel and lead appear to be comparable during both wet and dry weather periods. Unlike these four metals, dissolved zinc concentrations are often higher during storm events.

- Concentrations of total copper, lead and zinc are distinctly higher in association with storm flows. These metals were found to correlate well with TSS in previous years (Kinnetic Laboratories, Inc. 2004). Seasonal differences in total cadmium and nickel are less evident but the highest concentrations still tend to occur during winter storm events.

- Diazinon and chlorpyrifos which were commonly detected in previous years were not detected in stormwater during the 2005/2006 season. The highest concentrations of both these contaminants were reported during the 2001/2002 wet weather season. Over the next three years, the highest concentrations of these compounds were encountered during wet weather runoff but no seasonal trends were noted for either compound. Now that residential use of both diazinon and chlorpyrifos has been phased out, it is appears likely that occurrences of measurable levels of these compounds in stormwater will continue to be uncommon. The manufacture of diazinon for lawn, garden and turf use ended in June 2003 with all sales and distribution to retailers ending in August 2003. Retailers were allowed to sell any product on their shelves up until December 31, 2004. Manufacturing of chlorpyrifos products for most residential uses was terminated on December 1, 2000 and could no longer be sold through retail outlets after December 31, 2002. Use of chlorpyrifos as a preconstruction termiticide was allowed December 31, 2005. Although

manufacturing was of diazinon was allowed to continue until June 2003, annual production was decreased by 25 percent in 2002 and 50 percent in 2003.

- In most years, stormwater discharges from the Dominguez Gap Pump Station are found to be of a higher quality than the other three mass emission sites. Concentrations of total recoverable metals (copper, lead, nickel and zinc) in stormwater discharges from this site were among the lowest encountered in the past seven years. Again, this correlated with very low concentrations of total suspended solids. Despite the low levels of total recoverable copper, concentrations of dissolved copper exceeded CTR freshwater and saltwater criteria during each of the two storm events at this site.

Toxicity Results

- Toxicity to one or both test organisms was detected at each of the stations sampled this year during ten of twelve wet weather storm events. Neither species showed toxicity at the Bouton Creek station during the March 3 2006 storm or at the Cerritos Channel station during the February 28 2006 storm.

- Water flea (*Ceriodaphnia*) toxicity was seen only during the first storm (October 18 2005) at the Belmont and Cerritos stations. The frequency and/or magnitude of wet weather water flea toxicity from the Long Beach stations during this monitoring period were in the same range as those from the three previous monitoring periods and were reduced compared with the Long Beach programs from 2000-2002 and from Chollas Creek (San Diego) in 1999.

- Sea urchin toxicity was seen during all four storms at Belmont, during the January, February and late March (2006) storms at Bouton and at the October 2005, January 2006 and early March 2006 storms at Cerritos. The frequency of stormwater sea urchin toxicity from the Long Beach stations during this monitoring period was higher than that reported for the three previous Long Beach stormwater monitoring periods, and comparable to that reported from the 2000-2002 Long Beach programs. Magnitude of urchin toxicity was generally comparable throughout all years of the Long Beach program. Frequency of sea urchin stormwater toxicity at Long Beach was comparable this year with stormwater data collected during 1997-2000 from other southern California watersheds, while magnitude was most similar to that observed in the Ballona Creek (Santa Monica) and Chollas Creek (San Diego) samples. These samples were obtained from smaller highly urbanized watersheds (similar to Long Beach) as opposed to the Los Angeles River and San Gabriel River watersheds.

- Toxicity to water fleas was measured in the fall dry weather samples from Bouton Creek and Cerritos Channel and the spring dry weather sample from Cerritos Channel. The magnitude of fall dry weather toxicity to water fleas (<16 TU_c) at both Bouton and Cerritos was much greater than that measured in the only toxic wet weather wet weather samples (2 TU_c). In the spring dry weather sample there were only 2 TU_c measured at Bouton. These results do not support a hypothesis suggesting significant differences in the composition of stormwater and dry weather discharge from the City of Long Beach.

- Four TIEs (two wet weather and two dry weather) were triggered in 2005/2006. Sea urchin TIEs were attempted on the March 29 2006 storm samples from Belmont and Bouton, and water flea TIEs were performed on the August 18 2005 dry weather samples from Bouton and Los Cerritos. The stormwater (sea urchin) TIEs yielded no information due to loss of baseline toxicity in both samples. The dry weather TIEs performed with water fleas yielded useful information. The

results of this year were somewhat different from the 2004/2005 monitoring period, but were similar to TIE results from previous years.

- Both of the dry-season TIEs indicated that non-polar organics were important water flea toxicants, with C18 treatment generally eliminating toxicity. Bioassay results suggested that organophosphate pesticides and pyrethroid pesticides may have contributed to sample toxicity, although analytical support for that conclusion was lacking. Particle-associated toxicants were suggested as contributing toxicants in the Bouton sample but not in the Cerritos sample. Metals were not implicated at Bouton but may have contributed to the Los Cerritos sample dry weather toxicity. Again, however, chemical analyses did not reveal metals in high enough concentrations to account for observed toxicity.

- Correlations of toxicity with chemical constituents suggested dissolved metals, including copper, lead nickel and zinc, as causes of stormwater toxicity to sea urchins. Calculations of predicted sea urchin toxicity based upon measured zinc and copper concentrations in the stormwater suggested that toxicity in the most toxic samples was due to as yet unmeasured toxic chemicals.

Pilot Watershed Source Identification Program (Appendix B)

- The first phase of the Pilot Watershed Source Identification study for the northwestern arm of Colorado Lagoon identified two drainages that require further investigation. Constituents of concern in Colorado Lagoon are trace metals, organochlorine pesticides (including DDT and chlordane compounds), and PCBs. Upstream investigations therefore focused on possible sources of these constituents in the watershed.

- The three major storm drain systems entering Colorado Lagoon and sediment from the old railroad right-of-way were investigated. Eroding sediments from the segment of the former railroad right-of-way that was sampled showed no evidence of elevated levels of the target contaminants. Based upon initial survey results, two of the three storm drains entering this portion of the Lagoon were targeted for further investigation.

- Samples of sediment from the storm drain entering at the north end of this portion of Colorado Lagoon indicated that presence of all measured metals except lead in concentrations greater than those measured in sediments from the Lagoon. Concentrations of cis-nonachlor and total chlordane also show some evidence of elevated levels at this site.

- Two parallel storm drains enter Colorado Lagoon from the west. Initial investigations suggest that the southernmost of these two storm drains may be a significant source of lead as well as other metals and organochlorine pesticides. Sediments from this location were 97.5 percent sand with no clay content.

- Further upstream investigations are scheduled for this summer for the two storm drains identified as potential sources of constituents of concern.

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2.0 INTRODUCTION

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The City of Long Beach received an NPDES Permit issued by the California Regional Water Quality Control Board, Los Angeles Region on 30 June 1999 (Order No 99-060, NPDES No. CAS004003, [CI 8052]). This order defined Waste Discharge Requirements for Municipal Stormwater and Urban Runoff discharges within the City of Long Beach. Specifically, the permit regulates discharges of stormwater and urban runoff from municipal separate storm sewer systems (MS4s), also called storm drain systems, into receiving waters of the Los Angeles Basin.

Since issuance of the 1999 NPDES permit, the population served by City of Long Beach has increased by nearly 9 percent. When the permit was first issued, the population was estimated at 452,000. Current estimates place the City's population at 490,166[1] people in an area of approximately 50 square miles. This makes the City of Long Beach the fifth most populated city in the California. The discharges from the MS4 system consist of surface runoff (non-stormwater and stormwater) from various land uses in the hydrologic drainage basins within the City. Approximately 44% of the land area discharges to the Los Angeles River, 7% to the San Gabriel River, and the remaining 49% drains directly to Long Beach Harbor and San Pedro Bay (City of Long Beach Municipal Stormwater Permit; CRWQCB, Los Angeles, 1999). The quality and quantity of these discharges vary considerably and are affected by the hydrology, geology, and land use characteristics of the watersheds; seasonal weather patterns; and frequency and duration of storm events. Impairments or threatened impairments of beneficial uses of water bodies in Long Beach include Alamitos Bay, Los Angeles River, El Dorado Lake, Los Angeles River Reach 1 and Reach 2, San Gabriel River Estuary, San Gabriel River Reach 1, Colorado Lagoon, and Los Cerritos Channel. These areas also include coastal shorelines, including Alamitos Bay Beaches, Belmont Shore Beach, Bluff Park Beach, and Long Beach Shore[2].

2.1 Annual Program Adjustments

The 1999 NPDES permit requires the City of Long Beach to prepare, maintain, and update if necessary a monitoring plan. The original monitoring plan required the City to monitor three (Year 1) and four (Years 2 through 5) discharge sites draining representative urban watersheds (mass emission sites) during the program. Flow, chemical analysis of water quality, and toxicity were to be monitored at each of these sites for four representative storm events each year. During the dry season, inspections and monitoring of these same discharge sites were to be carried out, with the same water quality characterization and toxicity tests to be run. In addition, one receiving water body (Alamitos Bay) was to be monitored during the first two years of the program for bacteria and toxicity. Monitoring at the Alamitos Bay site was to be conducted during both the wet and the dry seasons and was to be used to document the effect of a dry weather diversion. Each year the program is reviewed and adjustments are made as a result of discussions with Regional Board staff. Evolution of the program is summarized in Table 2.1.

[1] Population estimate. State of California Department of Finance Demographic Research Unit, 1/1/2006
[2] Los Angeles Regional Water Quality Control Board, 2002 303(d) list

Table 2.1 Summary of the City of Long Beach Stormwater NPDES Monitoring and Reporting Program with Annual Adjustments.

1999 Monitoring and Reporting Program

Mass Emission Site Monitoring

- Monitor 3 mass emission sites (Belmont Pump Station, Bouton Creek and Dominguez Gap Pump Station) during the 1st year of the permit. Add a 4th mass emission site (Los Cerritos Channel) during the 2nd and subsequent years. Flow-rated composites to be obtained during 4 storm events at each site and analyzed for:
  - ✓ Conventionals, total and dissolved metals, semivolatile organic compounds, organochlorine pesticides, organophosphate pesticides, herbicides and MBTE.
  - ✓ Toxicity testing using mysids, sea urchin and water flea.
  - ✓ Phase 1 Toxicity Identification Evaluations (TIEs) to be conducted when 3 consecutive wet weather or 2 consecutive dry weather samples from the same monitoring station show toxicity.
  - ✓ Grab samples for indicator bacteria and oil and grease.

  Dry season inspections and monitoring to be conducted at each mass emission site 2 times per year. Sampling of dry weather flows to be conducted over 24-hour periods to provide representative samples. Samples from each site to be tested consistent with stormwater monitoring.

Receiving Waters

- Conduct receiving water quality monitoring in Alamitos Bay for the first two years of the program to document effects of a dry weather diversion. Testing to consist of indicator bacteria and toxicity.

Special Studies

- Conduct a special study to examine characteristics of stormwater runoff from parking lots (one year only).

2001 - M&R Program Modifications

- List of constituents and reporting limits modified for consistency with minimum levels (MLs) listed in the State's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (SIP).
- TIE triggers altered to enhance opportunities for defining toxicity whenever it occurs.
- Use of the mysid toxicity test reduced to include only the first event of the season.

2002 - M&R Program Modifications

- Suspend toxicity monitoring at the Dominguez Pump Station monitoring site.
- Suspend monitoring of semivolatile organic compound.
- Conduct a pilot plume monitoring program in Alamitos Bay to document the horizontal and vertical extent of the stormwater plume in the receiving waters, measure the concentration of selected metals and organophosphate pesticides at four points in the plume and conduct sea urchin bioassay tests to document potential toxicity in the plume.
- Immediate upstream investigations were to be conducted if elevated pH was detected during dry weather surveys at mass emission monitoring sites in order to document the source or cause.

2003 - M&R Program Modifications

- Suspend analyses of parameters infrequently detected and/or typically detected at low levels.
- Continue the pilot plume monitoring program targeting the first storm of the season.
- Adjust TIE triggers – TIEs to be conducted using water flea when toxicity exceeds 2 toxicity units (TUs). TIEs to be conducted using sea urchins when toxicity exceeds 3 TUs.
- Change monitoring strategy to emphasize sampling during early season events.
- Monitor TSS and stormwater flow for all storm events at all four mass emission sites.

2004 - M&R Program Modifications

- Recommended setting minimum of 7 days between monitored events.
- Include daily records of rainfall for current and previous seasons in report.
- Submit draft work plan for identification of PBT sources to SMC for input and participation.

2005 - M&R Program Modifications

- No changes; continue with current program.

3.0 STUDY AREA DESCRIPTION

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3.0 STUDY AREA DESCRIPTION

The four sites for mass emissions monitoring were originally selected by the City of Long Beach with the assistance of the Southern California Coastal Water Research Project (SCCWRP), with input from the Los Angeles Department of Public Works, the environmental community, and with the approval of the Regional Water Quality Control Board. These sites were then specified in the NPDES permit after an analysis of the drainage basins and receiving waters. They were selected to be representative of the stormwater discharges from the City's storm drain system, as well as to be practical sites to carry out stormwater and dry weather monitoring.

3.1 Regional Setting

3.1.1 Geography

The City of Long Beach is located in the center and southern part of the Los Angeles Basin (Figure 3.1) and is part of the highly urbanized Los Angeles region. In addition to residential and other uses, the City also encompasses heavy industrial and commercial areas and includes a major port facility, one of the largest in the United States. The City's waterfront is protected from the open Pacific Ocean by the extensive rock dikes encircling the outer harbor area of the Port of Los Angeles/Port of Long Beach complex. The waterfront includes port facilities along with a downtown commercial/residential area that includes small boat marinas, recreational areas, and convention facilities. Topography within the City boundaries can be generally characterized as low relief, with Signal Hill being the most prominent topographic feature (Figure 3.2).

3.1.2 Major Watersheds

Major water bodies receiving stormwater discharges from the City of Long Beach include the Los Angeles River located near the western boundary of the City, the San Gabriel River located near the eastern boundary, and the outer Harbor of the Los Angeles/Long Beach area. The City of Long Beach has fifteen pump stations that discharge into the Los Angeles River, and one pump station that discharges into the San Gabriel River. Receiving water sub-areas of importance include the extensive Alamitos Bay, heavily developed for marina and recreational uses, and the inner harbor areas of the City, heavily developed as port facilities. Other receiving water sub-areas include the Los Angeles River, El Dorado Lake, Los Angeles River Reach 1 and Reach 2, San Gabriel River Estuary, San Gabriel River Reach 1, Colorado Lagoon, and Los Cerritos Channel. These areas also include coastal shorelines, including Alamitos Bay Beaches, Belmont Shore Beach, Bluff Park Beach, and Long Beach Shore. The drainage from the City is characterized by major creeks or storm channels, usually diked and/or concrete lined such as the Los Cerritos Channel that originates in Long Beach, flows near the eastern City boundary, and discharges into the Marine Stadium and then into Alamitos Bay. Other such regional drains include:

- Coyote Creek, which passes through a small portion of Long Beach before it discharges to the San Gabriel River;
- Heather Channel and Los Cerritos Line E that both enter Long Beach from the City of Lakewood and discharge into the Los Cerritos Channel; and the
- Artesia-Norwalk Drain that enters Long Beach from Hawaiian Gardens and discharges into Coyote Creek.

The City of Long Beach, including the City of Signal Hill, is divided into 30 watersheds as shown in Figure 3.3. Data presently in the City of Long Beach GIS database on total areas and specific land use categories for each basin are given in Table 3.1 (City of Long Beach, 2001). Specific watersheds selected

by the City of Long Beach for this present stormwater monitoring program are described in more detail in the section 4.0.

3.1.3 Annual Rainfall and Climate

The City of Long Beach is located in the semi-arid Southern California coastal area and receives significant rainfall on a seasonal basis. The rain season generally extends from October through April, with the heavier rains more likely in the months of November through March (see Figure 5.2 for average rainfall by month and seasonal total rainfall as measured at the Long Beach Airport). The long-term average (1971-2000) rainfall for October through April at the Long Beach Airport is 12.27 inches per year. Average annual rainfall for the entire year is 12.94 inches.

The City lies in the Los Angeles Plain, which is south of the Santa Monica and San Gabriel Mountains and west of the San Jose and the Puente Hills. The Los Angeles River is the largest stream on the Plain and it drains the San Fernando Valley and much of the San Gabriel Mountains. Most of the streams are dry during the summer and there are no lakes or ponds, other than temporary ponding behind dunes (Miles & Goudy, 1998). The climate is mild, with a 30-year average temperature of 23.4 °C (74.1°F) at the Long Beach Daugherty Airport (NCDC, 2000).

3.1.4 Population and Land Use Characteristics

The population of the City of Long Beach totaled 490,166 residents in January 2006 (State of California Department of Finance Demographic Research Unit, 2006). The total population of the County of Los Angeles, in which it resides, was 10,245,572. The independent city of Signal Hill, located on a promontory, is surrounded by the City of Long Beach. Signal Hill's population was recently estimated to be 11,089. Signal Hill contributes runoff to drainage basins 6, 7, 8, 9 and 18.

The City of Long Beach has a total area of 26,616 acres. Of that total 16,926 acres (64%) are classified as residential, 4,784 acres (18%) as commercial, 2,269 acres (8.5%) as industrial, 1,846 (7%) as institutional, and 786 acres (3%) as open space (City of Long Beach Municipal Stormwater Permit; CRWQCB, Los Angeles, 1999). The drainage basins sampled for the stormwater monitoring study follow this general pattern of land use.

Figure 3.1 Los Angeles Basin. (Source: 3-D TopoQuads Copyright 1999 DeLorme, Yarmouth, ME 04096).

Figure 3.2 City of Long Beach. (Source: Google Earth Pro, 2006).

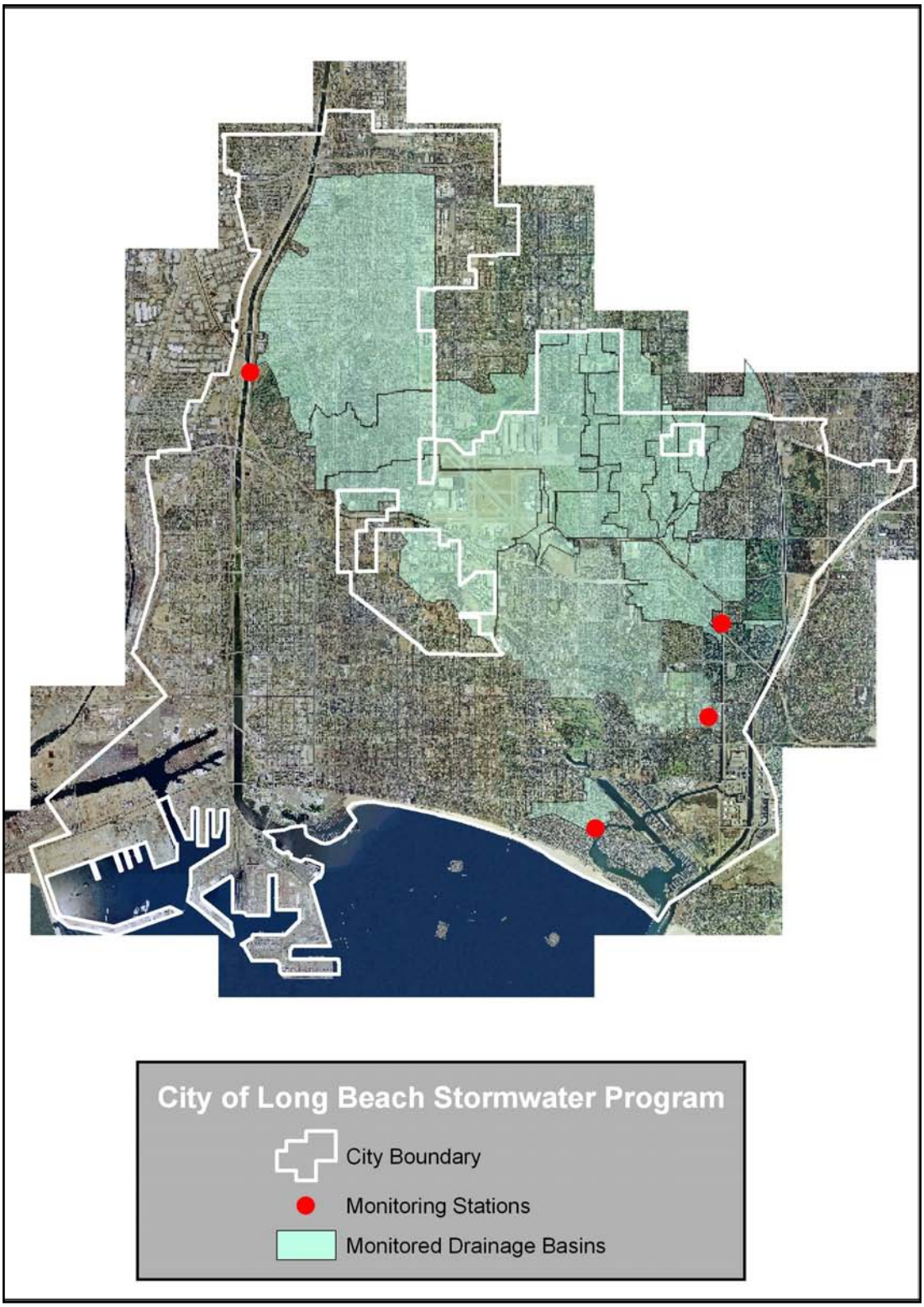

Figure 3.3 City of Long Beach, Major Drainage Basins (Source: City of Long Beach, Department of Technology Services, last update 1994) and City of Long Beach Stormwater Monitoring Sites.

Table 3.1 Total Areas and Land Use for City of Long Beach Watersheds.

Drainage Basin	Drainage Pattern	Sub-basins	Total Acres	Residential Acres	Commercial Acres	Industrial Acres	Institutional Acres	Open Space Acres
1	N to S	4	456	393	44	0	7	12
2	E to W	1	1,276	905	287	22	59	3
3	E to W	3	1,083	367	642	7	58	9
4	E to W	2	810	426	176	140	56	12
5	E to W	1	546	434	97	0	13	2
6	S & SE	1	695	475	125	0	73	17
7	to center	1	1,029	858	89	11	53	18
8	E to W	1	248	163	27	58	0	0
9	SW & NW	1	399	295	91	0	12	1
10	S & E	3	416	16	49	351	0	0
11	S & E	1	424	338	64	3	18	1
12	S & E	1	719	556	98	9	41	15
13	S & E	1	84	0	7	77	0	0
14	S & W	2	3,374	2,445	392	148	273	116
15	S & W	1	958	569	167	197	25	0
16	N to S	1	194	113	61	8	5	7
17	S & E	1	317	244	68	0	5	0
18	E	1	1,814	804	262	729	19	0
19	E	20	3,898	2,475	610	439	228	146
20	S & E	1	2,259	1,215	412	70	492	70
21	S & E	3	1,172	773	125	0	55	219
22	variable	9	520	38	428	0	54	0
23	S	1	213	110	85	0	14	4
24	SE & NW	1	281	188	30	0	0	63
25	W & E	2	90	70	9	0	4	7
26	S & W	3	355	304	22	0	29	0
27	E & S	9	1,083	825	109	0	143	6
28	S & E	1	630	386	179	0	65	0
29	S	8	727	633	10	0	26	58
30	SW(6) & SE(1)	7	546	508	19	0	19	0
	Total Acres		26,616	16,926	4,784	2,269	1,846	786

Monitored Watersheds

- **Dominguez Gap**
- **Belmont Pump Station**
- **Bouton Creek**
- **Los Cerritos Channel**

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4.0 MONITORING PROGRAM

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4.0 MONITORING PROGRAM

4.1 Monitoring Program Objectives

The stated long-term objectives of the stormwater monitoring program are as follows:

1. Estimate annual mass emissions of pollutants discharged to surface waters through the MS4;
2. Evaluate water column and sediment toxicity in receiving waters;
3. Evaluate impact of stormwater/urban runoff on marine life in receiving waters;
4. Determine and prioritize pollutants of concern in stormwater;
5. Identify pollutant sources on the basis of flow sampling, facility inspections, and ICID investigations; and
6. Evaluate BMP effectiveness.

Monitoring efforts during the initial term of the permit have focused on developing accurate assessments of pollutant loads from mass emission sites and determining the chemical and toxicological characteristics of discharges from the City's MS4 during both storm events and dry weather periods. During the first full year of monitoring a special Parking Lot Study was implemented to assist in identification of potential pollutant sources and to evaluate application of BMPs in parking lots. Specific objectives of this year's work included the following:

1. Obtain monitoring data from four (4) storm events for each mass emission station during the 2005/2006 storm season.
2. Conduct a field study to document the extent of stormwater plumes in Alamitos Bay and measure associated toxicity and water chemistry at four different dilutions.
3. Carry out dry weather inspections and obtain samples of dry weather flow at each of the four mass emission stations. Perform this dry weather work twice during the dry season that extends from May through October.
4. Perform chemical analyses for the specified suite of analytes at the appropriate detection limits for all stormwater samples collected.
5. Perform toxicity testing of the stormwater samples collected, and Toxicity Identification Evaluations (TIEs) if warranted by the toxicity results at a given site. No toxicity testing was required for water from the Dominguez Gap Pump Station monitoring site.
6. Conduct an initial pilot investigation of sediments in storm drains to determine the efficacy of this method in identifying significant sources of Persistent Bioaccumulative and Toxic Compounds (PBTs) not readily measured in typical stormwater monitoring programs.
7. Report the above results and evaluate the monitoring data with respect to receiving water quality criteria.

4.2 Monitoring Site Descriptions

Four mass emission monitoring sites are routinely monitored as part of the City's stormwater program. The general locations of the drainage basins sampled by each of these sites and each monitoring location are shown in Figure 3.3. The latitude and longitude of each site are shown in Table 4.1. Brief descriptions of each drainage basin and land use are provided in the following sections.

4.2.1 Basin 23: Belmont Pump Station Monitoring Site

This site collects water from Basin 23 that covers 213 acres. Land use in the basin is 52% residential, 40% commercial, 0% industrial, 6% institutional, and 2% open space (Figure 4.1, Table 3.1). This basin is located in the southeastern portion of the City and is bounded on the north, south, east, and west by Colorado Street, Division Street, Ultimo Avenue and Belmont Avenue respectively. The Belmont Pump Station is located at 222 Claremont Avenue.

Water enters the forebay of the facility via a nine-foot diameter underground storm pipe. A trash rack catches debris before water drops four feet into the sump area. A small summer pump typically comes on and discharges about two feet of water from the sump area every evening at around 2300 hours. Four main pumps are available to remove water during storm events. Water from these pumps is discharged into Alamitos Bay.

The storm monitoring equipment is interfaced with all five pumps to determine when each pump is activated. Water depth and pump discharge curves are then used to calculate discharges from this site for use in pacing the sampling equipment.

4.2.2 Basin 20: Bouton Creek Monitoring Site

This site collects water from Basin 20 covering 2,259 acres. Basin 20 is 54% residential, 22% institutional, 18% commercial, 3% industrial, and 3% open space (Figure 4.2). This basin is located in the east central portion of the City and is bounded on the north, south, east, and west by Spring Street, 8th Avenue, the Los Cerritos Channel and Redondo Avenue, respectively. The sampling station is located a short way upstream from the point of discharge into Los Cerritos Channel, along side of the Alamitos Maintenance Yard of the Los Angeles County Public Works Department.

At the sampling station, Bouton Creek is a 35 ft wide, 8.5 ft deep open concrete box channel. The elevation of the channel bed is approximately one inch lower at the side than the center. About a quarter of a mile to the southeast, Bouton Creek flows into Los Cerritos Channel. Based on numerous observations of conductivity at various tides, this site has saltwater influence at tide levels above three feet. The automatic sampling equipment was therefore configured and programmed to measure discharge flow and to obtain flow-composited samples of the freshwater discharge down the creek, avoiding the tidal contributions by using real-time conductivity sensors. A velocity sensor was mounted on the invert of the box channel near the center of flow. Two conductivity sensors were mounted on the wall of the channel near the bottom and 2 feet above the bottom. A third conductivity sensor and the sample intake were mounted on a floating arm that kept them near the surface.

The velocity sensor at this site was destroyed on two separate occasions this year due to debris present in the Creek. Blocks of broken pavement, concrete and rebar were removed from the creek to prevent further damage.

4.2.3 Portions of Basins 18, 19, 27 and 29: Los Cerritos Channel Monitoring Site

The Los Cerritos Channel Monitoring Site receives runoff from all or portions of four different basins. Small portions of the watershed are located outside of the City of Long Beach. This includes roughly 577 acres of the City of Lakewood and 581 acres of the City of Signal Hill.

The total area of watershed above the sampling site is approximately 7,685 acres. Land use within the watershed consists of 65% residential, 12% commercial, 12% institutional and 5% open space (Figure 4.3).

The stormwater monitoring station was installed in a steel utility box located on the west side of the channel south of Stearns Street. Flow sensors and sampling tubing were installed on the bottom of the large concrete lined channel. Flow rates based upon flow velocity and channel dimensions are used to control the composite sampler, and to calculate total flow at the end of the storm event.

This sampling site is normally above tidewater on Los Cerritos Channel. During extreme tides required for the dry weather surveys, this site can be impacted by backwater conditions.

4.2.4 Basin 14: Dominguez Gap Monitoring Site

The sampling station located at the Dominguez Gap Pump Station is intended to monitor Basin 14 that covers 3,374 acres. Land use in this basin is 72% residential, 12% commercial, 8% institutional, 4% industrial, and 4% open space (Figure 4.4). The basin is located in the northwestern portion of Long Beach just east of the Los Angeles River and is bounded on the north, south, east, and west by Artesia Boulevard, Roosevelt Road, the railroad, and the Los Angeles River respectively (City of Long Beach, 2001).

Normally in the summer, the retention basin located adjacent to the pump station would be dry according to the Flood Maintenance Division of the Los Angeles Public Works. However, recent practice has been to keep the pumps locked off for the summer with water diverted into the retention basin from the Los Angeles River to recharge the groundwater aquifer and to study the feasibility of a wetland habitat in the area. During winter storms, the retention basin fills from stormwater discharge, which then infiltrates into the groundwater. During intense rains, when the retention basin fills to a specified level, the pump station pumps the water over the levee and discharges it into the Los Angeles River.

The stormwater monitoring equipment is located within the Dominguez Gap Pump Station. The automatic sampler utilized a peristaltic pump to collect water from the pump station's sump. The configuration of monitoring equipment was updated two years ago to improve measurement of flow particularly during periods when the basin was being manually pumped down. All five pumps have been individually instrumented to detect when each pump is activated. Flow is calculated based upon pump curves and water elevations in the sump as measured with a pressure transducer instantaneous head. Flow from each pump is summed to determine discharge rates at any one point in time.

Under normal operation, it is highly unusual for the complement of pumps to be activated. In the past, equipment constraints prevented instrumentation of the final pump that comes on line during high flows. Although this was not an issue with automatic operations, this becomes an issue when the basin is manually pumped down since all pumps are operated at such times.

4.3 Monitoring Station Design and Configuration

Each of the four land use stations monitored in Long Beach is equipped with Kinnetic Laboratories Automatic Sampling System (KLASS). Figure 4.5 illustrates the configuration of a typical KLASS. This system consists of several commercially available components that Kinnetic Laboratories has integrated and programmed into an efficient flow-based stormwater compositing sampler.

The integral components of this system consist of an acoustic Doppler flow meter or a pressure transducer, a datalogger/controller module, cellular or landline telecommunications equipment, a rain gauge, and a peristaltic sampler. The system installed at Bouton Creek also incorporated several conductivity cells for distinguishing tidal flow from fresh water runoff. Pump station sites also incorporate a variety of sensors to monitor individual pump activity.

The equipment was installed with intakes and sensors securely mounted, tubing and wires in conduits, and all above ground instruments protected within a security enclosure. Section 4.2 described how the equipment was placed at each station.

All materials used in the collection of stormwater samples and in contact with the samples meet strict criteria in order to prevent any form of contamination of the sample. These materials allow both inorganic and organic trace toxicant analyses from the same sampler and composite bottle. Only the highest grade of borosilicate glass is suitable for both trace metal and organic analyses from the same composite sample bottle. Sample hoses were Teflon®.

All bottles and hoses were cleaned according to EPA-approved protocols consistent with approved methodology for analysis of stormwater samples (USEPA, 1983). These bottles and hoses were then evaluated through a blanking process to verify that the hoses and composite bottles were contamination-free and appropriately cleaned for analyses of both inorganic and organic constituents.

4.4 Field Monitoring Procedures

The following sections provide a summary of the field methods and procedures used to collect and process data for both the wet and dry weather surveys.

4.4.1 Wet Weather Monitoring

Stormwater runoff was collected using two primary methods. Composite sampling was conducted to collect water for both chemical analysis and toxicity testing. A few analytes such as bacteria must be sampled using grab sampling methods and thus reflect conditions only at the time of sampling. For the past three years, wet weather monitoring has also included a second study designed to investigate the spatial extent of the stormwater plume in the receiving waters of Alamitos Bay. The following sections provide details of methods used for composite sampling, grab sampling and for the receiving water study in Alamitos Bay.

4.4.1.1 Composite Sample Collection

A priority objective of the storm monitoring was to maximize the percent storm capture of the composite sample, while ensuring that the composite bottle collects enough water to support all the required analyses. This study required volumes of 20 to 30 liters of sample from each of the four land use sites to meet these analytical needs.

All aspects of the sampling events were continuously tracked from an office command and control center (Storm Control) located at our Santa Cruz laboratory. The status of each station was monitored through telecommunication links to each site. Station data were downloaded, and the stations were controlled and reprogrammed remotely. Weather information, including Doppler displays of rainfall for each area being monitored were also available on screen at the Storm Control center. In addition, Storm Control was in contact by cellular phone with the field crews.

When a storm was likely, all stations were made ready to sample. This preparation included entering the correct volume of runoff required for each sample aliquot ("Volume to Sample"), setting the automatic sampler and the data logger to sampling mode, pre-icing the composite sample bottle, and performing a general equipment inspection. A brief physical inspection of the equipment was made if possible to make certain that there were no obvious problems such as broken conduit, a kinked hose, or debris.

Once a storm event ended, the stations were shut down either on site or remotely by Storm Control. The station was left ready for the next storm event in case there was insufficient time for a maintenance visit between storms. Data were retrieved remotely via telecommunications from the data logger on a daily basis throughout the wet weather season.

All water samples were kept chilled (4ºC) and were transferred to the analytical laboratories within holding times. Prior to sample shipping, sub-sampling from the composite container into sample containers was accomplished using protocol cleaned Teflon and silicone sub-sampling hoses and a peristaltic pump. Using a large magnetic stirrer, all composite water was first mixed together thoroughly and then continuously mixed while the sub-sampling took place. All sub-sampling took place at a staging area near Long Beach. Documentation accompanying samples to the laboratories included Chain of Custody forms, and Analysis Request forms (complete with detection limits).

4.4.1.2 Grab Sampling

During each storm event, grab samples for oil and grease, total and fecal coliform, and enterococcus were collected. The timing of grab sampling efforts was often driven by the short holding times for the bacterial analyses. The ability to deliver samples to the microbiological laboratory within the 6-hour holding time was always a major consideration.

Except at the pump stations, all grab samples were taken near the center of flow as possible or at least in an area of sufficient velocity to ensure good mixing. At both the Dominguez Gap and Belmont Pump stations, grabs were taken from the sump. A specially constructed sampling pole was required to obtain samples at most sites. Poles used were fitted with special bottle holders to secure the sampling containers. Care was taken not to overfill the sample containers for some of the containers contained preservative.

4.4.1.3 Alamitos Bay Receiving Water Study

This element of the stormwater monitoring program was initiated during the 2001/2002 annual program review with Regional Board staff. A pilot receiving water program was first conducted during the 2002/2003 season. This program was retained as a component of the 2003/2004, 2004/2005 and 2005/2006 monitoring efforts. The primary objectives of the receiving water program were to:

- Define the general vertical and horizontal extent of stormwater in Alamitos Bay, Marine Stadium and Los Cerritos Channel.
- Evaluate toxicity and associated water quality characteristics of the stormwater plume.

Alamitos Bay, located approximately 10 miles southeast of Long Beach Harbor, is a 1 by ¾ mile, multi-use harbor. The opening of the harbor is at the southeast corner. The center of the harbor is occupied by Naples Island, which effectively gives it the structure of a ring. The bay receives fresh water from a variety of sources, the largest being Cerritos Creek, which drains the Long Beach Area and regions further inland. The upper end of Marine Stadium also can receive significant stormwater discharge volumes from Colorado Lagoon.

This program was intended to be conducted once during the early portion of the wet-weather season. The study area included all of Alamitos Bay, Marine Stadium and the Los Cerritos Channel up to the first upstream bridge. Field sampling was to be initiated within 12 to 24 hours following the end of rainfall.

The first task of this field program was to roughly define the horizontal and vertical extent of the stormwater plume. This required rapid characterization of the plume by use of a towed YSI Multiparameter Sonde deployed from a boom off the side of KLI's research vessel, the *D.W. Hood*. For establishing the horizontal extent of the plume, the sonde was towed at a depth of approximately 0.5 feet. Data from the Sonde was recorded on a portable computer. Sonde parameters included time, salinity, temperature, turbidity, pH and dissolved oxygen. A Garmin differential global positioning system (DGPS) unit was linked to a separate portable computer to record location and time and provide a real-time display of position. The Sonde and DGPS unit were synchronized to the nearest second to ensure concurrent locational data for all water quality data.

Predeployment Calibration Check

Occasional depth profiles were conducted in the plume to determine the depth of freshwater influence. Profiles were made to a depth of 10 feet with near surface data being recorded at six-inch depth intervals. After defining the halocline, recording depth intervals were increased to 1-foot. After establishing the general distribution of stormwater in receiving waters, sites were selected for collection of water samples based upon salinity. Four sites were selected to be representative of four different stormwater dilutions. To the extent practical, sites were intended to be selected from locations within the defined study area where receiving water salinities ranged from approximately 15 to 30‰.

The following table summarizes the target ranges of conditions to be sampled in the field. The target ranges were to provide a general framework and strategy for selection of sampling locations. This was intended to provide stormwater concentrations ranging from 12 to 56 percent. As anticipated, the actual ranges varied due to specific field conditions during the survey such as the general extent of the stormwater plume and characteristics of the vertical profiles of the plume.

Receiving Water Station Designation	Salinity (‰)	Est. % Stormwater
RW-1	15	56
RW-2	20	41
RW-3	25	26
RW-4	30	12

Each receiving water sample was subjected to the sea urchin fertilization test. This is the only test that has been found to suggest potential for toxicity in the marine/estuarine receiving waters of Alamitos Bay. These samples were also analyzed for a subset of the analytes required for the stormwater monitoring program. Analytes were selected based upon previous results of toxicity testing and Toxicity Identification Evaluations (TIEs) conducted on the stormwater samples as well as general potential for

toxicity. Chemical analyses of receiving water samples included total and dissolved trace metals (Cd, Cu, Ni, Pb and Zn), TSS, ammonia-N, pH, conductivity, and salinity.

The data files from the YSI Sonde containing time and water quality measurements and from the Garmin DGPS containing time and position data were merged by the time field. This combined data was entered into ArcInfo and contours based upon the point measured values of salinity were generated. The contours were plotted on a map of Alamitos Bay to show the salinity throughout the bay a few hours after the end of the rainfall.

4.4.2 Dry Weather Monitoring

The NPDES Permit calls for two dry weather inspections and sampling events to be carried out during the summer. Inspections at each site included whether water was present and whether this water was flowing or just ponded. When flowing water was present at one of these mass emission sites, then water quality measurements, flow estimates, and water samples were taken along with observations of site conditions. Flowing water was present and all measurements were taken at Bouton Creek, the Belmont Pump Station, and at Los Cerritos Channel. As in previous years, no dry weather discharge was observed at the Dominguez Gap Pump Station. Temperature, conductivity, and pH were measured with a YSI Model 63 Handheld pH, Conductivity, Salinity, and Temperature Meter. Oxygen was measured a YSI Model 58 Dissolved Oxygen Meter.

For the August 2005 event water samples were collected at the Belmont Pump Station and the Los Cerritos Channel Station by use of an automatic peristaltic pump sampler that collected aliquots every half hour for a 24-hour period. For the May 2006 event the method described above was again used to collect the samples at Cerritos Channel. A modification in method was made at the Belmont Pump Station.

Dry weather flow into the Belmont Pump Station occurs continually at rates that vary throughout the day. The accumulated flow is discharged via a maintenance pump and usually occurs once a day. The maintenance pump is installed in a well in the floor of the sump. The pump is controlled by a depth switch and a timer. The pump turns on when the depth of the water in the sump is at or above 1.75 feet and turns off when the depth is zero feet, but the timer restricts the time of operation of the pump to the hours from 10:00 p.m. to 6:00 a.m. PDT. During the dry weather season the pump runs only once each day. It turns on promptly at 10:00 p.m. and runs for 20 to 35 minutes. If the maintenance pump is allowed to operate during the 24 hour dry weather sample collection period, the level of the water in the sump will drop below the level from which the sampler can draw water. Thus, a number of the 30 minute sample aliquots are not collected. If the sump pump is disabled during the 24 hour period all of the sample aliquots are collected, but the water in the sump is not well mixed, so a good representative sample of the inflow is not obtained.

During the several years that dry weather sampling has been conducted 24 hour composite samples have been collected both with the pump enabled and with it disabled. For the May 2006 sampling event a different approach was used. The samples were collected as a grab sample during the period that the maintenance pump was running. Collection was begun when the pump turned on and continued until the level of the water fell below the level that the sampler could draw water from. It was felt that this method would provide a more representative sample of the water in the sump due to the mixing taking place while the pump was running.

For the Bouton Creek Station where tidal influences are present, the method is to collect a composite grab sample over a 30 minute period of low tide in order to isolate sampling to just the fresh water discharge

down the creek. Additional grab samples for TPH and bacteria were taken just after the time-composited samples. All samples were cooled to 4 ºC and transported to the appropriate laboratory for analysis.

4.5 Laboratory Analyses

The water quality constituents selected for this program were established based upon the requirements of the City of Long Beach NPDES permit for stormwater discharges as modified through the annual review process. All analyses were conducted at laboratories certified for such analyses by the Department of Health Services or approved by the Executive Officer and in accordance with current EPA guideline procedures or as specified in this Monitoring Program. Analytical methods are based upon approved USEPA methodology. The following sections detail laboratory methods for chemical and biological testing.

4.5.1 Analytical Suite and Methods

Conventional, bacteriological, and chemical constituents selected for inclusion in this stormwater quality program are presented in Table 4.2. Analytical method numbers, holding times, and reporting limits are also indicated for each analysis.

4.5.2 Laboratory QA/QC

Quality Assurance/ Quality Control (QA/QC) activities associated with laboratory analyses are detailed in Appendix A.

The laboratory QA/QC activities provide information needed to assess potential laboratory contamination, analytical precision and accuracy, and representativeness. Analytical quality assurance for this program included the following:

- Employing analytical chemists trained in the procedures to be followed.
- Adherence to documented procedures, USEPA methods and written SOPs.
- Calibration of analytical instruments.
- Use of quality control samples, internal standards, surrogates and SRMs.
- Complete documentation of sample tracking and analysis.

Internal laboratory quality control checks included the use of internal standards, method blanks, matrix spike/spike duplicates, duplicates, laboratory control spikes and Standard Reference Materials (SRMs).

Data validation was performed in accordance with the USEPA Functional Guidelines for Low Level Concentration Organic Data Review (USEPA 2001), USEPA Functional Guidelines for Inorganic Data Review (USEPA 2002), and Guidance on the Documentation and Evaluation of Trace Metals Data Collected for the Clean Water Act Compliance Monitoring (USEPA 1995a).

4.5.3 Toxicity Testing Procedures

Upon receipt in the laboratory, stormwater discharge and receiving water samples were stored at 4 °C, in the dark until used in toxicity testing. Toxicity testing commenced within 72 hours of sample collection for most samples. The relative toxicity of each discharge sample was evaluated using two chronic test methods: the water flea (*Ceriodaphnia dubia*) reproduction and survival test (freshwater) and the purple sea urchin (*Strongylocentrotus purpuratus*) fertilization test (marine). Each of the methods is recommended by the USEPA for the measurement of effluent and receiving water toxicity. Samples of marine receiving water from Alamitos Bay were tested with the marine species only. Water samples were

diluted with laboratory water to produce a concentration series using procedures specific to each test method.

4.5.3.1 Water Flea Reproduction and Survival Test

Toxicity tests using the water flea, *Ceriodaphnia dubia*, were conducted in accordance with methods recommended by USEPA (1994a). The test procedure consisted of exposing 10 *C. dubia* neonates (less than 24 hours old) to the samples for six or seven days. One animal was placed in each of 10 individual polystyrene cups containing approximately 20 mL of test solution. The test temperature was 25 ± 1 °C and the photoperiod was 16 hours light: 8 hours dark. Daily water changes were accomplished by transferring each individual to a fresh cup of test solution; water quality measurements and observations of survival and reproduction (number of offspring) were made at this time also. Prior to transfer, each cup was inoculated with food (100 µL of a 3:1 mixture of *Selenastrum* culture, density approximately 3.5 x 108 cells/mL, and *Ceriodaphnia* chow).

The test organisms were obtained from in-house cultures that were established from broodstock obtained from USEPA (Duluth, MN). The laboratory water used for cultures, controls, and preparation of sample dilutions was synthetic moderately hard freshwater, prepared with deionized water and reagent chemicals. Test samples were poured through a 60 µm Nitex screen in order to remove indigenous organisms prior to preparation of the test concentrations. Serial dilutions of the test sample were prepared, resulting in test concentrations of 100, 50, 25, 12, and 6 %.

The quality assurance program for this test consisted of three components. First, a control sample (laboratory water) was included in all tests in order to document the health of the test organisms. Second, a reference toxicant test consisting of a concentration series of potassium chloride (KCl) was conducted with each batch of samples to evaluate test sensitivity and precision. Third, the results were compared to established performance criteria for control survival, reproduction, reference toxicant sensitivity, sample storage, and test conditions. Any deviations from the performance criteria were noted in the laboratory records and prompted corrective action, ranging from a repeat of the test to adjustment of laboratory equipment.

4.5.3.2 Sea Urchin Fertilization Test

All discharge and receiving water samples of stormwater were also evaluated for toxicity using the purple sea urchin fertilization test (USEPA 1995b). This test measures toxic effects on sea urchin sperm, which are expressed as a reduction in their ability to fertilize eggs. The test consisted of a 20-minute exposure of sperm to the samples. Eggs were then added and given 20 minutes for fertilization to occur. The eggs were then preserved and examined later with a microscope to assess the percentage of successful fertilization. Toxic effects are expressed as a reduction in fertilization percentage. Purple sea urchins (*Strongylocentrotus purpuratus*) used in the tests were supplied by U.C. Davis – Granite Canyon. The tests were conducted in glass shell vials containing 10 mL of solution at a temperature of 15 ± 1 °C. Five replicates were tested at each sample concentration.

All samples were adjusted to a salinity of 33.5‰ for the fertilization test. Previous experience has determined that many sea salt mixes are toxic to sea urchin sperm. Therefore, the salinity for the urchin test was adjusted by the addition of hypersaline brine. The brine was prepared by freezing and partially thawing seawater. Since the addition of brine dilutes the sample, the highest stormwater concentration that could be tested for the sperm cell test was 50%. The adjusted samples were diluted with seawater to produce test concentrations of 50, 25, 12, 6, and 3%.

Seawater control (1.0 µm filtered natural seawater from ToxScan's Long Marine Laboratory facility) and brine control samples (50% deionized water and 50% brine) were included in each test series for quality control purposes. Water quality parameters (temperature, dissolved oxygen, pH, ammonia, and salinity) were measured on the test samples to ensure that the experimental conditions were within desired ranges and did not create unintended stress on the test organisms. In addition, a reference toxicant test was included with each stormwater test series in order to document intralaboratory variability. Each reference toxicant test consisted of a concentration series of copper sulfate with four replicates tested per concentration. The median effective concentration (EC_{50}) was estimated from the data and compared to control limits based upon the cumulative mean and two standard deviations of recent experiments.

4.5.3.3 Toxicity Identification Evaluations (TIEs)

Phase I TIEs were conducted on selected runoff samples from stations that exhibited substantial toxicity. Substantial toxicity was defined as ≥ 2 TU_a (acute Toxic Units) in the case of water fleas and ≥ 3 TU_a for sea urchins. Each sample was subjected to treatments designed to selectively remove or neutralize classes of compounds (e.g., metals, nonpolar organics) and thus the toxicity that may be associated with them. Treated samples were then tested to determine the change in toxicity using the sea urchin fertilization test.

Prior to evaluation of toxicity changes, an untreated aliquot of sample was tested to confirm persistence of the originally-noted toxicity. If toxicity in this "baseline" sample had decreased to <2 TU, further toxicity tests were not performed and the TIE was abandoned.

Four or five treatments were applied to each sample. These treatments were: particle removal, trace metal chelation, nonpolar organic extraction, organophosphate (OP) deactivation (except urchins) and chemical reduction. With the exception of the organics extraction, each treatment was applied independently on a salinity-adjusted sample. A control sample (lab dilution water) was included with each type of treatment to verify that the manipulation itself was not causing toxicity. If the TIE was not conducted concurrently with the initial testing of a sample, then a reduced set of concentrations of untreated sample was tested at the time of the TIE to determine the baseline toxicity and control for changes in toxicity due to sample storage.

Ethylene diamine tetraacetic acid (EDTA), a chelator of metals, was added to a concentration of 60 mg/L to the marine test samples. EDTA additions to the *Ceriodaphnia* samples were based upon sample hardness (USEPA 1991). Sodium thiosulfate (STS), a treatment that reduces oxidants such as chlorine and also decreases the toxicity of some metals was added to a concentration of 50 mg/L to separate portions of each marine sample. STS additions to the *Ceriodaphnia* samples were at 500, 250 and 125 mg/L. The EDTA and sodium thiosulfate treatments were given at least one hour to interact with the sample prior to the start of toxicity testing. Pipernyl butoxide, which inhibits activation of OP pesticides was added at three concentrations (125, 250 and 500 mg/L) for *Ceriodaphnia*.

Samples were centrifuged for 30 min at 3000 X g to remove particle-borne contaminants and tested for toxicity. A portion of the centrifuged sample was also passed through a 360 mg Sep-Pak™ C-18 solid phase extraction column in order to remove nonpolar organic compounds. C-18 columns have also been found to remove some metals from aqueous solutions.

4.5.3.4 Statistical Analysis

The toxicity test results were normalized to the control response in order to facilitate comparisons of toxicity between experiments. Normalization was accomplished by expressing the test responses as a percentage of the control value. Four statistical parameters (NOEC, LOEC, median effect, and TU_c) were calculated to describe the magnitude of stormwater toxicity. The NOEC (highest test concentration not producing a statistically significant reduction in fertilization or survival) and LOEC (lowest test concentration producing a statistically significant reduction in fertilization or survival) were calculated by comparing the response at each concentration to the dilution water control. Various statistical tests were used to make this comparison, depending upon the characteristics of the data. Water flea survival and reproduction data were usually tested against the control using Fisher's Exact and Steel's Many-One Rank test, respectively. Sea urchin fertilization data were evaluated for significant differences using Dunnett's multiple comparison test, provided that the data met criteria for homogeneity of variance and normal distribution. Data that did not meet these criteria were analyzed by the non-parametric Steel's Many-One Rank or Wilcoxon's tests.

Measures of median effect for each test were calculated as the LC_{50} (concentration producing a 50% reduction in survival) for water flea survival, the EC_{50} (concentration effective on 50% of eggs) for sea urchin fertilization, or the IC_{50} (concentration inhibitory to 50% of individuals) for water flea reproduction and IC_{25}. The LC_{50} or EC_{50} was calculated using either probit analysis or the trimmed Spearman-Karber method. The IC_{25} and IC_{50} were calculated using linear interpolation analysis. All procedures for calculation of median effects followed USEPA guidelines.

The toxicity results were also expressed as chronic Toxic Units (TU_c). This statistic was calculated as: 100/NOEC. Increased values of toxic units indicate relatively greater toxicity, whereas greater toxicity for the NOEC, LOEC, and median effect statistics is indicated by a lower value.

Comparisons of chemical or physical parameters with toxicity results were made using the non-parametric Spearman rank order correlation.

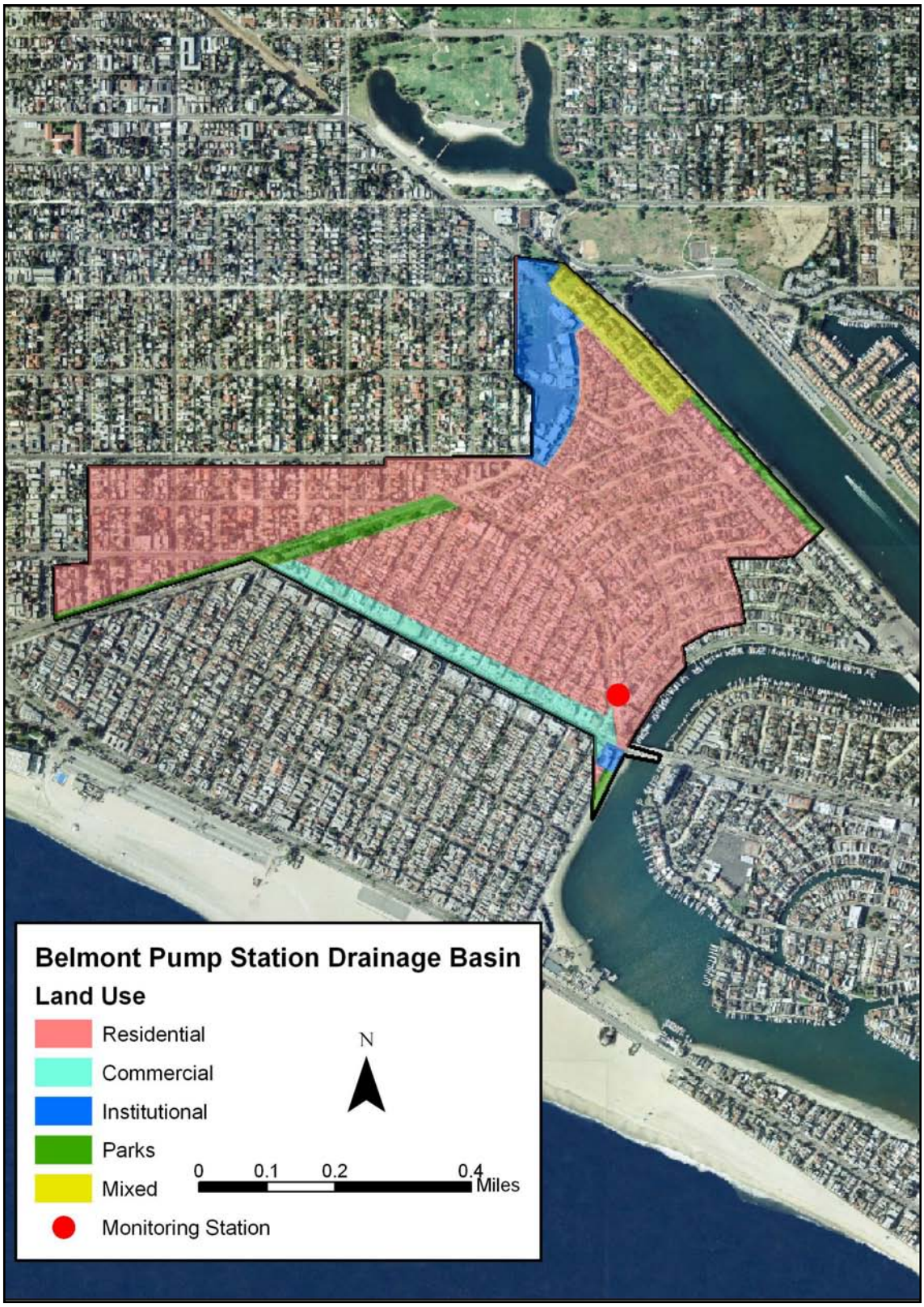

Figure 4.1 Land Use of Drainage Basin #23 which Drains to the Belmont Pump Station Mass Emission Site. (Source: City of Long Beach, Department of Technology Services, last updated 12/20/00)

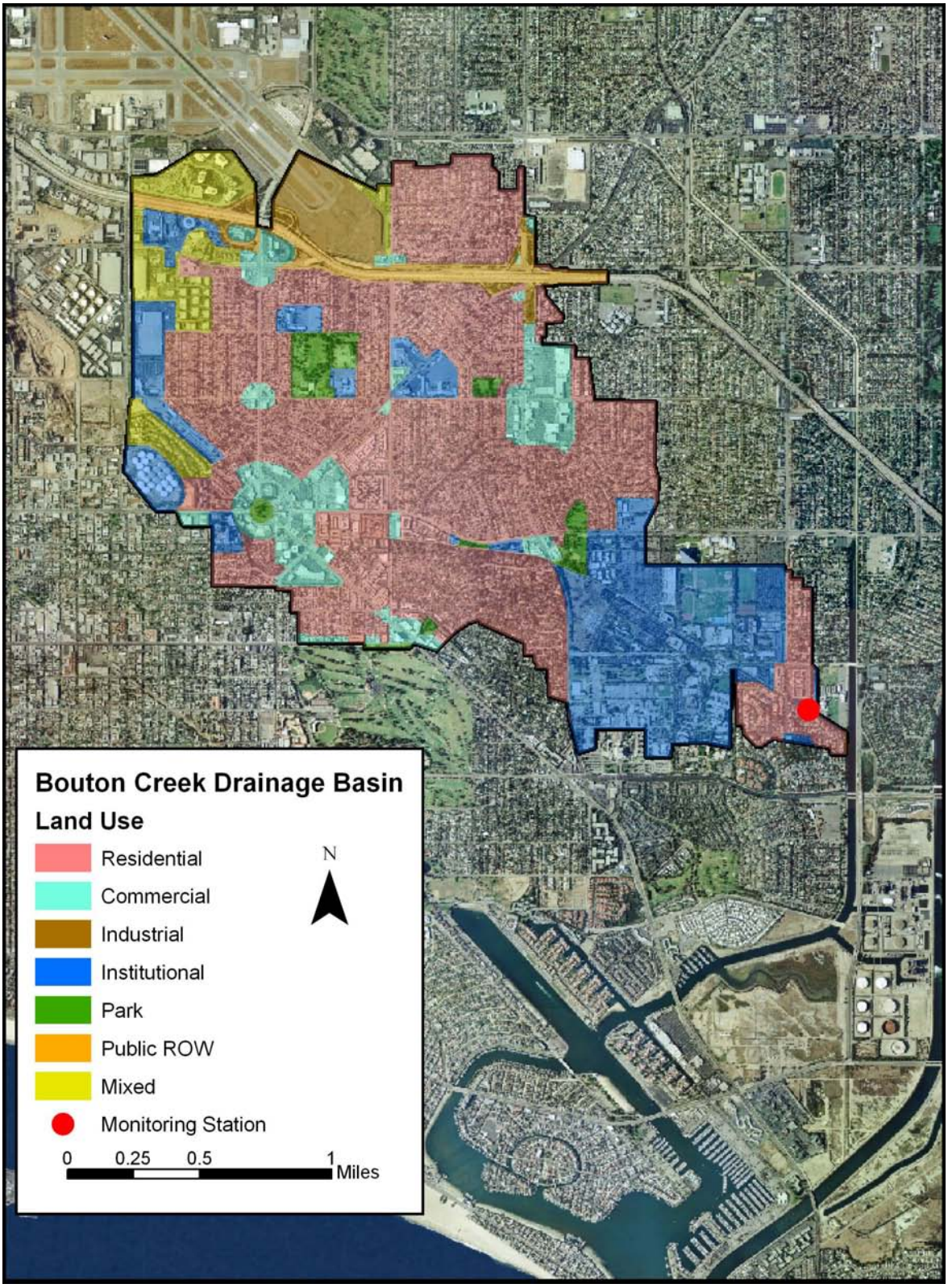

Figure 4.2 Land Use of Drainage Basin #20 which drains to the Bouton Creek Mass Emission Site. (Source: City of Long Beach, Department of Technology Services, last updated 12/20/00).

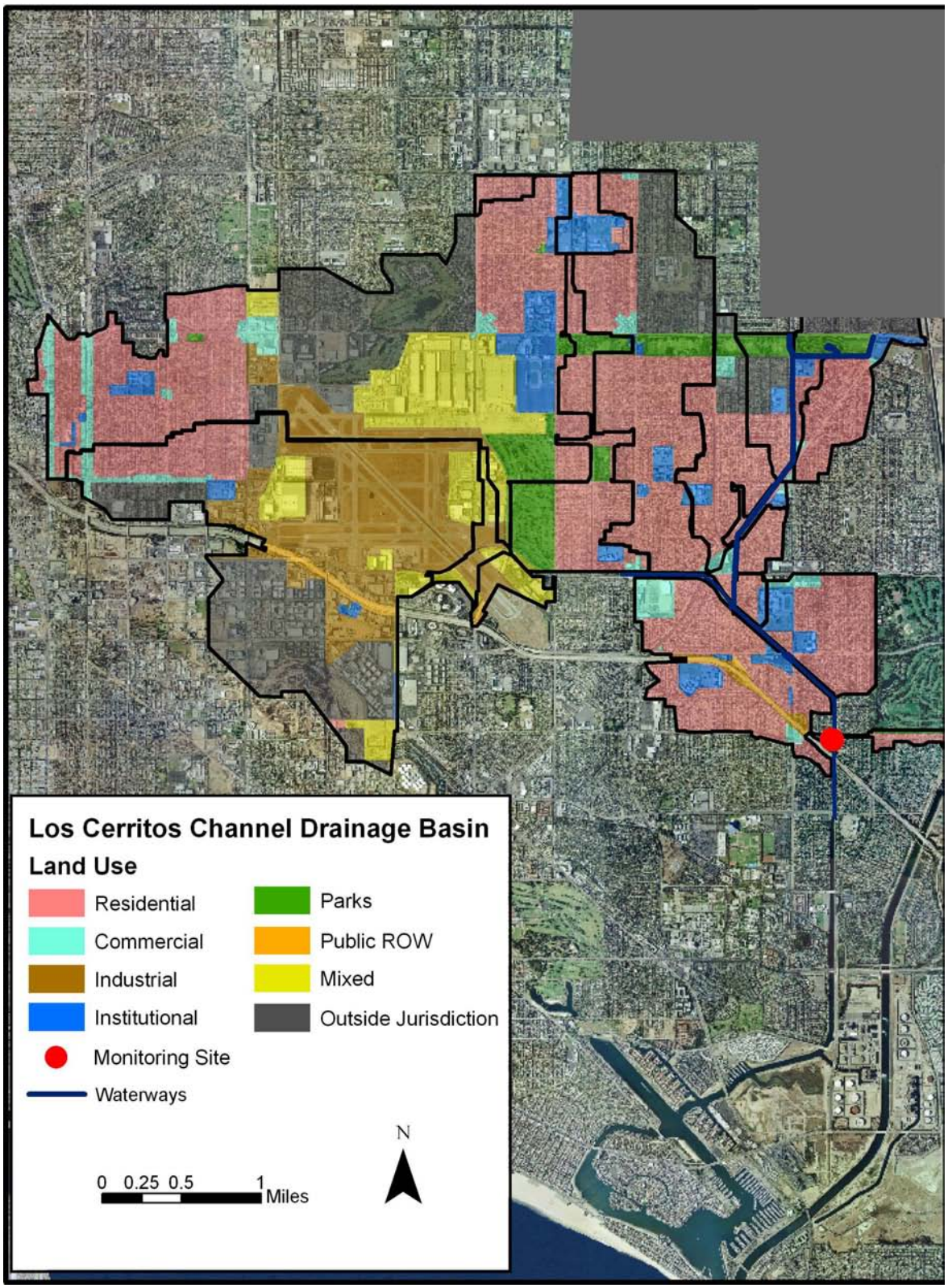

Figure 4.3 Land Use of Drainage Basins which Drain to the Los Cerritos Channel Monitoring Site. (Source: City of Long Beach, Department of Technology Services, last update 12/20/00).

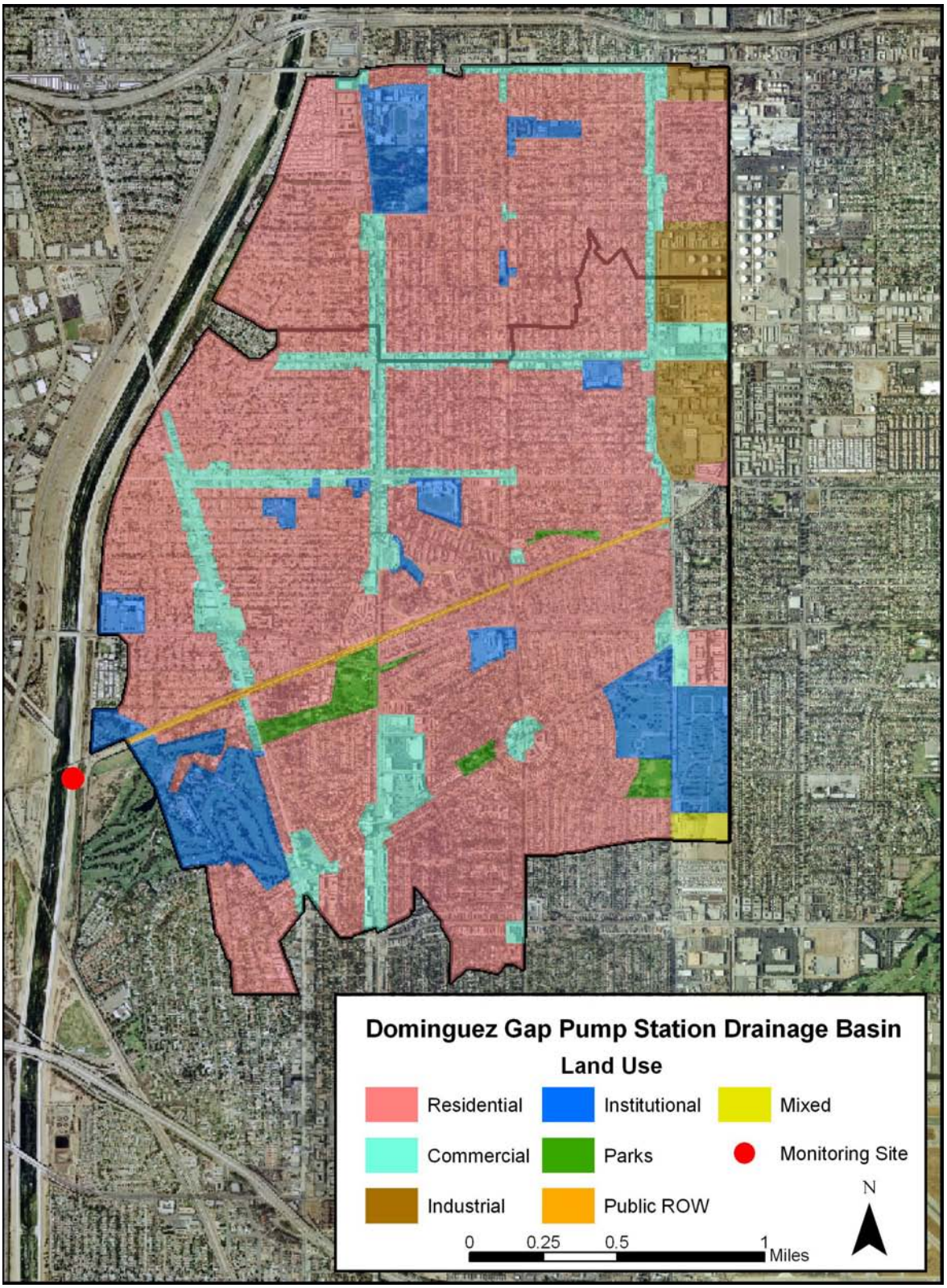

Figure 4.4 Land Use of Drainage Basin #14 which Drains to the Dominguez Gap Mass Emission Site. (Source: City of Long Beach Department of Technology Services, last update 12/20/00)**.**

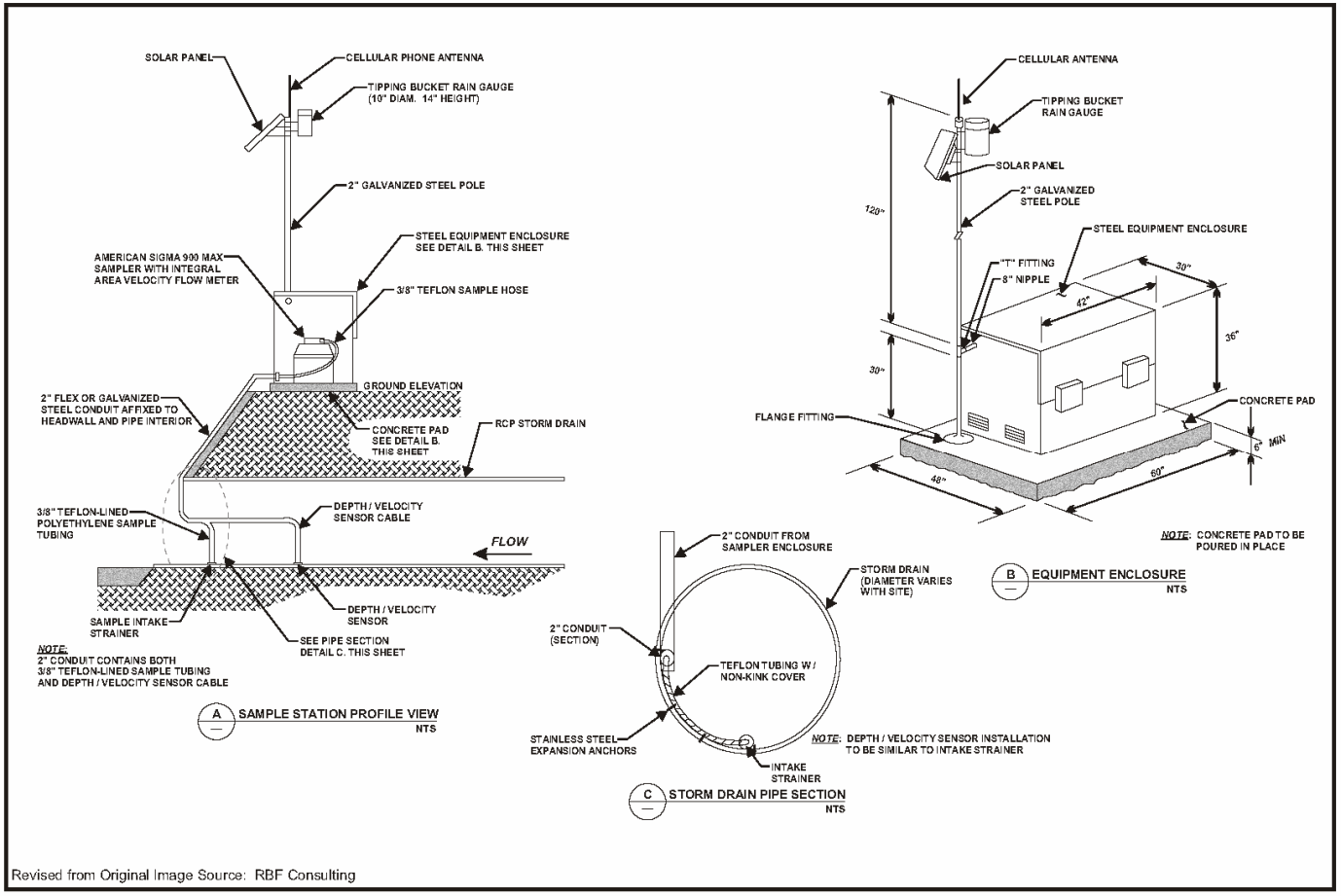

Figure 4.5 Typical KLASS Stormwater Monitoring Station.

Table 4.1 Location Coordinates of Monitoring Stations for the City of Long Beach Stormwater Monitoring Program.

Station Name	State Plane Coordinates: Zone 5		North American Datum (NAD) 83	
	Northing (ft)	Easting (ft)	Latitude	Longitude
Belmont Pump	1734834.9	6522091.2	33° 45’ 36.6”N	118° 07’ 48.7”W
Bouton Creek	1741960.5	6529305.2	33° 46’ 44.3”N	118° 06’ 23.4”W
Los Cerritos Channel	1747935.9	6530153.2	33° 47’ 43.3”N	118° 06’13.4”W
Dominguez Gap Pump	1764025.0	6500042.5	33° 50’ 22.1”N	118° 12’ 10.5”W

Table 4.2 Analytical Methods, Holding Times, and Reporting Limits.

Analyte and Reporting Unit	EPA Method Number	Holding Time	Target Reporting Limit or ML
Conventional Parameters			
Oil and Grease (mg/L)	1664	28 days	5.0
Total Phenols (mg/L)	420.1	28 days	0.1
pH (units)	150.1	ASAP	0 – 14
Orthophosphate-P (mg/L)	365.3	48 hours	0.01
Total Phosphorus (mg/L)	365.3	28 days	0.05
Turbidity (NTU)	180.1	48 hours	1.0
Total Suspended Solids (mg/L)	160.2	7 days	1.0
Total Dissolved Solids (mg/L)	160.1	7 days	1.0
Volatile Suspended Solids (mg/L)	160.4	7 days	1.0
Total Organic Carbon (mg/L)	415.1	28 days	1.0
Biochemical Oxygen Demand (mg/L)	405.1	48 hours	4.0
Chemical Oxygen Demand (mg/L)	410.1	28 days	4.0
Total Ammonia-Nitrogen (mg/L)	350.2	28 days	0.1
Total Kjeldahl Nitrogen (mg/L)	351.3	28 days	0.1
Nitrite Nitrogen (mg/L)	300.0	48 hours	0.1
Nitrate Nitrogen (mg/L)	300.0	48 hours	0.1
Alkalinity, as CaCO3 (mg/L)	310.1	48 hours	5.0
Specific Conductance (µmhos/cm)	120.1	48 hours	1.0
Total Hardness (mg/L)	130.2	180 days	1.0
MBAS (mg/L)	425.1	48 hours	0.02
Chloride (mg/L)	300.0	48 hours	1.0
Fluoride (mg/L)	300.0	48 hours	0.1
Bacteria (MPN/100ml)			
Total Coliform	SM 9221B	6 hours	<20
Fecal Coliform	SM 9221B	6 hours	<20
Enterococcus	SM 9230C	6 hours	<20
Total and Dissolved Metals (µg/L)[1]			
Aluminum	200.8	180 days	100
Arsenic	200.8	180 days	0.5
Cadmium	200.8	180 days	0.25
Chromium	200.8	180 days	0.5
Copper	200.8	180 days	0.5
Iron	236.1	180 days	25
Lead	200.8	180 days	0.5
Nickel	200.8	180 days	1.0
Selenium	200.8	180 days	1.0
Silver	200.8	180 days	0.25
Zinc	200.8	180 days	1.0

1. Samples to be analyzed for dissolved metals are to be filtered within 48 hours.

Table 4.2 Analytical Methods, Holding Times, and Reporting Limits. (continued)

Analyte and Reporting Unit	EPA Method Number	Holding Time	Target Reporting Limit
Chlorinated Pesticides (µg/L)			
Aldrin	8081A	7 days	0.005
alpha-BHC	8081A	7 days	0.01
beta-BHC	8081A	7 days	0.005
delta-BHC	8081A	7 days	0.005
gamma-BHC (lindane)	8081A	7 days	0.02
alpha-Chlordane	8081A	7 days	0.1
gamma-Chlordane	8081A	7 days	0.1
4,4'-DDD	8081A	7 days	0.05
4,4'-DDE	8081A	7 days	0.05
4,4'-DDT	8081A	7 days	0.01
Dieldrin	8081A	7 days	0.01
Endosulfan I	8081A	7 days	0.02
Endosulfan II	8081A	7 days	0.01
Endosulfan sulfate	8081A	7 days	0.05
Endrin	8081A	7 days	0.01
Endrin Aldehyde	8081A	7 days	0.01
Heptachlor	8081A	7 days	0.01
Heptachlor Epoxide	8081A	7 days	0.01
Toxaphene	8081A	7 days	0.5
PCBs (µg/L)			
Aroclor-1016	8081A	7 days	0.5
Aroclor-1221	8081A	7 days	0.5
Aroclor-1232	8081A	7 days	0.5
Aroclor-1242	8081A	7 days	0.5
Aroclor-1248	8081A	7 days	0.5
Aroclor-1254	8081A	7 days	0.5
Aroclor-1260	8081A	7 days	0.5
Total PCBs	8081A	7 days	0.5
Organophosphate Pesticides (µg/L)			
Diazinon	8141A	7 days	0.01
Chlorpyrifos (Dursban)	8141A	7 days	0.05
Malathion	8141A	7 days	1.0
Prometryn	8141A	7 days	1.0
Atrazine	8141A	7 days	1.0
Simazine	8141A	7 days	1.0
Cyanazine	8141A	7 days	1.0

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5.0 RAINFALL AND HYDROLOGY

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5.0 RAINFALL AND HYDROLOGY

The four Long Beach stormwater runoff monitoring stations were fully operational at the end of September 2005 prior to the start of the 2005/2006 wet weather season. Precipitation and discharge were continuously monitored throughout the season.

An attempt was made to collect samples for a complete suite of water quality analytes during the first significant rains of the season. The first fully monitored storm occurred October 16 through October 18, 2005. Although this event represented the "first flush" of the season, a small event went through the Long Beach region during the third week of September. The October "first flush" event was forecasted as a moderate event that was anticipated to yield more than an inch of rainfall. Actual rainfall was half that forecast. As a result, there was insufficient sample volume at the Bouton Creek monitoring station to perform the full suite of tests and no discharge occurred at the Dominguez Gap Pump Station. Other than at the Dominguez Gap Pump Station, the following four wet weather events also yielded partial results due to the lack of anticipated runoff. Therefore, it took the first six monitored events of the season to satisfy all testing requirements at the Belmont Pump station, Cerritos Channel and Bouton Creek monitoring stations. Two events subsequent to the sixth event were also sampled at these three stations for total suspended solids analyses only. Discharge did not occur at the Dominguez Gap Pump Station until a 1.1-inch rain event that began on March 27, 2006. Discharge occurred at the Dominguez Gap Pump Station during only one other event, which took place on April 4, 2006. Alamitos Bay receiving waters were successfully sampled during the October "first flush" event (See Section 8.0).

5.1 Precipitation during the 2005/2006 Wet Weather Season

Unlike the 2004/2005 wet weather season, which was one of the wettest in recorded history for Southern California, the 2005/2006 season saw below normal precipitation, returning Southern California back to drought conditions. Normal precipitation for October through April at the Long Beach Airport is 12.27 inches. This season, a total of 7.76 inches of rainfall was recorded at the airport during the same period (Figure 5.1), resulting in a 4.51 inch deficit for the season or 60% of normal.

A direct comparison of daily rainfall measured at each site during the 2004/2005 and 2005/2006 wet weather seasons (Tables 5.1 through 5.4) clearly illustrates the large differences in rainfall over the past two years. Large differences are evident in terms of the number of days of precipitation, the daily precipitation totals, and monthly precipitation totals.

Rainfall was relatively uniform at each of the monitoring stations with seasonal totals ranging from 6.97 inches at the Bouton Creek to 6.25 inches at Cerritos Channel (Figure 5.1).

5.1.1 Monthly Precipitation

Below normal precipitation was recorded for most months during the 2005/2006 wet weather season (Figure 5.2). This is in stark contrast to the 2004/2005 season when this season's precipitation total fell by the end of December (Tables 5.1 through 5.4). Only October and April had above normal precipitation. Below normal precipitation was especially evident in November, December and January, which had less than 50% of normal.

5.1.2 Precipitation during Monitored Events

Precipitation during each storm event has been characterized by total rainfall, duration of rainfall, maximum intensity, days since last rainfall, and the magnitude of the event immediately preceding the monitored storm event (antecedent rainfall). Precipitation characteristics for each monitored event are summarized in Table 5.5. Cumulative descriptive statistics between fully monitored events (as opposed to TSS events only) for each monitoring station are presented in Table 5.6. Cumulative rainfall and intensity are summarized graphically for each fully monitored event at each station in Figures 5.3 through 5.28.

For the 2005/2006 wet weather season, rainfall during fully monitored events varied between 0.33 and 1.3 inches at the Belmont Pump Station, 0.18 and 1.25 inches at Bouton Creek, 0.25 and 1.14 inches at Cerritos Channel, and 0.98 and 1.13 inches at the Dominguez Gap Pump Station. Note that the rain gage at the Dominguez Gap Pump Station was unreliable towards the end of the season when the only discharge occurred. These bad data were substituted with Cerritos Channel rainfall data.

The mean rainfall total for all fully monitored events during the 2005/2006 wet weather station ranged from 0.61 inches at Cerritos Channel to 1.06 inches at the Dominguez Gap Pump Station. This is around half the mean rainfall totals that occurred during 2004/2005 monitored events.

Mean maximum rainfall intensities among fully monitored events (based on five minutes of data) ranged from 0.6 inches per hour at Bouton Creek and Cerritos Channel to 0.91 inches per hour at the Belmont Pump Station. Like mean total rainfall, mean maximum rainfall intensities during fully monitored events were much less than those that occurred during the 2004/2005 monitored events. Rainfall intensities briefly peaked at 1.68 inches per hour at the Belmont Pump Station during the February 17 through 19, 2006 event.

With one major exception, all storm events sampled for the full suite of analytes were spaced by about three or more days of no rainfall. The January 1 and 2 Cerritos Channel event was preceded by only about a day of dry weather. Overall, the mean period of dry conditions prior to fully monitored events ranged from 4.8 days at the Dominguez Gap Pump Station to 30.3 days at the Belmont Pump Station. With very little rain in November and December, the period prior to the event starting on December 31 was the driest for a fully monitored event.

5.2 Stormwater Runoff during Monitored Events

In order to properly estimate Event Mean Concentrations (EMCs) and constituent loadings, monitoring was designed to quantify rainfall events in their entirety and the majority of runoff created by those events. Table 5.7 summarizes flow characteristics among monitored events at each station including the duration of discharge/flow, total discharge volume, and peak discharge/flow. Table 5.6 provides descriptive statistics for all four fully monitored events during the 2005/2006 season. This information complements the calculated EMCs for each monitored analyte at these sites. Figures 5.3 through 5.28 graphically depict flow during each fully monitored event at each station in response to rainfall. These figures also show how the aliquoting of each composite sample was conducted and when grab samples were collected.

Flow duration or the period of discharge varied between stations and events. Flow duration was typically greatest at Bouton Creek due to tidal effects and Cerritos Creek due to the large drainage area. During incoming tides at Bouton Creek, low flows are backed up and held back by the tide. As the tide recedes,

stormwater is detected at the station using the conductivity sensors and sampling continues. In contrast, the period of discharge at the Dominguez Gap Pump Station is usually the smallest since most of the runoff from this drainage must fill a reservoir prior to discharge.

The duration of discharge reported in Tables 5.6 and 5.7 for the Belmont and Dominguez Gap pump stations are often overestimated because of the on and off cycling of the pumps. The discharge durations reported in these tables represent the period between the first time a pump came on to the time all pumps became silent. One should refer to the hydrographs developed for the pump stations for a better estimate of the duration of discharge.

For the 2005/2006 wet weather season, mean total flow or discharge for fully monitored events ranged from 367,000 cf at the Belmont Pump Station to 8,502,000 cf at Cerritos Channel. These volumes were less than half the mean total flow volumes recorded the previous wet weather season. For TSS only events, the per event total flow or discharge was as high as 524,000 cf at the Belmont Pump Station, 2,131,000 cf at Bouton Creek, and 16,344,000 cf at Cerritos Channel. Again, these peak values were substantial less than peak flow volumes experienced during the 2004/2005 wet weather season.

The percent storm captures (percentage of the total storm event volume effectively represented by the flow-weighted composite sample) were acceptable (>90%) in most cases. Loss of percent usually occurred toward the end of an event when flow levels were lower than the level of the sample intake or when time lapsed after a composite bottle was filled.

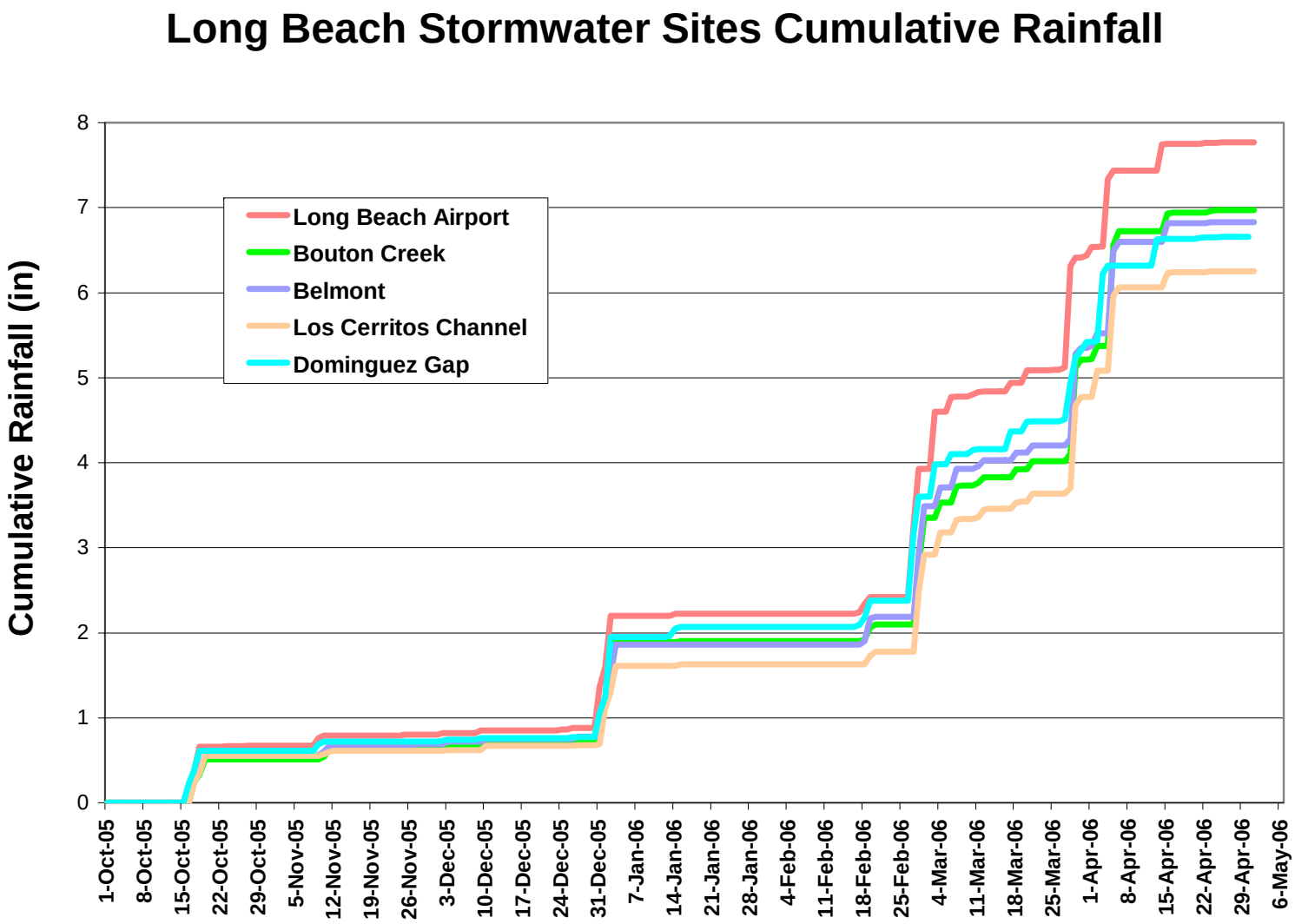

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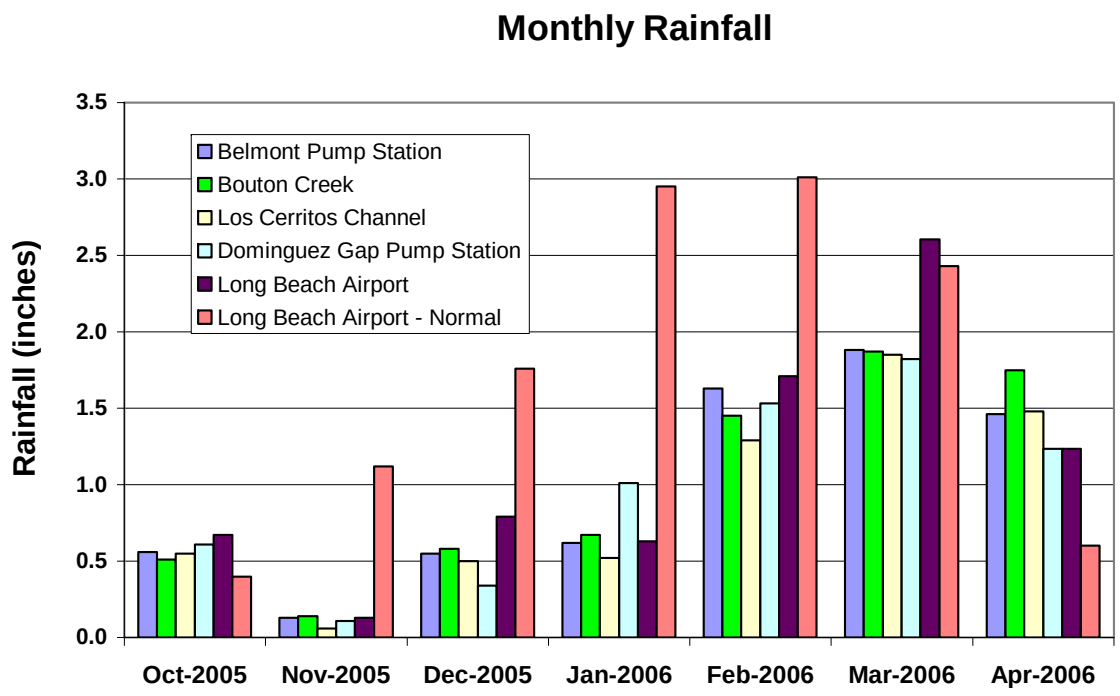
Figure 5. 1 Cumulative Rainfall for the 2005/2006 Wet Weather Season.



	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06
Belmont Pump Station	0.56	0.13	0.55	0.62	1.63	1.88	1.46
Bouton Creek	0.51	0.14	0.58	0.67	1.45	1.87	1.75
Los Cerritos Channel	0.55	0.06	0.50	0.52	1.29	1.85	1.48
Dominguez Gap Pump Station	0.61	0.11	0.34	1.01	1.53	1.82	1.24
Long Beach Airport	0.67	0.13	0.79	0.63	1.71	2.61	1.24
Long Beach Airport - Normal	0.40	1.12	1.76	2.95	3.01	2.43	0.60

Figure 5. 2 Monthly Rainfall Totals for the 2005/2006 Wet Weather Season and Normal Rainfall at Long Beach Daugherty Air Field.

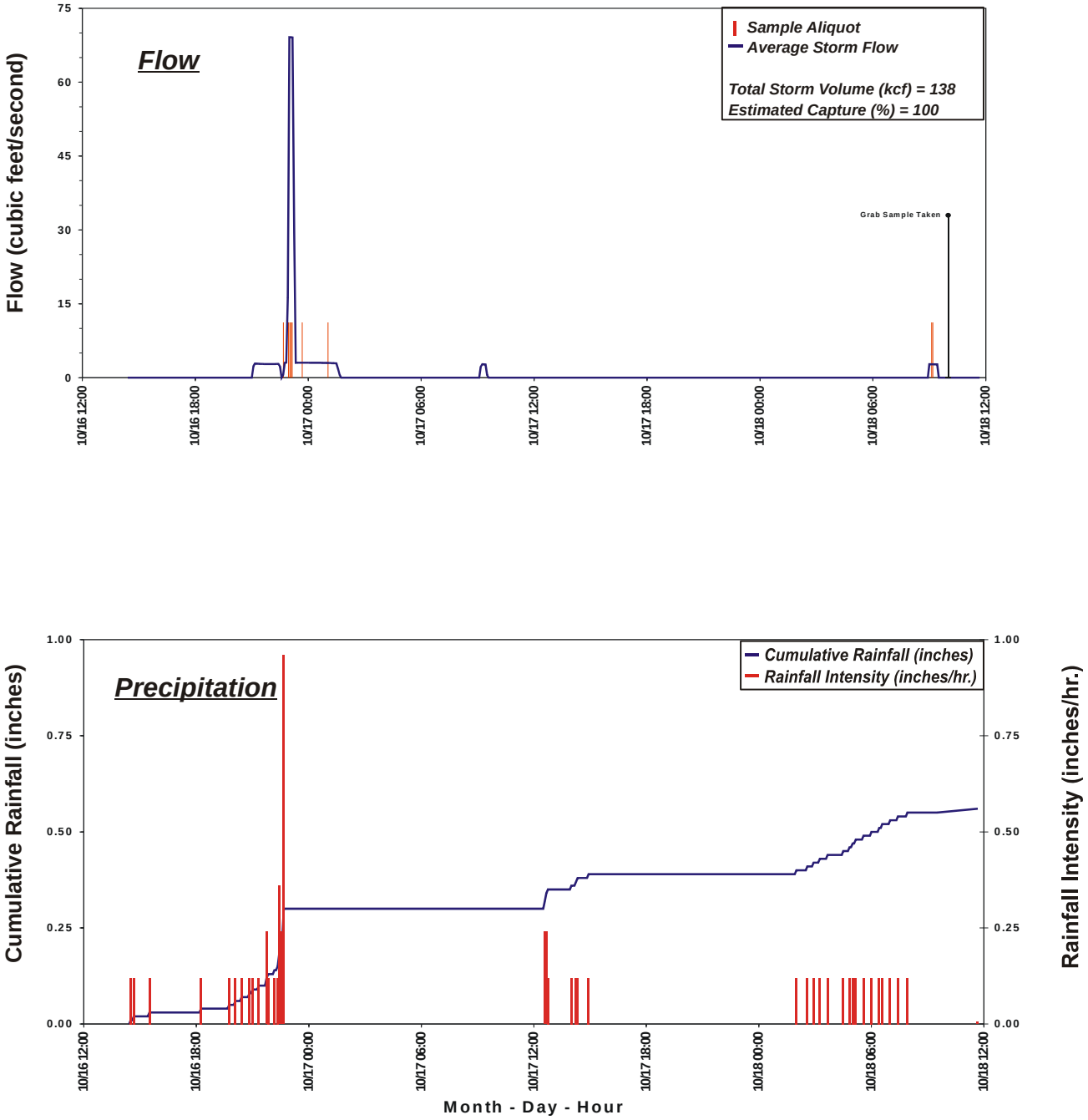


Figure 5.3. Belmont Pump Station – Event 1 (October 16 - 18, 2005 – Global Event 1).

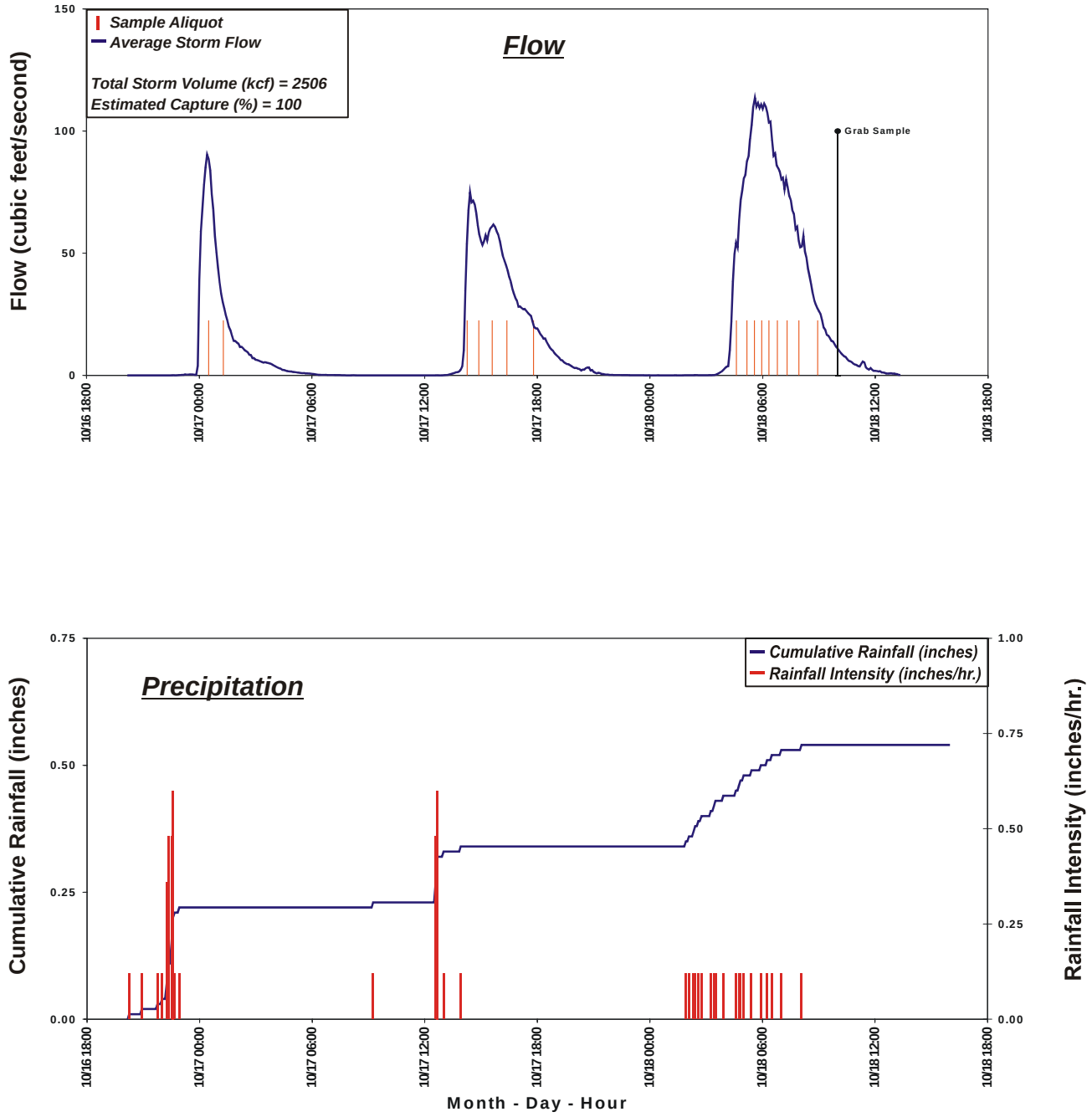


Figure 5.4 Los Cerritos Channel – Event 1 (October 16 - 18, 2005 – Global Event 1).

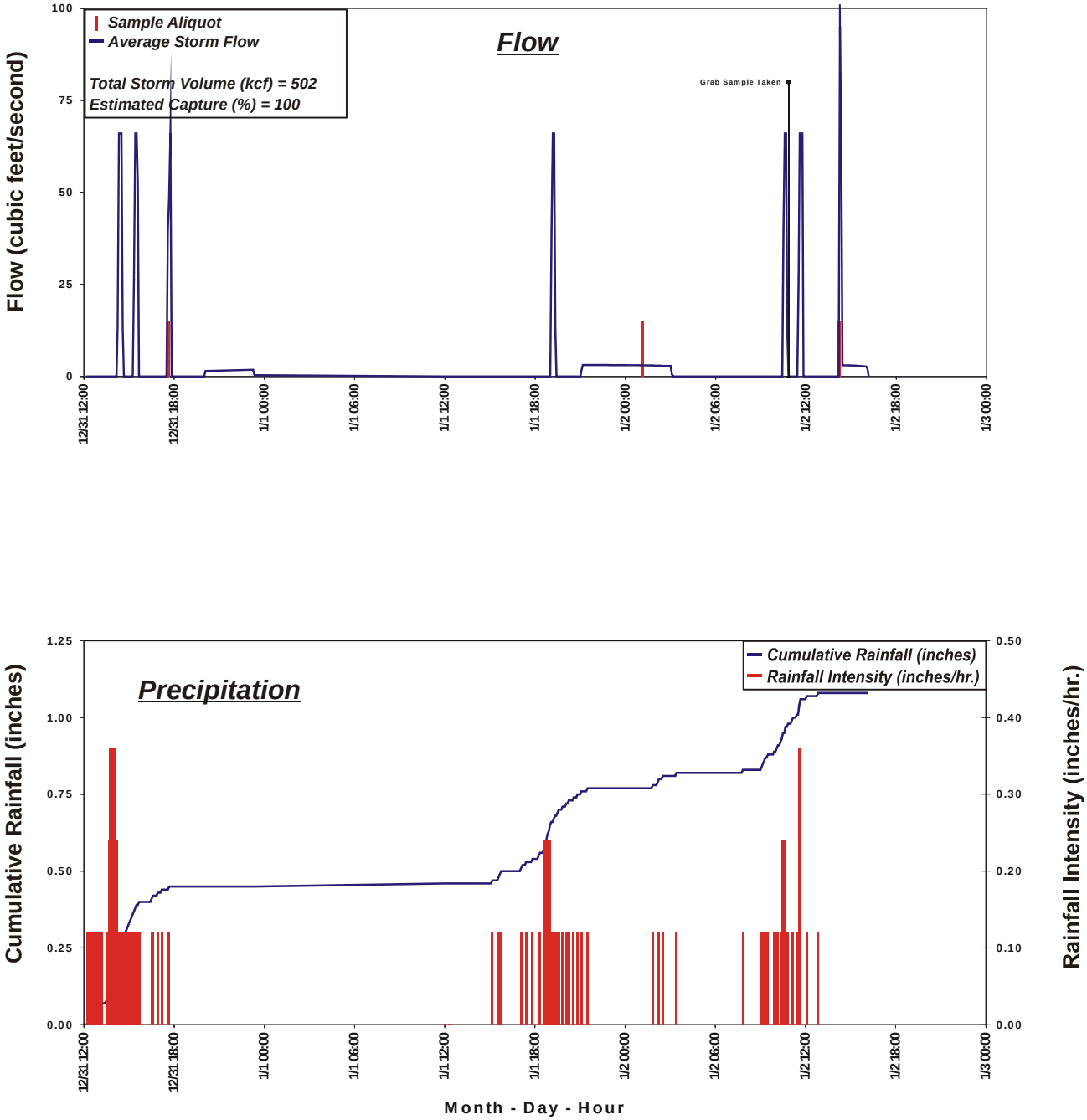


Figure 5.5 Belmont Pump Station – Event 2 (December 31, 2005 – January 3, 2006 – Global Event 2).

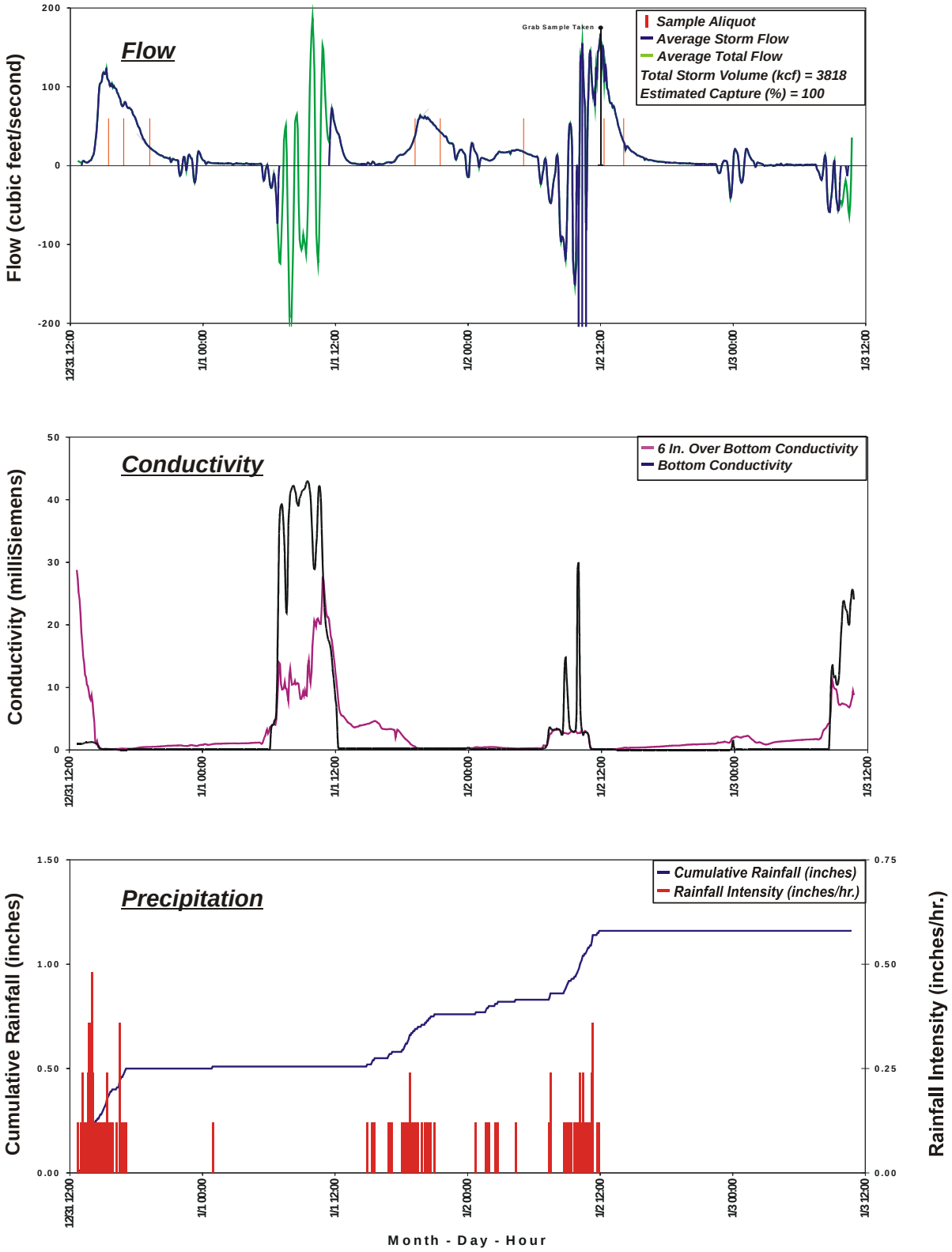


Figure 5.6 Bouton Creek – Event 1 (December 31, 2005 – January 3, 2006 – Global Event 2).

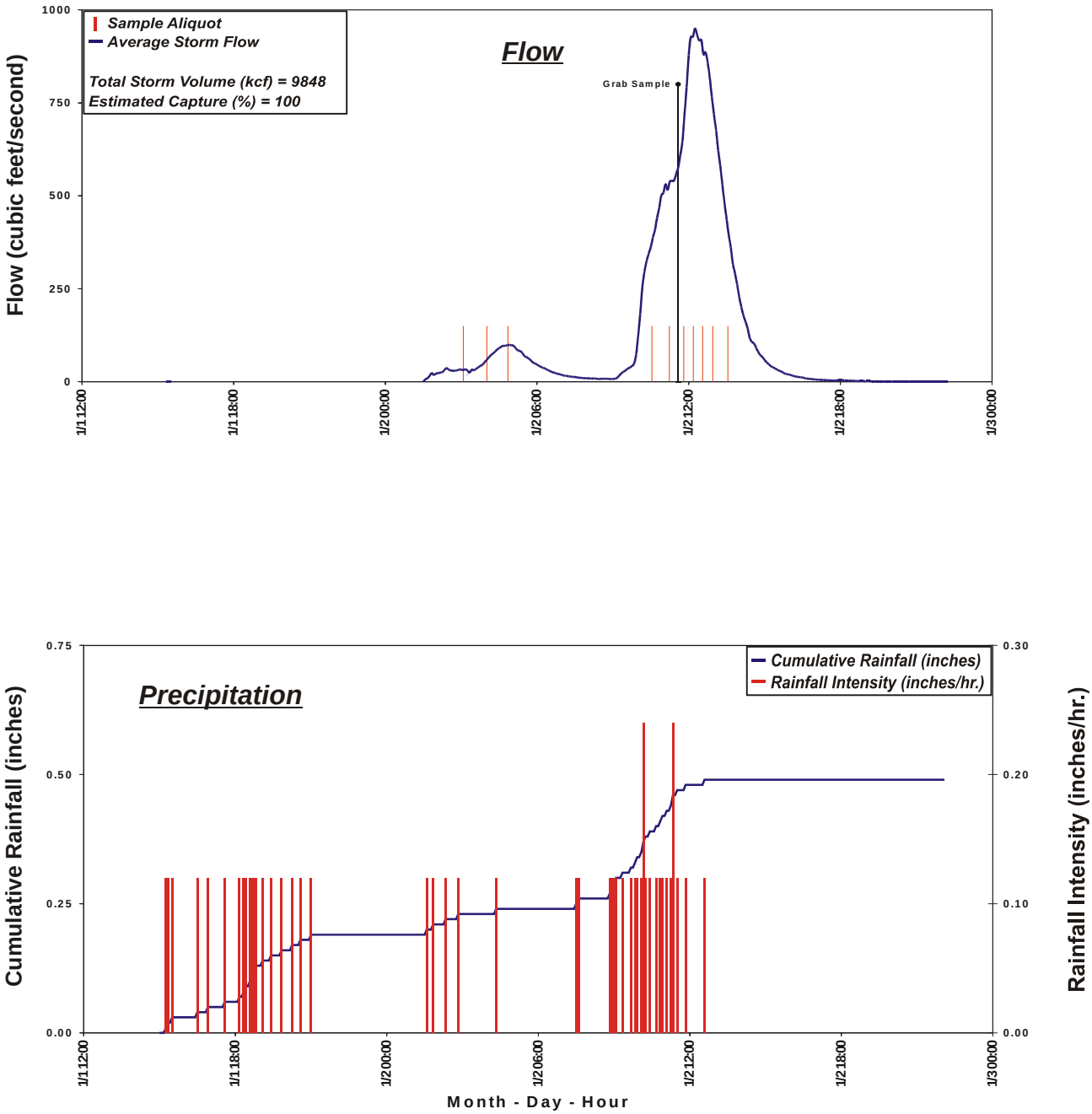
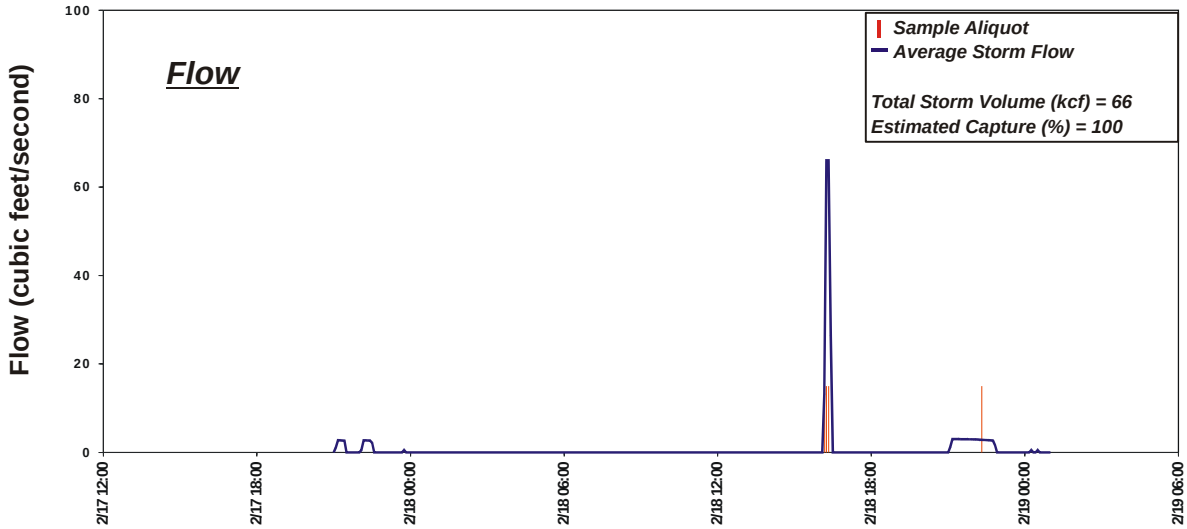


Figure 5.7 Los Cerritos Channel – Event 2 (January 1 and 2, 2006 – Global Event 2).



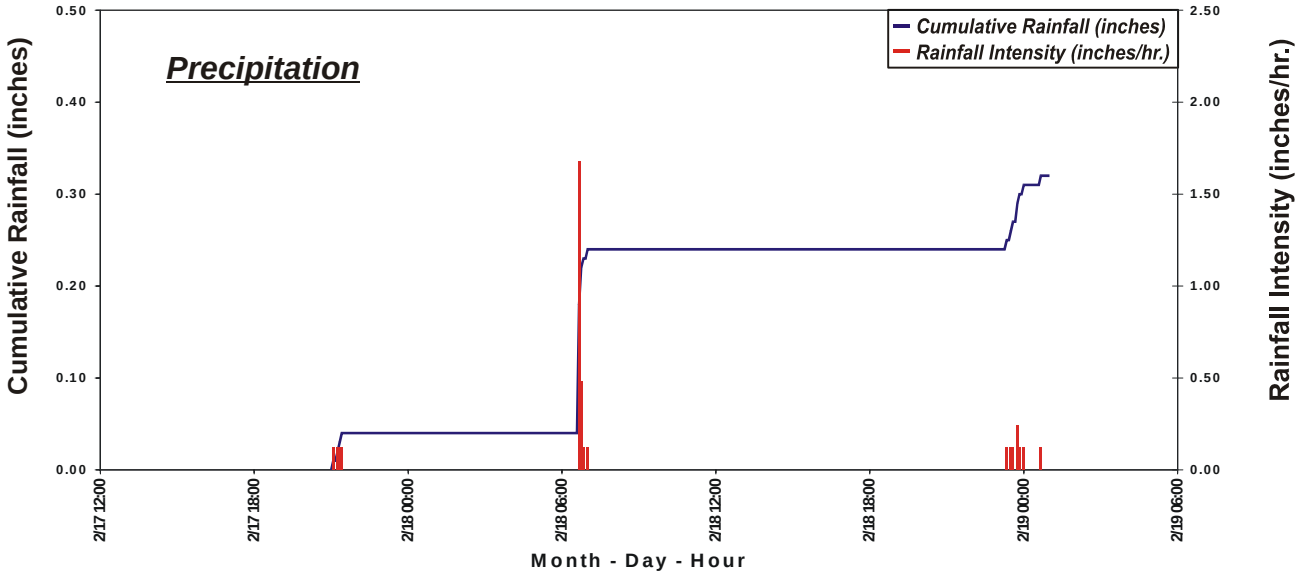


Figure 5.8. Belmont Pump Station – Event 3 (February 17 - 19, 2006 – Global Event 3).

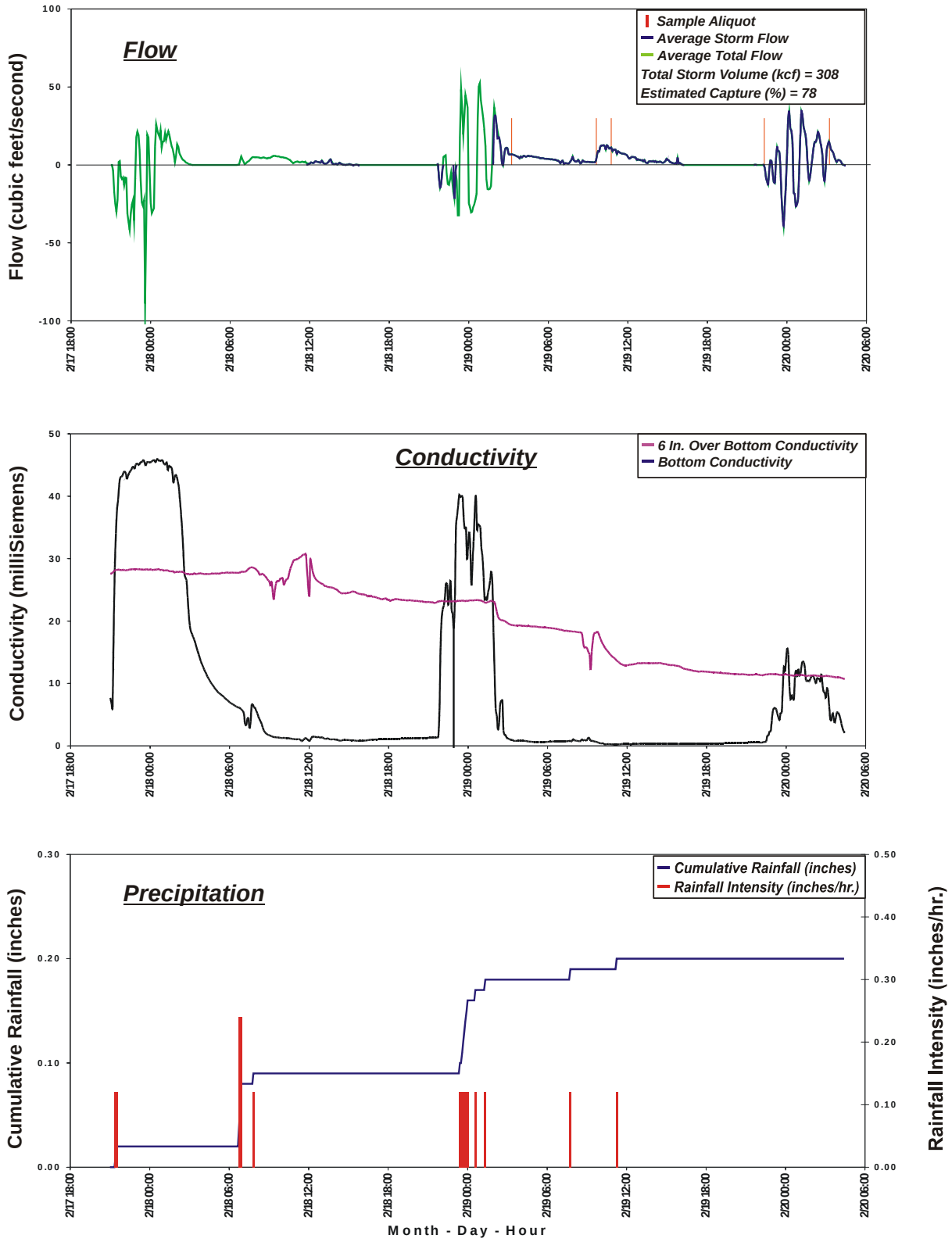


Figure 5.9 Bouton Creek – Event 2 (February 18 – 20, 2006 – Global Event 3).

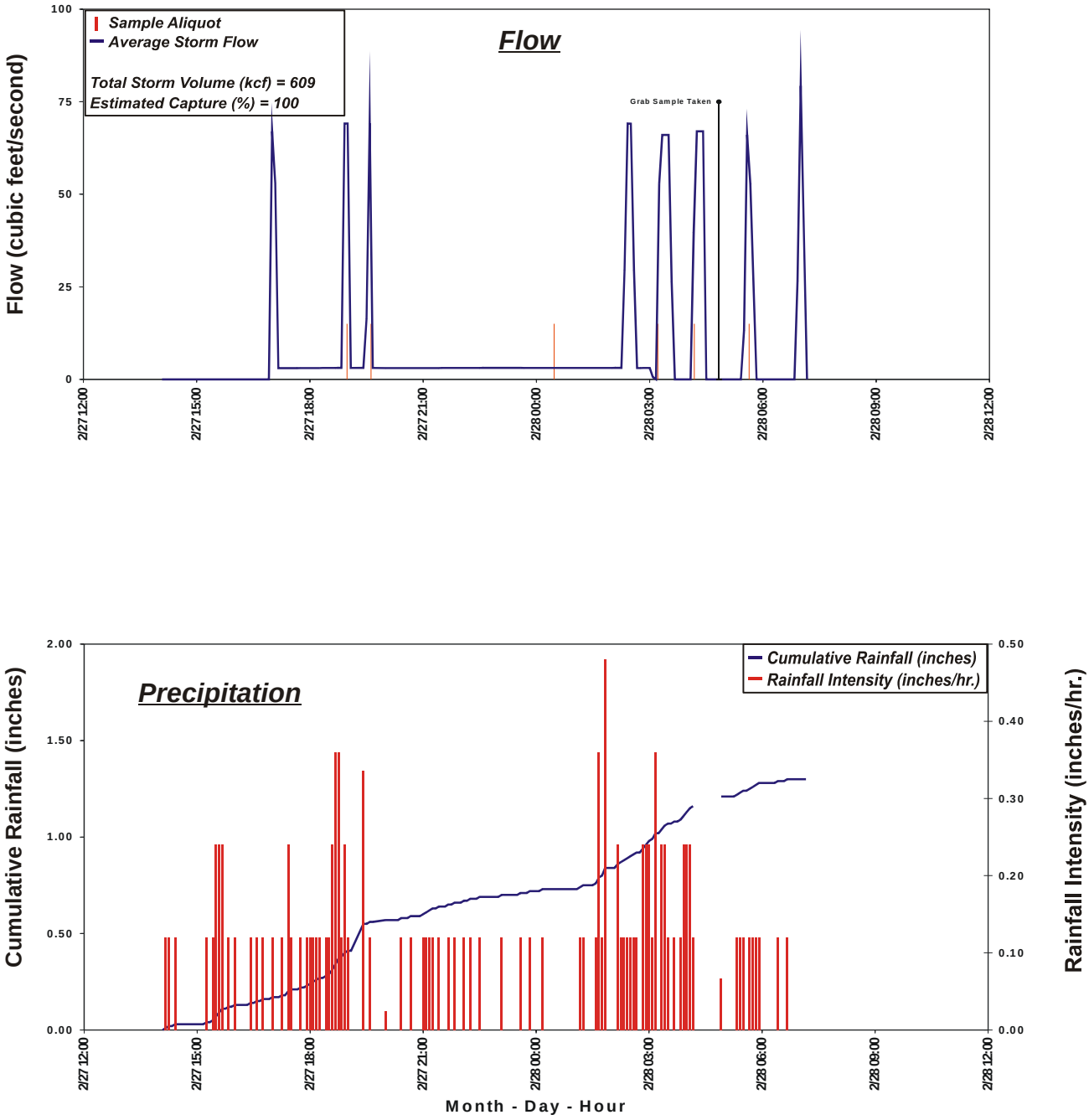


Figure 5.10 Belmont Pump Station – Event 4 (February 27 and 28, 2006 – Global Event 4).

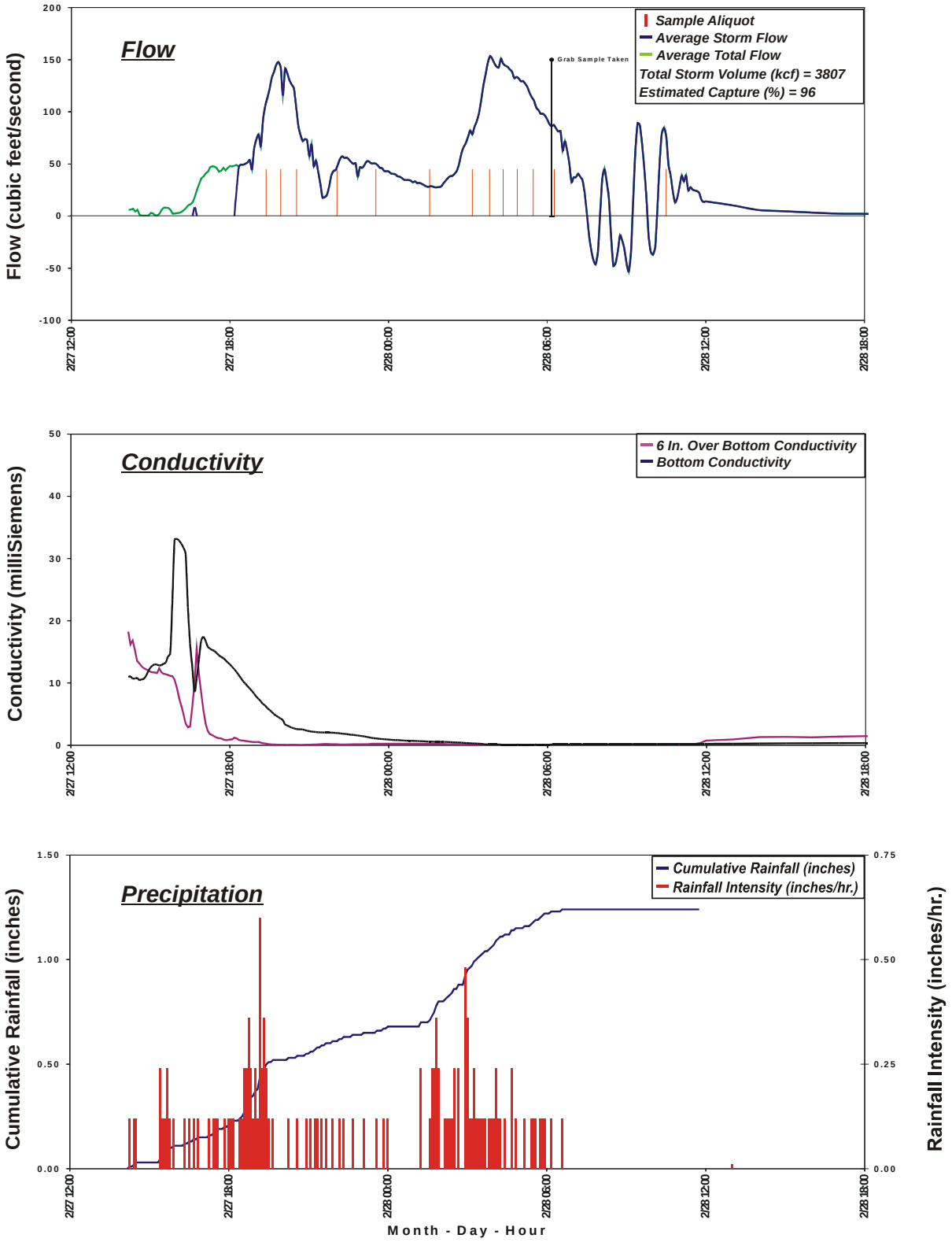


Figure 5.11 Bouton Creek – Event 3 (February 27 and 28, 2006 – Global Event 4).

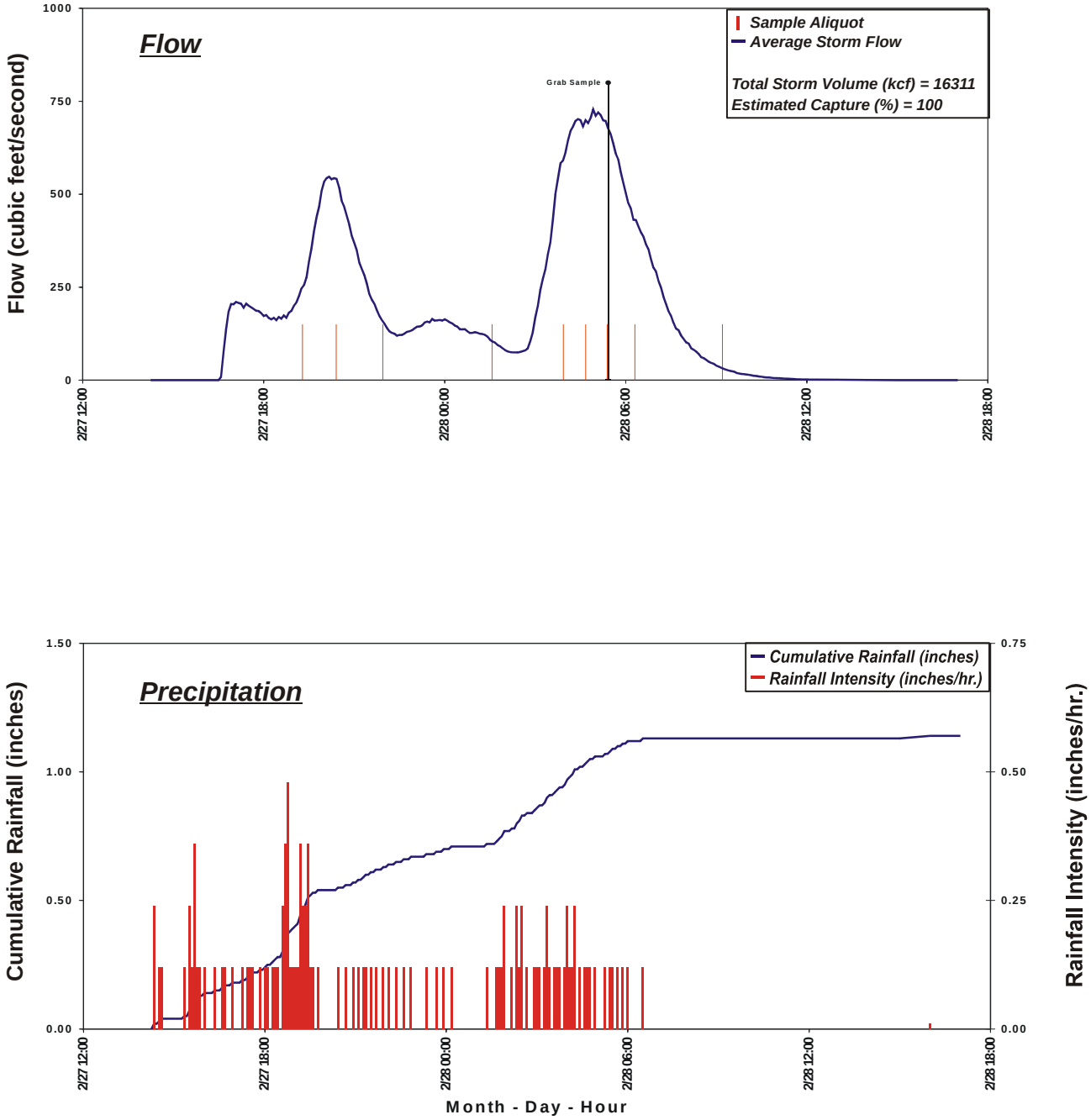


Figure 5.12 Los Cerritos Channel – Event 3 (February 27 and 28, 2006 – Global Event 4).

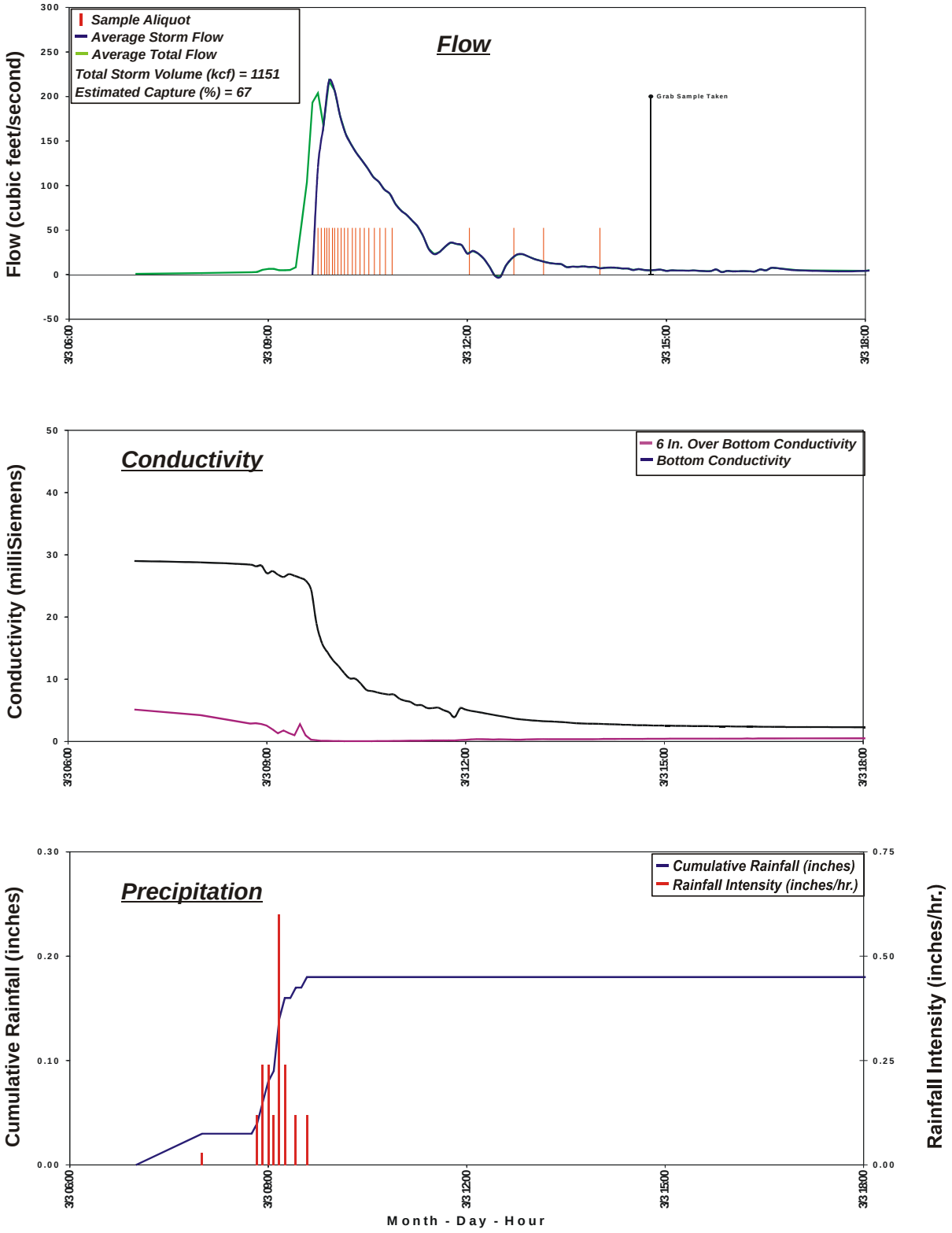
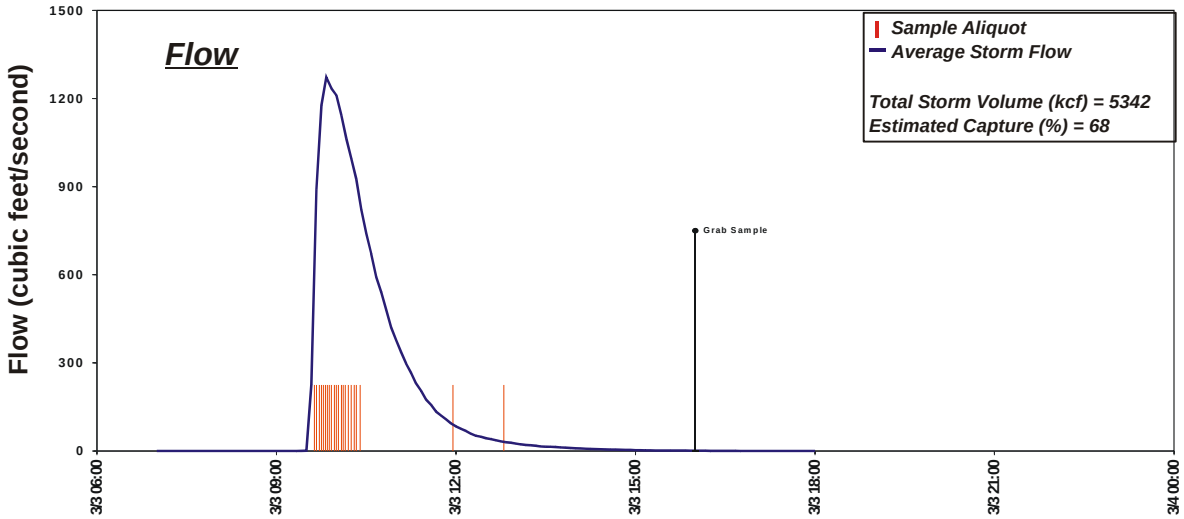


Figure 5.13 Bouton Creek – Event 4 (March 3 and 4, 2006 – Global Event 5).



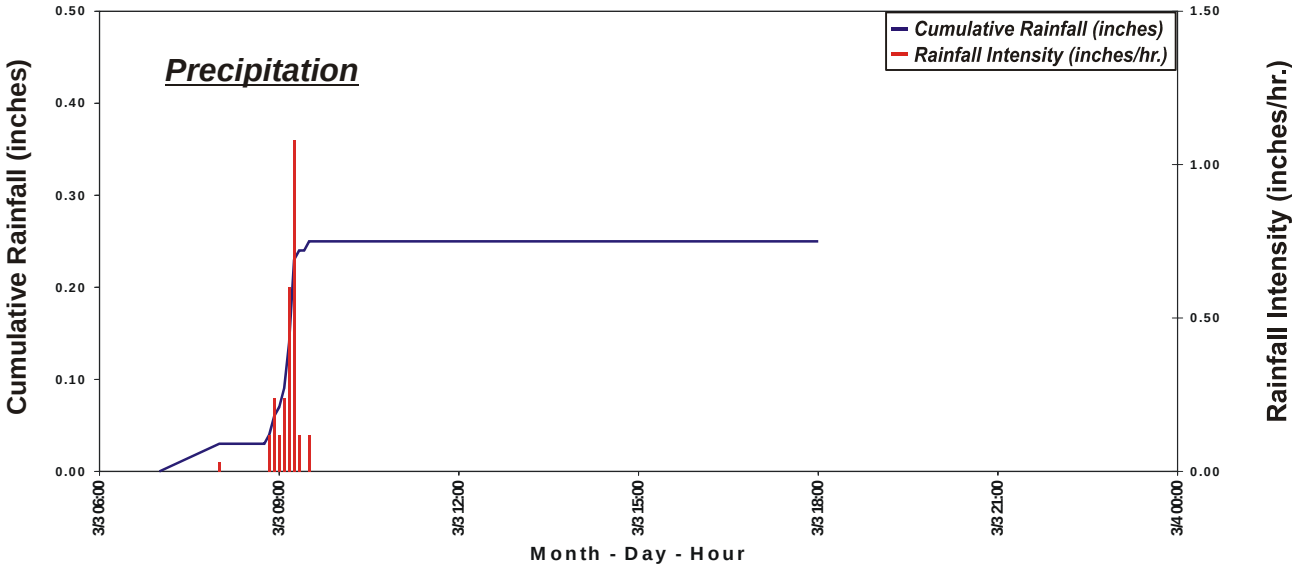


Figure 5.14 Los Cerritos Channel – Event 4 (March 3, 2006 – Global Event 5).

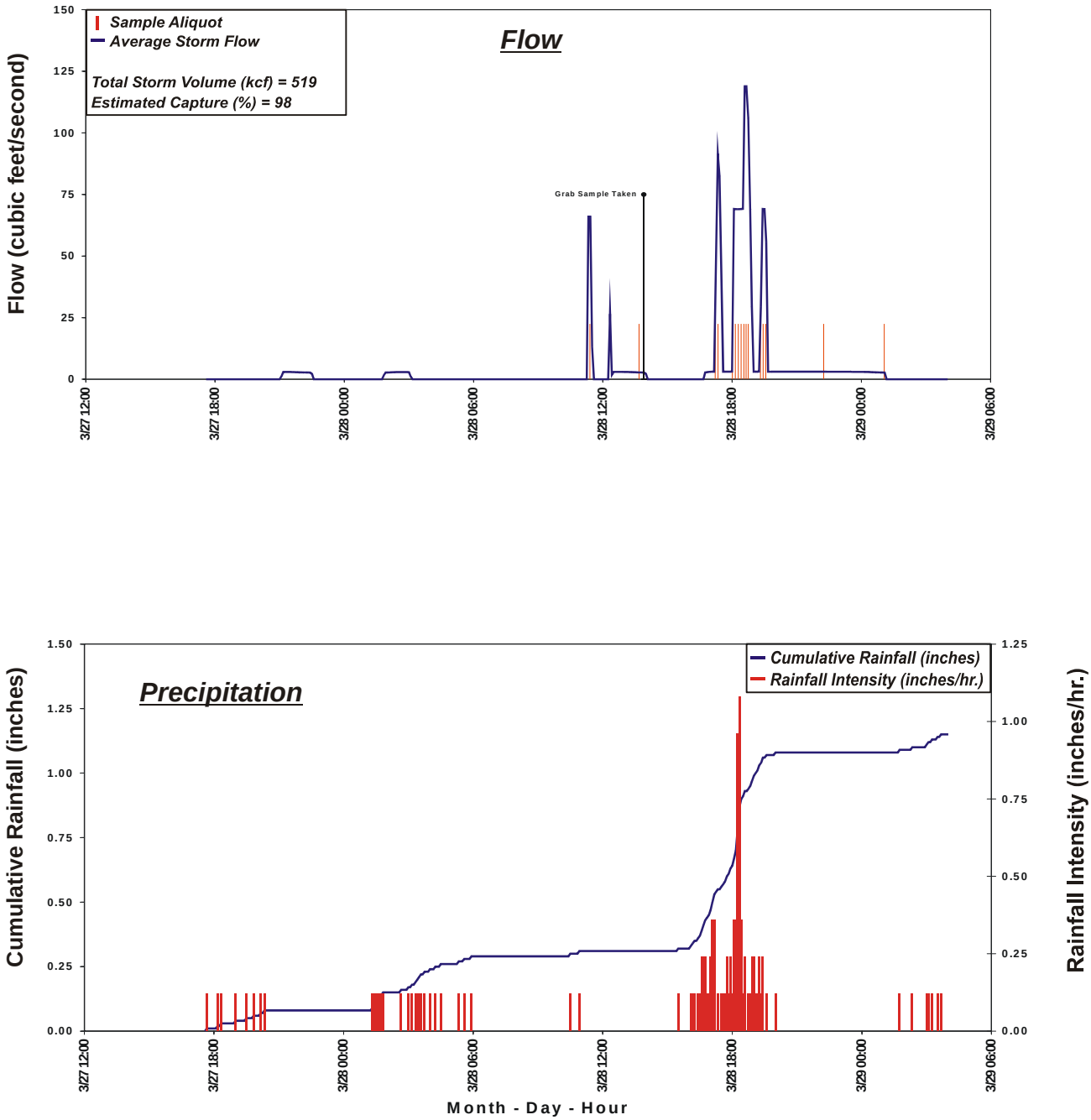


Figure 5.15 Belmont Pump Station – Event 5 (March 27 - 29, 2006 – Global Event 6)

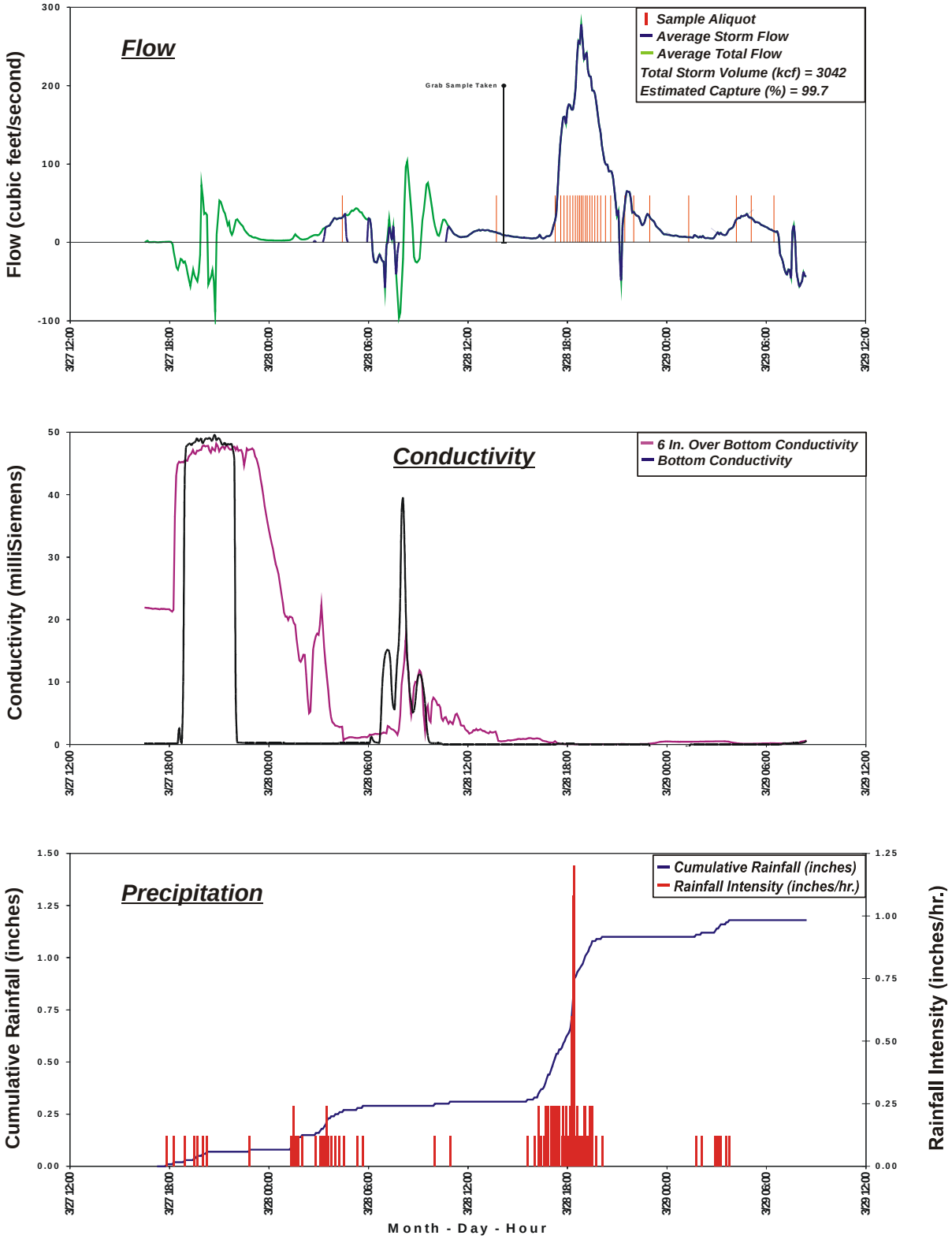


Figure 5.16 Bouton Creek – Event 5 (March 28 and 29, 2006 – Global Event 6)

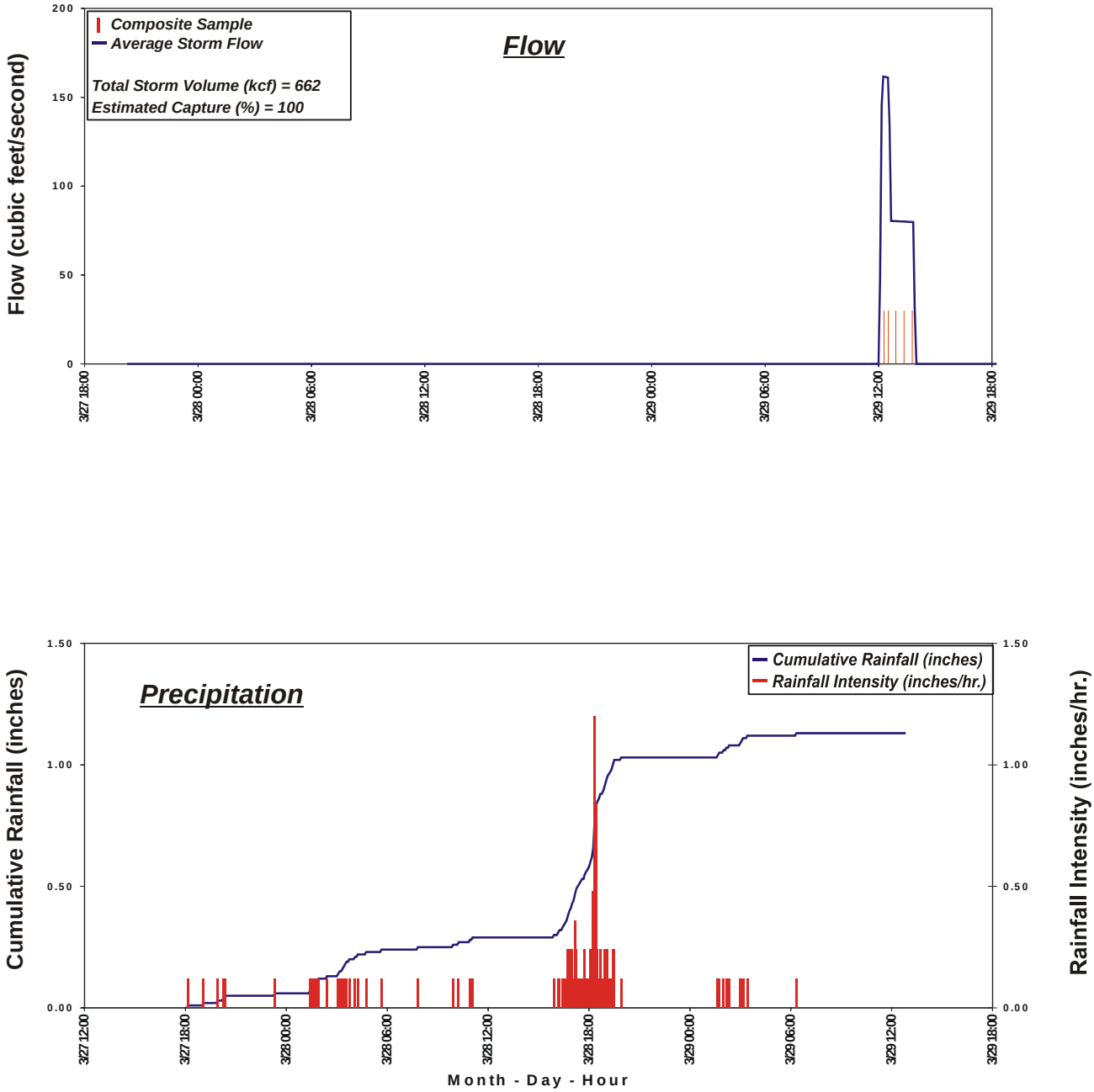


Figure 5.17 Dominguez Gap Pump Station – Event 1 (March 29 - 30, 2006 – Global Event 6).

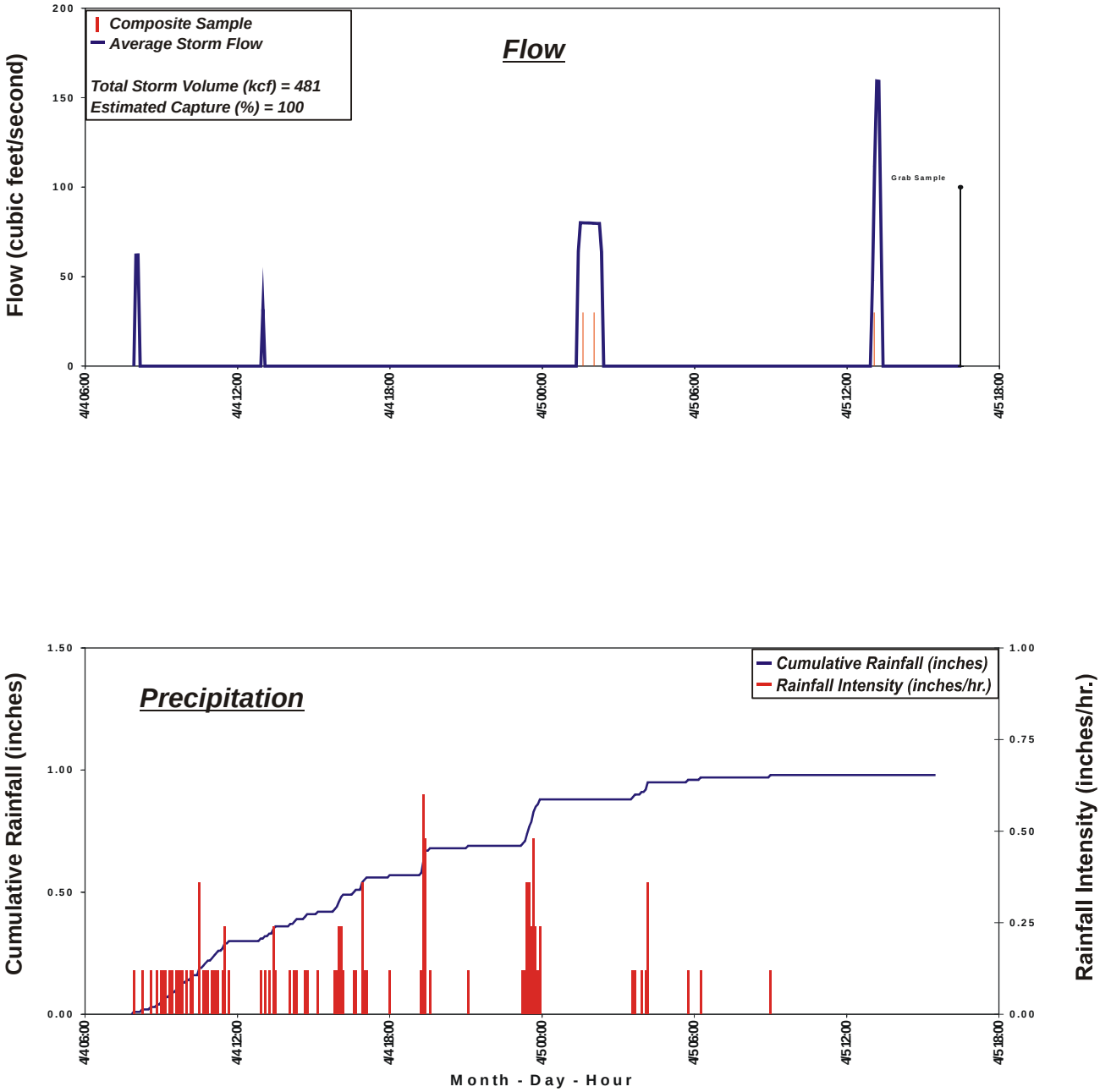


Figure 5.18 Dominguez Gap Pump Station – Event 2 (April 4 and 5, 2006 – Global Event 7).

Table 5.1 Daily Rainfall Data at Belmont Pump Station during the 2004/2005 and 2005/2006 Wet Weather Seasons.

	October		November		December		January		February		March		April		Season Total	
Day	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**	**2004/2005**	**2005/2006**
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00	0.58	0.00	0.02		
2	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.31	0.00	0.00	0.05	0.00	0.00	0.15		
3	0.00	0.00	0.00	0.00	0.00	0.03	0.15	0.31	0.00	0.00	0.00	0.00	0.00	0.00		
4	0.00	0.00	0.00	0.00	0.17	0.00	0.19	0.00	0.00	0.00	0.09	0.22	0.00	0.00		
5	0.00	0.00	0.00	0.00	0.39	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.97		
6	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11		
7	0.00	0.00	0.02	0.00	0.12	0.00	0.88	0.00	0.00	0.00	0.00	0.22	0.00	0.00		
8	0.00	0.00	0.01	0.00	0.06	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
9	0.00	0.00	0.00	0.00	0.00	0.00	2.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
10	0.00	0.00	0.00	0.04	0.00	0.03	0.99	0.00	0.02	0.00	0.00	0.00	0.00	0.00		
11	0.00	0.00	0.00	0.07	0.00	0.00	0.19	0.00	1.92	0.00	0.00	0.03	0.00	0.00		
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.07	0.00	0.00		
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
14	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22		
16	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
17	1.29	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00		
18	0.02	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.04	0.13	0.09	0.00	0.00		
19	0.11	0.17	0.00	0.00	0.00	0.00	0.00	0.00	1.43	0.27	0.10	0.00	0.00	0.00		
20	1.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.02	0.00	0.00	0.00	0.00		
21	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	2.33	0.00	0.00	0.08	0.00	0.00		
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	0.00	0.51	0.00	0.00	0.00		
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00	0.01		
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00		
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
26	1.11	0.00	0.00	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
27	0.64	0.00	0.05	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
28	0.01	0.00	0.00	0.00	1.11	0.00	0.47	0.00	0.00	0.72	0.06	0.08	0.63	0.00		
29	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00			0.00	1.00	0.00	0.00		
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.07	0.00	0.00		
31	0.00	0.00			0.50	0.00	0.00	0.00			0.00	0.00				
Total	5.05	0.56	0.53	0.13	2.99	0.55	5.89	0.62	8.48	1.63	0.94	1.88	0.78	1.46	24.66	6.83

Table 5.2 Daily Rainfall Data at Bouton Creek during the 2004/2005 and 2005/2006 Wet Weather Seasons.

	October		November		December		January		February		March		April		Season Total	
Day	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**	**2004/2005**	**2005/2006**
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.57	0.00	0.01		
2	0.00	0.00	0.00	0.00	0.00	0.00	0.94	0.26	0.00	0.00	0.03	0.00	0.00	0.15		
3	0.00	0.00	0.00	0.00	0.00	0.03	0.11	0.40	0.77	0.00	0.00	0.00	0.00	0.00		
4	0.00	0.00	0.00	0.00	0.14	0.00	0.15	0.00	0.00	0.00	0.23	0.18	0.00	0.00		
5	0.00	0.00	0.00	0.00	0.40	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.19		
6	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16		
7	0.00	0.00	0.03	0.00	0.08	0.00	0.77	0.00	0.00	0.00	0.00	0.19	0.00	0.00		
8	0.00	0.00	0.00	0.00	0.06	0.00	0.25	0.00	0.00	0.00	0.00	0.01	0.00	0.00		
9	0.00	0.00	0.00	0.00	0.00	0.00	2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
10	0.00	0.00	0.00	0.03	0.00	0.04	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
11	0.00	0.00	0.00	0.09	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.03	0.00	0.00		
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00		
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.21		
16	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01		
17	1.02	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
18	0.01	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.12	0.09	0.00	0.00		
19	0.15	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.14	0.06	0.00	0.00	0.00		
20	1.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.00	0.00		
21	0.02	0.00	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00		
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.58	0.00	0.00	0.00		
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.02		
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.01		
25	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
26	1.12	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.81	0.00	0.00	0.00	0.00	0.00		
27	0.54	0.00	0.05	0.02	0.00	0.01	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00		
28	0.01	0.00	0.00	0.00	1.17	0.00	0.44	0.00	0.00	0.68	0.06	0.08	0.72	0.00		
29	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00			0.00	1.02	0.00	0.00		
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.09	0.00	0.00		
31	0.00	0.00			0.71	0.00	0.00	0.00			0.00	0.00				
Total	4.75	0.51	0.42	0.14	3.23	0.58	6.11	0.67	3.44	1.45	1.11	1.87	0.87	1.75	24.83	6.97

Table 5.3 Daily Rainfall Data at Los Cerritos Channel during the 2004/2005 and 2005/2006 Wet Weather Seasons.

	October		November		December		January		February		March		April		Season Total	
Day	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**	**2004/2005**	**2005/2006**
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.44	0.00	0.00		
2	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.20	0.00	0.00	0.02	0.00	0.00	0.31		
3	0.00	0.00	0.00	0.00	0.00	0.01	0.11	0.30	0.00	0.00	0.00	0.00	0.00	0.00		
4	0.00	0.00	0.00	0.00	0.10	0.00	0.15	0.00	0.00	0.00	0.20	0.26	0.00	0.00		
5	0.00	0.00	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88		
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10		
7	0.00	0.00	0.03	0.00	0.05	0.00	0.82	0.00	0.00	0.00	0.00	0.15	0.00	0.00		
8	0.00	0.00	0.00	0.00	0.05	0.00	0.28	0.00	0.00	0.00	0.00	0.01	0.00	0.00		
9	0.00	0.00	0.00	0.00	0.00	0.00	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
10	0.00	0.00	0.00	0.02	0.00	0.05	0.92	0.00	0.02	0.00	0.00	0.00	0.00	0.00		
11	0.00	0.00	0.00	0.03	0.00	0.00	0.25	0.00	1.88	0.00	0.00	0.02	0.00	0.00		
12	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.09	0.00	0.00		
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00		
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
15	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.17		
16	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01		
17	0.78	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00		
18	0.02	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.06	0.07	0.00	0.00		
19	0.16	0.20	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.10	0.05	0.01	0.00	0.00		
20	1.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.05	0.01	0.00	0.00	0.00		
21	0.01	0.00	0.25	0.00	0.00	0.00	0.00	0.00	2.54	0.00	0.00	0.10	0.00	0.00		
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11	0.00	0.73	0.00	0.00	0.00		
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.01		
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00		
25	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
26	1.22	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
27	0.52	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
28	0.01	0.00	0.00	0.00	1.16	0.00	0.35	0.00	0.00	0.70	0.07	0.06	0.68	0.00		
29	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00			0.00	0.97	0.00	0.00		
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.10	0.00	0.00		
31	0.00	0.00			0.70	0.01	0.00	0.00			0.00	0.00				
Total	4.60	0.55	0.33	0.06	3.05	0.50	5.77	0.52	8.93	1.29	1.14	1.85	0.75	1.48	24.57	6.25

Table 5.4 Daily Rainfall Data at the Dominguez Gap Pump Station during the 2004/2005 and 2005/2006 Wet Weather Seasons.

	October		November		December		January		February		March		April		Season Total	
Day	2004	2005	2004	2005	2004	2005	2005	2006	2005	2006	2005	2006	2005	2006	2004/2005	2005/2006
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.42	0.00	0.10		
2	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.18	0.00	0.00	0.06	0.00	0.00	0.00		
3	0.00	0.00	0.00	0.00	0.00	0.01	0.54	0.71	0.00	0.00	0.01	0.00	0.00	0.01		
4	0.00	0.00	0.00	0.00	0.09	0.01	0.18	0.00	0.00	0.00	0.02	0.38	0.00	0.79		
5	0.00	0.00	0.00	0.00	0.47	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.10		
6	0.00	0.00	0.00	0.00	0.01	0.00	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
7	0.00	0.00	0.04	0.00	0.07	0.00	1.15	0.00	0.00	0.00	0.00	0.12	0.00	0.00		
8	0.00	0.00	0.00	0.00	0.05	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
9	0.00	0.00	0.00	0.00	0.00	0.00	1.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
10	0.00	0.00	0.00	0.08	0.00	0.02	0.68	0.00	0.02	0.00	0.00	0.00	0.00	0.00		
11	0.00	0.00	0.01	0.03	0.00	0.00	0.05	0.00	2.38	0.00	0.00	0.05	0.00	0.00		
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.01	0.00	0.00		
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
14	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.31		
15	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00		
16	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00		
17	0.78	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00		
18	0.02	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.02	0.09	0.21	0.00	0.00		
19	0.16	0.23	0.00	0.00	0.00	0.00	0.00	0.00	1.72	0.09	0.05	0.00	0.00	0.00		
20	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.20	0.00	0.00	0.00	0.00		
21	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.11	0.00	0.00		
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.80	0.01	0.00	0.01		
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.03	0.00	0.00	0.00		
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00		
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
26	0.79	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
27	0.50	0.00	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
28	0.01	0.00	0.00	0.00	2.21	0.00	0.39	0.00	0.00	0.80	0.10	0.02	0.94	0.00		
29	0.00	0.00	0.00	0.00	0.62	0.00	0.00	0.00			0.00	0.43	0.00	0.00		
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.29	0.00	0.00		
31	0.00	0.00			0.29	0.00	0.00	0.00			0.00	0.09				
Total	4.03	0.61	0.27	0.11	3.81	0.34	7.90	1.01	7.44	1.53	1.19	1.82	0.95	1.24	25.59	6.65

Table 5.5 Rainfall for Monitored Events during the 2005/2006 Wet-Weather Season.

Site/Event	Start Rain Date	Start Rain Time	End Rain Date	End Rain Time	Duration Rain (hrs:mins)	Total Rain (inches)	Max Intensity (Inches/hr)	Antecedent Rain (days)	Antecedent Rain (inches)	Sampling Code
Event 1										
BELMONT PUMP ST.	10/16/2005	14:30	10/18/2005	11:40	45:10:00	0.56	0.96	25.4	0.38	Full
BOUTON CREEK	10/16/2005	14:25	10/18/2005	18:00	51:35:00	0.51	0.60	26.1	0.33	TSS
CERRITOS CHANNEL	10/16/2005	20:15	10/18/2005	8:10	35:55:00	0.54	0.60	25.0	0.27	Full
Event 2										
BELMONT PUMP ST.	12/31/2005	12:15	1/2/2006	12:30	48:15:00	1.04	0.36	51.2	0.11	Full
BOUTON CREEK	12/31/2005	12:45	1/2/2006	11:55	47:10:00	1.16	0.48	73.8	0.51	Full
CERRITOS CHANNEL	1/1/2006	15:15	1/2/2006	12:35	21:20:00	0.49	0.24	0.9	0.43	Full
Event 3										
BELMONT PUMP ST.	2/17/2006	21:05	2/19/2006	4:30	31:25:00	0.33	1.68	46.4	1.04	Full
BOUTON CREEK	2/17/2006	21:25	2/19/2006	11:15	37:50:00	0.20	0.24	46.4	0.40	Full
CERRITOS CHANNEL	2/18/2006	6:45	2/19/2006	7:50	25:05:00	0.15	0.12	46.8	0.49	TSS
Event 4										
BELMONT PUMP ST.	2/27/2006	14:10	2/28/2006	6:40	16:30:00	1.30	0.48	8.4	0.33	Full
BOUTON CREEK	2/27/2006	14:15	2/28/2006	13:00	22:45:00	1.25	0.60	8.1	0.20	Full
CERRITOS CHANNEL	2/27/2006	14:20	2/28/2006	16:00	25:40:00	1.14	0.48	8.3	0.15	Full
Event 5										
BELMONT PUMP ST.	3/3/2006	8:00	3/3/2006	9:25	1:25:00	0.21	0.84	3.1	1.30	TSS
BOUTON CREEK	3/3/2006	8:00	3/3/2006	9:35	1:35:00	0.18	0.60	2.8	1.25	Full
CERRITOS CHANNEL	3/3/2006	8:00	3/3/2006	9:30	1:30:00	0.25	1.08	2.7	1.00	Full
Event 6										
BELMONT PUMP ST.	3/27/2006	17:40	3/29/2006	3:45	34:05:00	1.15	1.08	20.3	0.22	Full
BOUTON CREEK	3/27/2006	17:50	3/29/2006	3:45	33:55:00	1.18	1.20	6.7	0.10	Full
CERRITOS CHANNEL	3/27/2006	18:10	3/29/2006	6:20	36:10:00	1.13	1.20	6.8	0.10	TSS
DOMINGUEZ PUMP ST.	3/27/2006	19:10	3/29/2006	13:55	42:45:00	1.13	1.20	6.8	0.10	Full

Table 5.5 Rainfall for Monitored Events during the 2005/2006 Wet-Weather Season. (continued)

Site/Event	Start Rain Date	Start Rain Time	End Rain Date	End Rain Time	Duration Rain (hrs:mins)	Total Rain (inches)	Max Intensity (Inches/hr)	Antecedent Rain (days)	Antecedent Rain (inches)	Sampling Code
Event 7										
BELMONT PUMP ST.	4/4/2006	7:05	4/5/2006	6:45	23:40:00	1.08	0.60	2.9	0.16	TSS
BOUTON CREEK	4/4/2006	7:25	4/5/2006	10:05	26:40:00	1.35	0.84	2.9	0.16	TSS
CERRITOS CHANNEL	4/4/2006	7:55	4/5/2006	9:00	25:05:00	0.98	0.60	2.9	0.31	TSS
DOMINGUEZ PUMP ST.	4/4/2006	8:55	4/6/2006	9:00	48:05:00	0.98	0.60	2.9	0.31	Full
Event 8										
BELMONT PUMP ST.	4/14/2006	9:45	4/14/2006	23:30	13:45:00	0.22	0.36	9.1	1.08	TSS
BOUTON CREEK	4/14/2006	9:45	4/15/2006	0:35	14:50:00	0.22	0.12	9.0	1.35	TSS
CERRITOS CHANNEL	4/14/2006	10:00	4/15/2006	0:25	14:25:00	0.18	0.12	9.0	0.93	TSS

Sampling Codes
Full = Sampled for full suite of chemical constituents
TSS = Sampled for TSS only
MF = Sampler or other equipment malfunction

Table 5.6 Descriptive Statistics - Rainfall and Flow Data for Full Suite Events (2005/2006).

Site / Parameter	n	Min	Max	Mean	Standard Deviation	1st Quartile	Median	3rd Quartile
BELMONT PUMP ST.								
Duration Flow (days)	5	0.59	2.08	1.31	0.54	1.17	1.22	1.51
Total Flow (kcf)	5	66.0	609.0	367	246.4	138.0	502.0	519.0
Duration Rain (days)	5	0.69	2.0	1.5	0.52	1.3	1.4	1.9
Total Rain (in)	5	0.33	1.30	0.88	0.41	0.56	1.04	1.15
Max Intensity (in/hr)	5	0.36	1.68	0.91	0.53	0.48	0.96	1.08
Antecedent Dry (days)	5	8.4	51.2	30.3	18.0	20.3	25.4	46.4
Antecedent Rain (in)	5	0.11	1.04	0.42	0.36	0.22	0.33	0.38
BOUTON CREEK								
Duration Flow (days)	5	0.59	2.08	1.35	0.56	1.18	1.21	1.68
Total Flow (kcf)	5	308	3807	1762	1573	502	1151	3042
Duration Rain (days)	5	0.07	2.0	1.2	0.74	0.95	1.4	1.6
Total Rain (in)	5	0.18	1.25	0.76	0.53	0.20	1.04	1.15
Max Intensity (in/hr)	5	0.24	1.20	0.60	0.37	0.36	0.60	0.60
Antecedent Dry (days)	5	2.8	51.1	23.0	23.6	6.7	8.1	46.4
Antecedent Rain (in)	5	0.10	1.25	0.41	0.48	0.11	0.20	0.40
CERRITOS CHANNEL								
Duration Flow (days)	4	0.46	1.74	1.10	0.52	0.89	1.10	1.31
Total Flow (kcf)	4	2506	16311	8502	6020	4633	7595	11464
Duration Rain (days)	4	0.06	1.5	0.9	0.6	0.7	1.0	1.1
Total Rain (in)	4	0.25	1.14	0.61	0.38	0.43	0.52	0.69
Max Intensity (in/hr)	4	0.24	1.08	0.60	0.35	0.42	0.54	0.72
Antecedent Dry (days)	4	0.90	25.0	9.2	11.0	2.2	5.5	12.4
Antecedent Rain (in)	4	0.15	0.43	0.25	0.13	0.15	0.21	0.31
DOMINGUEZ GAP PUMP ST.								
Duration Flow (days)	2	0.95	1.35	1.15	0.28	1.05	1.15	1.25
Total Flow (kcf)	2	481	662	572	128	526	572	617
Duration Rain (days)	2	1.8	2.0	1.9	0.16	1.8	1.9	1.9
Total Rain (in)	2	0.98	1.13	1.06	0.11	1.02	1.06	1.09
Max Intensity (in/hr)	2	0.60	1.20	0.90	0.42	0.75	0.90	1.05
Antecedent Dry (days)	2	2.9	6.8	4.8	2.8	3.9	4.8	5.8
Antecedent Rain (in)	2	0.10	0.31	0.21	0.15	0.15	0.21	0.26

Table 5.7 Flow for Monitored Events during the 2005/2006 Wet Weather Season.

Site/Event	Start Flow Date	Start Flow Time	End Flow Date	End Flow Time	Flow or Discharge Duration (hrs:mins)	Total Flow (kcf)	No. of Sample Aliquots Collected	Peak Flow (cfs)	% Storm Capture	Peak Capture	Sampling Code
Event 1											
BELMONT PUMP ST.	10/16/2005	21:05	10/18/2005	9:13	36:08:00	138	9	69	100	Y	Full
BOUTON CREEK	10/16/2005	23:00	10/16/2005	23:30	0:30:00	49	1	41	100	Y	TSS
CERRITOS CHANNEL	10/16/2005	22:20	10/18/2005	16:00	41:40:00	2506	16	114	100	Y	Full
DOMINGUEZ PUMP ST.											ND
Event 2											
BELMONT PUMP ST.	12/31/2005	14:15	1/2/2006	16:10	49:55:00	502	3	95	100	Y	Full
BOUTON CREEK	12/31/2005	7:30	1/3/2006	10:25	74:55:00	3818	8	166	100	Y	Full
CERRITOS CHANNEL	1/1/2006	18:05	1/2/2006	22:15	28:10:00	9848	10	950	100	Y	Full
DOMINGUEZ PUMP ST											ND
Event 3											
BELMONT PUMP ST.	2/17/2006	21:05	2/19/2006	2:20	29:15:00	66	4	66	100	Y	Full
BOUTON CREEK	2/18/2006	12:00	2/20/2006	4:20	40:20:00	308	5	34	78	Y	Full
CERRITOS CHANNEL	2/18/2006	7:00	2/19/2006	16:10	33:10:00	815	2	159	100	Y	TSS
DOMINGUEZ PUMP ST											ND
Event 4											
BELMONT PUMP ST.	2/27/2006	17:00	2/28/2006	7:10	14:10:00	609	6	79	100	Y	Full
BOUTON CREEK	2/27/2006	16:40	2/28/2006	21:00	28:20:00	3807	13	153	96	Y	Full
CERRITOS CHANNEL	2/27/2006	16:20	2/28/2006	17:00	24:40:00	16311	9	728	100	Y	Full
DOMINGUEZ PUMP ST											ND
Event 5											
BELMONT PUMP ST.	3/3/2006	9:35	3/3/2006	10:05	0:30:00	58	4	66	100	Y	TSS
BOUTON CREEK	3/3/2006	9:45	3/4/2006	0:00	14:15:00	1151	24	217	67	Y	Full
CERRITOS CHANNEL	3/3/2006	8:55	3/3/2006	20:00	11:05:00	5342	22	1273	68	Y	Full
DOMINGUEZ PUMP ST											ND

Table 5.7 Flow for Monitored Events during the 2005/2006 Wet Weather Season. (continued)

Site/Event	Start Flow Date	Start Flow Time	End Flow Date	End Flow Time	Flow or Discharge Duration (hrs:mins)	Total Flow (kcf)	No. of Sample Aliquots Collected	Peak Flow (cfs)	% Storm Capture	Peak Capture	Sampling Code
Event 6											
BELMONT PUMP ST.	3/27/2006	21:05	3/29/2006	1:10	28:05:00	519	17	119	98	Y	Full
BOUTON CREEK	3/28/2006	2:45	3/29/2006	7:45	29:00:00	3042	29	278	99.7	Y	Full
CERRITOS CHANNEL	3/28/2006	1:50	3/29/2006	12:50	35:00:00	16344	15	1499	100	Y	TSS
DOMINGUEZ PUMP ST	3/29/2006	12:05	3/30/2006	10:55	22:50:00	662	5	162	100	Y	Full
Event 7											
BELMONT PUMP ST.	4/4/2006	10:45	4/5/2006	16:00	29:15:00	524	6	69	100	Y	TSS
BOUTON CREEK	4/4/2006	5:10	4/5/2006	17:00	35:50:00	2131	10	99	100	Y	TSS
CERRITOS CHANNEL	4/4/2006	9:20	4/5/2006	16:20	31:00:00	7802	7	545	100	Y	TSS
DOMINGUEZ PUMP ST	4/4/2006	8:00	4/5/2006	16:30	32:30:00	481	4	162	100	Y	Full
Event 8											
BELMONT PUMP ST.	4/14/2006	12:25	4/14/2006	22:45	10:20:00	59	3	68	100	Y	TSS
BOUTON CREEK	4/14/2006	12:55	4/15/2006	10:50	21:55:00	607	15	39	93	Y	TSS
CERRITOS CHANNEL	4/14/2006	12:25	4/15/2006	2:55	14:30:00	552	2	48	100	Y	TSS
DOMINGUEZ PUMP ST					0:00:00						ND

Sampling Codes
Full = Sampled for full suite of chemical constituents
TSS = Sampled for TSS only
MF = Sampler or other equipment malfunction
ND = No discharge

6.0 CHEMISTRY RESULTS

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6.0 CHEMISTRY RESULTS

6.1 Wet Weather Chemistry Results

A total of eight storm events were monitored during the 2005/2006 season (Table 6.1). Five storm events were monitored for the full set of analytical constituents at the Belmont Pump Station and Bouton Creek and four events were monitored for the full analytical suite at the Los Cerritos Channel site. Low stormwater composite volumes obtained during the February 19, 2006 storm event at the Belmont Pump Station and Bouton Creek sites limited the water quality analyses to a subset of the full analytical suite. Water volumes were also insufficient to conduct the toxicity tests. This necessitated sampling a fifth event at each site. Between three and four additional events were successfully monitored for TSS measurements at the Belmont Pump Station, Bouton Creek and Los Cerritos Channel sites. Low composite sample volumes at the Bouton Creek site required analyses to be limited to TSS for the first storm event of the season.

A total of two events were monitored from the Dominguez Gap Pump Station site this season. This site rarely discharges due to the large capacity of the site for infiltration. Over the course of the past seven years, discharges from this site have typically been limited to less than three events. In all cases, these events have occurred late in the storm season. This season the first event producing a discharge from the Dominguez Gap Pump Station occurred on March 29, 2006. The second event occurred shortly after this on April 5th, 2006.

The results of the chemical analysis of these composite and grab stormwater samples are summarized in Tables 6.2 through 6.6. Toxicity results for the composite samples and the receiving water samples from these monitored events are given in Section 7 below.

6.2 Wet Weather Load Calculations

Estimates of total pollutant loads associated with stormwater runoff during each storm event are provided in Tables 6.7 through 6.11. Load calculations were made by multiplying the measured concentration times the total stormwater discharge along with the appropriate unit conversion factors. The following calculation is an example of the process used for analytes such as TSS that are measured in mg/L. The specific example is for the first storm event at the Los Cerritos Channel site

$$(370 \text{ mg/L}) \times [(2506 \text{ kcf})(28317 \text{ L/kcf})] \times (1 \text{ pound}/453592 \text{ mg}) = 57{,}884 \text{ pounds}$$

Consistent with sound scientific practice, total pollutant loads are reported to two significant figures since all chemical data are also reported to two significant figures. Thus the total TSS load for the first event at the Los Cerritos Channel is reported as 58,000 pounds.

Among the four mass emission sites, the Los Cerritos Channel has consistently exhibited the highest overall loads of solids and total metals. Estimates of solids discharged in association with the 8 events at the Los Cerritos Channel ranged from 3,300 to 140,000 pounds. Estimates of total copper ranged from 7.2 to 22 pounds for the four events that included all analytes. In contrast, the Belmont Pump Station which has the smallest catchment area was estimated to discharge between 120 and 9,100 pounds of solids in association with eight events. The load of total copper discharged from the Belmont Pump Station during the five fully monitored events ranged from 0.45 to 3.1 pounds.

Loading estimates for solids from the Dominguez Gap Pump Station continue to be substantially lower than all other sites. Total solids loads during the two monitored events were 420 and 1100 pounds (Table 6.10). Estimated loads of total recoverable metals such as copper and lead were among the lowest encountered at all mass emission sites.

6.3 Dry Weather Chemistry Results

The NPDES Permit requires that two dry weather inspections and sampling events are to be conducted each year. These surveys are conducted during the summer dry weather period at each of the four mass emission stations. A total of 12 dry weather surveys have now been conducted since issuance of the permit in 1999 (Table 6.12). Events 13 and 14 conducted during the 2005/2006 season are shaded. Field measurements are provided in Table 6.13 for the 2005/2006 season. Chemical analyses performed in the laboratory are summarized in Table 6.14 for the 2005/2006 season.

6.3.1 Basin 23: Belmont Pump Station Monitoring Site

Time-weighted composite sampling was conducted over a 24-hour period starting on August 17, 2005 and ending on August 18, 2005. Samples were collected from the sump using the automated sampler installed inside of the pump house. Samples were collected into 20-liter borosilicate bottles. Every half-hour for 24 hours, an aliquot of approximately 0.75 liters of water was pumped from the sump into a 20-liter bottle. The bottles were changed every 12 hours and chilled to 4°C with ice during sampling and transportation. Following completion of the sampling, the bottles of water were combined into a composite. Upon completion of the 24-hour sampling, on August 18, 2005 at 7:40 a.m., grab samples for TPH and bacteria were manually collected from the sump.

During the second dry weather event a composite was taking during the evening of May 10, 2006 over a 15 minute period beginning at 10:05 p.m. while the maintenance pump was running. Grab samples for TPH and bacteria were manually collected from the sump on May 11, 2006 at 9:30 a.m. after the level of the water in the sump had somewhat recovered during the nighttime hours. The reason the manual grab samples were not collected immediately after the composite grab sample was collected on May 10th was due to the need to maintain a maximum six hour holding time for the bacteria samples. Laboratories are not available during night time hours.

6.3.2 Basin 20: Bouton Creek Monitoring Site

Bouton Creek was sampled 2-3 hours after the low tide on August 18, 2005 from 7:25 to 7:40 a.m. and on May 11, 2006 from 7:04 to 7:19 a.m. At these times, flow in the creek was not impeded by seawater backing into the creek. This assured that the flow was fresh water flowing downstream and that the saline tidal water did not commingle with the dry weather discharge of fresh water.

Continuous sampling over a period of 15 minutes was performed to collect water from the Creek when the effects of residual salinity in the channel were minimized. Samples were collected from the creek and deposited into one 20-liter borosilicate glass bottle using the pump on the automatic sampler operating in manual mode. Grab samples for TPH and bacteria were collected following the pumped sampling on August 18, 2005 at 7:40 am and on May 11, 2006 at 7:30 am.

6.3.3 Portions of Basins 18, 19, 27 and 29: Los Cerritos Channel Monitoring Site

Time-weighted composite sampling of the water flowing down the channel was conducted over a 24-hour period. Sampling began on August 17, 2005 and ended on August 18, 2005. A separate sampling event began on May 10, 2006 and ended on May 11, 2006.

Samples were taken from the middle of the channel using the automated sampler installed on the bank of the channel. Dry weather flows consisted of a shallow, narrow stream located near the middle of the channel. To reach the water, the sampling hose that is used for sampling storm water was extended an additional 33-38 feet to reach the low flow channel. Every half-hour for 24 hours, an aliquot of approximately 0.75 liters of water was pumped into a 20-liter bottle. The bottles were changed every 12 hours and chilled to 4°C with ice during sampling and transportation. Following completion of the sampling, the bottles of water were combined into a composite sample. Grab samples were manually collected for TPH and bacteria at the end of the 24-hour sampling on August 18, 2005 at 9:20 am and at the end of the 24-hour sampling on May 11, 2006 at 10:50 am.

When the sample bottles were changed at 8:10 p.m. on the evening of August 17, 2005 it was noted in the log that the water extended completely across the Cerritos Channel to a depth of 8 inches. When the second sample bottle was retrieved on the morning of August 18th the flow was back to its normal dry weather depth and location in the center of the channel. Subsequent investigation revealed that the tide on the evening of the 17th was nearly, if not the actual, highest tide of the entire 2005 and 2006 years. The full channel is surmised to have been due to water being backed up by the tide. This is corroborated by the elevated conductivity measurement that was associated with the composite sample.

6.3.4 Basin 14: Dominguez Gap Monitoring Site

Inspections for dry weather flow were conducted at the Dominguez Gap Pump Station on August 17, 2005 and on May 10, 2006. No dry weather flow was observed on either occasion.

Table 6.1 Monitored Storm Events, 2005/2006.

Global Event	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7	Event 8
Date	18-Oct-05	02-Jan-06	19-Feb-06	28-Feb-06	03-Mar-06	29-Mar-06	05-Apr-06	15-Apr-06
Belmont Pump	S-1	S-2	S-3	S-4	TSS-1	S-5	TSS-2	TSS-3
Bouton Creek	TSS-1	S-1	S-2	S-3	S-4	S-5	TSS-2	TSS-3
Los Cerritos Channel	S-1	S-2	TSS-1	S-3	S-4	TSS-2	TSS-3	TSS-4
Dominguez Gap	-	-	-	-	-	S-1	S-2	-

S=Full Storm Composites
TSS=Storm Events monitored for TSS only

Table 6.2 Belmont Pump Station Stormwater Chemistry Results: 2005/2006.

Analytical Parameter	18-Oct-05	2-Jan-06	19-Feb-06	28-Feb-06	29-Mar-06
Conventionals (mg/L) *unless noted*					
pH (pH Units)	8.01	8.24	**8.93**[2]	**6.4**[2]	7.55
Conductivity (µmhos/cm)	230	120	500	76	94
Alkalinity as CaCO3	49	27	61	18	20
Hardness as CaCO3	52	32	73	18	18
Biochemical Oxygen Demand	68	16	33	8.9	7.6
Chemical Oxygen Demand	220	180	160	62	79
Total Organic Carbon	27	14	25	9.5	7.3
Chloride	30	19	79	7.7	11
Fluoride	0.25	0.11	0.31	0.059J	0.073J
MBAS	0.055	0.1U	0.29	0.098J	0.11
Oil and Grease	4.2J	4.5J	-	2.4J	5.1
Total Ammonia (as N)	0.79	0.49	0.56	0.34	0.35
Total Kjeldahl Nitrogen	3.9	3.4	4.1	1.1J+	1
Nitrate (as N)	1.4	0.65	2.1	0.56	0.43
Nitrite (as N)	0.091J	0.1U	0.1U	0.1U	0.1U
Total Orthophosphate (as P)	0.51	0.37	0.25	0.24	0.19
Total Phosphorus	1.7	1.3	0.88	0.81	0.53
Total Recoverable Phenolics	0.1U	0.1U	0.1U	0.1U	0.1U
Total Dissolved Solids	150	88	340	60	65
Total Suspended Solids	650	290	210	61	100
Total Volatile Solids	170	92	73	28	31
Turbidity (NTU)	100	140	76	30	44
Dissolved Metals (µg/L)					
Aluminum	100U	12J	15J	27	28
Arsenic	2.8	0.79	1.9	1.1	1.2
Cadmium	0.063J	0.069J	0.1J	0.033J	0.031J
Chromium	0.92	0.42J	0.63	0.68	0.74
Copper	**11**[5,6]	**7.9**[5,6]	**18**[5,6]	**9.2**[5,6]	**8.7**[5,6]
Iron	140	83	68	37	54
Lead	**1.4**[5]	**0.83**[5]	**0.74**	**0.49**[5]	**0.67**[5]
Nickel	5.2	3	5.4	1.8	1.7
Selenium	1U	1U	0.38J	1U	1U
Silver	0.2UJ	0.5UJ	0.5U	0.5U	0.2U
Zinc	**90J**[5,6]	**110**[5,6]	**110**[5,6]	**51**[5]	**42**[5]
Total Metals (µg/L)					
Aluminum	**6100**[2,7]	**6800**[2,7]	**5000**[2,7]	**1600**[2,7]	**2400**[2,7]
Arsenic	4.9	2.1	4.6	1.8	2.2
Cadmium	1.4	1.5	1.3	0.32	0.52
Chromium	13J+	17	13	4	6.2
Copper	**81**[1]	**100**[1]	**110**[1]	**32**[1]	**44**[1]
Iron	11,000	12,000	7000	2100	3300
Lead	**82**[1]	**60**[1]	**51**[1]	**15**[1]	**30**[1]
Nickel	16	18	18	5.7	7.4
Selenium	0.34J	0.4J	0.76J	1U	0.89J
Silver	0.2J+	0.5U	0.5U	0.056J	0.066J
Zinc	**R**	**650**[1]	**620**[1]	**180**[1]	**290**[1]

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.2 Belmont Pump Station Stormwater Chemistry Results: 2005/2006. (continued)

Analytical Parameter	18-Oct-05	2-Jan-06	19-Feb-06	28-Feb-06	29-Mar-06
Bacteria (MPN/100 ml)					
Enterococcus	**174,000[2]**	**23,300[2]**	-	**7500[2]**	**4100[2]**
Fecal Coliform	**>1,600,000[1,2]**	**13,000[1,2]**	-	**3000[1,2]**	**160,000[1,2]**
Total Coliform	**>1,600,000[1,2]**	**>160,000[1,2]**	-	**30,000[1,2]**	**160,000[1,2]**
Aroclors (µg/L)					
Aroclor 1016	0.02U	0.04U	0.02U	0.02U	0.02U
Aroclor 1221	0.02U	0.04U	0.02U	0.02U	0.02U
Aroclor 1232	0.02U	0.04U	0.02U	0.02U	0.02U
Aroclor 1242	0.02U	0.04U	0.02U	0.02U	0.02U
Aroclor 1248	0.02U	0.04U	0.02U	0.02U	0.02U
Aroclor 1254	0.02U	0.04U	0.02U	0.02U	0.02U
Aroclor 1260	0.02U	0.04U	0.02U	0.02U	0.02U
Chlorinated Pesticides (µg/L)					
2,4'-DDD	0.005U	0.01U	0.005U	0.005U	0.005U
2,4'-DDE	0.005U	0.01U	0.005U	0.005U	0.005U
2,4'-DDT	0.005U	0.01U	0.005U	0.005U	0.005U
4,4'-DDD	0.005U	0.01U	0.005U	0.005U	0.005U
4,4'-DDE	0.005U	0.01U	0.005U	0.005U	0.0225
4,4'-DDT	0.005U	0.01U	0.005U	0.005U	0.005U
Total DDT	0.005U	0.01U	0.005U	0.005U	0.0225
Aldrin	0.005U	0.01U	0.005U	0.005U	0.005U
Dieldrin	0.005U	0.01U	0.005U	0.005U	0.005U
Endrin	0.005U	0.01U	0.005U	0.005U	0.005U
Endrin aldehyde	0.005U	0.01U	0.005U	0.005U	0.005U
Endrin ketone	0.005U	0.01U	0.005U	0.005U	0.005U
alpha-BHC	0.005U	0.01U	0.005U	0.005U	0.005U
beta-BHC	0.005U	0.01U	0.005U	0.005U	0.005U
delta-BHC	0.005U	0.01U	0.005U	0.005U	0.005U
gamma-BHC (Lindane)	0.005U	0.01U	0.005U	0.005U	0.005U
Endosulfan I	0.005U	0.01U	0.005U	0.005U	0.005U
Endosulfan II	0.005U	0.01U	0.005U	0.005U	0.005U
Endosulfan sulfate	0.005U	0.01U	0.005U	0.005U	0.005U
alpha-Chlordane	0.020	0.01U	0.006	0.005U	0.024
gamma-Chlordane	0.020	0.009	0.009	0.005U	0.0195
Heptachlor	0.005U	0.01U	0.005U	0.005U	0.005U
Heptachlor epoxide	0.005U	0.01U	0.005U	0.005U	0.005U
Oxychlordane	0.005U	0.01U	0.005U	0.005U	0.005U
cis-Nonachlor	0.012	0.01U	0.005U	0.005U	0.0111
trans-Nonachlor	0.020	0.021	0.0175	0.005U	0.0176
Total Chlordane	0.071	0.030	0.032	0.005U	0.072
Methoxychlor	0.005U	0.01U	0.005U	0.005U	0.005U
Mirex	0.005U	0.01U	0.005U	0.005U	0.005U
Toxaphene	0.05U	0.1U	0.05U	0.05U	0.05U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.2 Belmont Pump Station Stormwater Chemistry Results: 2005/2006. (continued)

Analytical Parameter	18-Oct-05	2-Jan-06	19-Feb-06	28-Feb-06	29-Mar-06
Organophosphates (µg/L)					
Bolstar (Sulprofos)	0.02U	0.04U	0.02U	0.02U	0.004U
Chlorpyrifos	0.01U	0.02U	0.01U	0.01U	0.002U
Demeton	0.02U	0.04U	0.02U	0.02U	0.002U
Diazinon	0.01U	0.02U	0.01U	0.01U	0.004U
Dichlorvos	0.061	0.04U	0.02U	0.02U	0.006U
Dimethoate	0.01U	0.02U	0.01U	0.01U	0.006U
Disulfoton	0.02U	0.04U	0.02U	0.02U	0.002U
Ethoprop	0.02U	0.04U	0.02U	0.02U	0.002U
Fensulfothion	0.02U	0.04U	0.02U	0.02U	0.002U
Fenthion	0.02U	0.04U	0.02U	0.02U	0.004U
Malathion	**0.301**[7,8]	**0.552**[7,8]	0.069	0.0705	**0.197**[7,8]
Merphos	0.02U	0.04U	0.02U	0.02U	0.002U
Methyl Parathion	0.02U	0.04U	0.02U	0.02U	0.002U
Mevinphos	0.02U	0.04U	0.02U	0.02U	0.016U
Phorate	0.02U	0.04U	0.02U	0.02U	0.012U
Ronnel	0.02U	0.04U	0.02U	0.02U	0.004U
Tetrachlorvinphos (Stirophos)	0.02U	0.04U	0.02U	0.02U	0.004U
Tokuthion (Prothiofos)	0.02U	0.04U	0.02U	0.02U	0.006U
Trichloronate	0.02U	0.04U	0.02U	0.02U	0.002U
Triazines (µg/L)					
Ametryn	0.01U	0.02U	0.01U	0.01U	0.01U
Atraton	0.01U	0.02U	0.01U	0.01U	0.01U
Atrazine	0.01U	0.02U	0.01U	0.01U	0.01U
Cyanazine	0.01U	0.02U	0.01U	0.01U	0.01U
Prometon	0.01U	0.02U	0.09	0.05	0.01U
Prometryn	0.01U	0.02U	0.01U	0.01U	0.01U
Propazine	0.01U	0.02U	0.01U	0.01U	0.01U
Secbumeton	0.01U	0.02U	0.01U	0.01U	0.01U
Simazine	0.01U	0.02U	0.01U	0.01U	0.01U
Simetryn	0.01U	0.02U	0.01U	0.01U	0.01U
Terbutryn	0.01U	0.02U	0.01U	0.01U	0.01U
Terbutylazine	0.01U	0.02U	0.01U	0.01U	0.01U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.3 Bouton Creek Stormwater Chemistry Results: 2005/2006.

Analytical Parameter	2-Jan-06	19-Feb-06	28-Feb-06	3-Mar-06	29-Mar-06
Conventionals (mg/L) *unless noted*					
pH (pH Units)	7.78	7.45	**6.4**[2]	**6.35**[2]	7.64
Conductivity (µmhos/cm)	240	1400	140	120	130
Alkalinity as CaCO3	35	60	20	16	16
Hardness as CaCO3	61	180	25	22	23
Biochemical Oxygen Demand	11	38	8.4	27	7.8
Chemical Oxygen Demand	89	170	51	110	68
Total Organic Carbon	16	32	9.2	10	9.4
Chloride	59	420	25	21	23
Fluoride	0.15	0.71	0.083J	0.1U	0.074J
MBAS	0.1U	0.26	0.2U	0.1U	0.091J
Oil and Grease	2.1J	-	1.5J	5.0U	1.3J
Total Ammonia (as N)	0.59	0.076J	0.55	0.32	0.23
Total Kjeldahl Nitrogen	2.6	2.4	1.2J+	1.7	0.74
Nitrate (as N)	0.88	1.2	0.52	0.41	0.35
Nitrite (as N)	0.1U	0.1U	0.1U	0.1U	0.1U
Total Orthophosphate (as P)	0.2	0.049	0.17	0.12	0.11
Total Phosphorus	0.72	0.39	0.54	0.64	0.38
Total Recoverable Phenolics	0.1U	0.1U	0.1U	0.1U	0.1U
Total Dissolved Solids	170	1000	91	78	87
Total Suspended Solids	90	76	55	230	87
Total Volatile Solids	28	29	17	54	26
Turbidity (NTU)	60	41	41	94	55
Dissolved Metals (µg/L)					
Aluminum	20J	22J	63	38	56
Arsenic	0.73	1.8	1.2	1.0	1.0
Cadmium	0.079J	0.051J	0.03J	0.058J	0.052J
Chromium	0.93	0.91	1.0	1.4	1.3
Copper	**10**[5,6]	**18**[5,6]	**7.6**[5,6]	**6.2**[5,6]	**6.9**[5,6]
Iron	60	89	58	62	80
Lead	1.3	0.75	**0.98**[5]	**0.78**[5]	**0.87**[5]
Nickel	2.7	**12**[6]	1.7	1.4	1.6
Selenium	1U	0.34J	1U	1U	1U
Silver	0.5UJ	0.5U	0.5U	0.2U	0.2U
Zinc	62	69	**40**[5]	32	33
Total Metals (µg/L)					
Aluminum	**2500**[2,7]	**1900**[2,7]	**1700**[2,7]	**6200**[2,7]	**3100**[2,7]
Arsenic	1.4	3.5	1.9	3.3	2.4
Cadmium	0.59	0.3	0.24	0.89	0.51
Chromium	8.7	R	11	14	8.9
Copper	**40**[1]	**43**[1]	**21**[1]	**55**[1]	**35**[1]
Iron	4400	3100	**2000**[7]	**7500**[7]	**4200**[7]
Lead	**23**[1]	**11**[1]	**10**[1]	**53**[1]	**22**[1]
Nickel	7.8	**31**[1]	4.8	13	7.2
Selenium	0.45J	0.56J	0.25J	1.2	1
Silver	0.15J	0.086J	0.037J	0.13J	0.069J
Zinc	**260**[1]	**210**[1]	**130**[1]	**380**[1]	**210**[1]

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.3 Bouton Creek Stormwater Chemistry Results: 2005/2006. (continued)

Analytical Parameter	2-Jan-06	19-Feb-06	28-Feb-06	3-Mar-06	29-Mar-06
Bacteria (MPN/100 ml)					
Enterococcus	**9590**[2]	NA	**18,400**[2]	**28,800**[2]	**20,600**[2]
Fecal Coliform	**17,000**[1,2]	NA	**5000**[1,2]	**5000**[1,2]	**2400**[1,2]
Total Coliform	**50,000**[1,2]	NA	**30,000**[1,2]	**50,000**[1,2]	**50,000**[1,2]
Aroclors (µg/L)					
Aroclor 1016	0.04U	-	0.02U	0.02U	0.02U
Aroclor 1221	0.04U	-	0.02U	0.02U	0.02U
Aroclor 1232	0.04U	-	0.02U	0.02U	0.02U
Aroclor 1242	0.04U	-	0.02U	0.02U	0.02U
Aroclor 1248	0.04U	-	0.02U	0.02U	0.02U
Aroclor 1254	0.04U	-	0.02U	0.02U	0.02U
Aroclor 1260	0.04U	-	0.02U	0.02U	0.02U
Chlorinated Pesticides (µg/L)					
2,4'-DDD	0.01U	-	0.005U	0.005U	0.005U
2,4'-DDE	0.01U	-	0.005U	0.005U	0.005U
2,4'-DDT	0.01U	-	0.005U	0.005U	0.005U
4,4'-DDD	0.01U	-	0.005U	0.005U	0.005U
4,4'-DDE	0.01U	-	0.005U	0.005U	0.005U
4,4'-DDT	0.01U	-	0.005U	0.005U	0.005U
Total DDT	0.01U	-	0.005U	0.005U	0.005U
Aldrin	0.01U	-	0.005U	0.005U	0.005U
Dieldrin	0.01U	-	0.005U	0.005U	0.005U
Endrin	0.01U	-	0.005U	0.005U	0.005U
Endrin aldehyde	0.01U	-	0.005U	0.005U	0.005U
Endrin ketone	0.01U	-	0.005U	0.005U	0.005U
alpha-BHC	0.01U	-	0.005U	0.005U	0.005U
beta-BHC	0.01U	-	0.005U	0.005U	0.005U
delta-BHC	0.01U	-	0.005U	0.005U	0.005U
gamma-BHC (Lindane)	0.01U	-	0.005U	0.005U	0.005U
Endosulfan I	0.01U	-	0.005U	0.005U	0.005U
Endosulfan II	0.01U	-	0.005U	0.005U	0.005U
Endosulfan sulfate	0.01U	-	0.005U	0.005U	0.005U
alpha-Chlordane	0.01U	-	0.005U	0.005U	0.0091
gamma-Chlordane	0.01U	-	0.005U	0.005U	0.0052
Heptachlor	0.01U	-	0.005U	0.005U	0.005U
Heptachlor epoxide	0.01U	-	0.005U	0.005U	0.005U
Oxychlordane	0.01U	-	0.005U	0.005U	0.005U
cis-Nonachlor	0.01U	-	0.005U	0.005U	0.002J
trans-Nonachlor	0.01U	-	0.005U	0.005U	0.0054
Total Chlordane	0.01U	-	0.005U	0.005U	0.0215
Methoxychlor	0.01U	-	0.005U	0.005U	R
Mirex	0.01U	-	0.005U	0.005U	0.005U
Toxaphene	0.1U	-	0.05U	0.05U	0.05U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.3 Bouton Creek Stormwater Chemistry Results: 2005/2006. (continued)

Analytical Parameter	2-Jan-06	19-Feb-06	28-Feb-06	3-Mar-06	29-Mar-06
Organophosphates (µg/L)					
Bolstar (Sulprofos)	0.04U	-	0.02U	0.004U	0.004U
Chlorpyrifos	0.02U	-	0.01U	0.002U	0.002U
Demeton	0.04U	-	0.02U	0.002U	0.002U
Diazinon	0.02U	-	0.01U	0.004U	0.004U
Dichlorvos	0.04U	-	0.02U	0.006U	0.006U
Dimethoate	0.02U	-	0.01U	0.006U	0.006U
Disulfoton	0.04U	-	0.02U	0.002U	0.002U
Ethoprop	0.04U	-	0.02U	0.002U	0.002U
Fensulfothion	0.04U	-	0.02U	0.002U	0.002U
Fenthion	0.04U	-	0.02U	0.004U	0.004U
Malathion	0.066	-	0.039	0.006UJ	0.006U
Merphos	0.04U	-	0.02U	0.002U	0.002U
Methyl Parathion	0.04U	-	0.02U	0.002U	0.002U
Mevinphos	0.04U	-	0.02U	0.016U	0.016U
Phorate	0.04U	-	0.02U	0.012U	0.012U
Ronnel	0.04U	-	0.02U	0.004U	0.004U
Tetrachlorvinphos (Stirophos)	0.04U	-	0.02U	0.004U	0.004U
Tokuthion (Prothiofos)	0.04U	-	0.02U	0.006U	0.006U
Trichloronate	0.04U	-	0.02U	0.002U	0.002U
Triazines (µg/L)					
Ametryn	0.02U	-	0.01U	0.01U	0.01U
Atraton	0.02U	-	0.01U	0.01U	0.01U
Atrazine	0.02U	-	0.01U	0.01U	0.01U
Cyanazine	0.02U	-	0.01U	0.01U	0.01U
Prometon	0.02U	-	0.021	0.0261	0.01U
Prometryn	0.02U	-	0.01U	0.01U	0.01U
Propazine	0.02U	-	0.01U	0.01U	0.01U
Secbumeton	0.02U	-	0.01U	0.01U	0.01U
Simazine	0.02U	-	0.01U	0.01U	0.01U
Simetryn	0.02U	-	0.01U	0.01U	0.01U
Terbutryn	0.02U	-	0.01U	0.01U	0.01U
Terbutylazine	0.02U	-	0.01U	0.01U	0.01U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.4 Los Cerritos Channel Stormwater Chemistry Results: 2005/2006.

Analytical Parameter	18-Oct-05	2-Jan-06	28-Feb-06	3-Mar-06
Conventionals (mg/L) *unless noted*				
pH (pH Units)	7.5	8.27	6.8	7.4
Conductivity (µmhos/cm)	130	87	63	62
Alkalinity as CaCO3	65	21	18	17
Hardness as CaCO3	59	25	18	23
Biochemical Oxygen Demand	30	6.4	7	18
Chemical Oxygen Demand	170	55	39	82
Total Organic Carbon	25	11	8.8	10
Chloride	8.6	7.2	3.1	3.4
Fluoride	0.26	0.085J	0.048J	0.1U
MBAS	0.053	0.1U	0.2U	0.1U
Oil and Grease	3.5J	1.3J	1.7J	5.0U
Total Ammonia (as N)	0.73	0.39	0.24	0.31
Total Kjeldahl Nitrogen	3.4	1.5	0.85J	1.8
Nitrate (as N)	1.3	0.55	0.48	0.36
Nitrite (as N)	0.088J	0.1U	0.1	0.1U
Total Orthophosphate (as P)	0.26	0.17	0.15	0.12
Total Phosphorus	2.8	0.53	0.46	1.4
Total Recoverable Phenolics	0.1U	0.1U	0.1U	0.1U
Total Dissolved Solids	120	68	57	55
Total Suspended Solids	370	73	75	410
Total Volatile Solids	100	22	16	61
Turbidity (NTU)	91	74	62	190
Dissolved Metals (µg/L)				
Aluminum	30J	67	460	59
Arsenic	2.9	0.56	1.3	1.1
Cadmium	0.22	0.12J	0.12J	0.059J
Chromium	1.7	0.98	1.4	0.94
Copper	**12**[5,6]	**5.7**[5,6]	**6.9**[5,6]	**4.8**[5,6]
Iron	160	93	310	200
Lead	**1.7**[5]	**0.66**[5]	**0.92**[5]	0.5
Nickel	5.2	1.7	1.7	1.2
Selenium	1U	1U	1U	1U
Silver	0.16J	0.5UJ	0.5U	0.2U
Zinc	**120J**[5,6]	**49**[5]	**53**[5]	20
Total Metals (µg/L)				
Aluminum	**4400**[2,7]	**3400**[2,7]	**3700**[2,7]	**15,000**[2,7]
Arsenic	4.2	1.2	2.6	4.7
Cadmium	1.4	0.6	0.5	1.5
Chromium	11J+	7.5	7.6	25
Copper	**46**[1]	**21**[1]	**22**[1]	**63**[1]
Iron	**7400**[7]	**5300**[7]	**4400**[7]	**15,000**[7]
Lead	**38**[1]	**13**[1]	**13**[1]	**61**[1]
Nickel	16	7.6	8.5	**33**[1]
Selenium	0.21J	0.31J	0.36J	1.4
Silver	0.18J	0.082J	0.043J	0.33
Zinc	R	**180**[1]	**170**[1]	**500**[1]

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.4 Los Cerritos Channel Stormwater Chemistry Results: 2005/2006. (continued)

Analytical Parameter	18-Oct-05	2-Jan-06	28-Feb-06	3-Mar-06
Bacteria (MPN/100 ml)				
Enterococcus	**158,000[2]**	**9590[2]**	**15,500[2]**	**7900[2]**
Fecal Coliform	**>1,600,000[1,2]**	**13,000[1,2]**	**30,000[1,2]**	**24,000[1,2]**
Total Coliform	**>1,600,000[1,2]**	**90,000[1,2]**	**160,000[1,2]**	**50,000[1,2]**
Aroclors (µg/L)				
Aroclor 1016	0.02U	0.04U	0.02U	0.02U
Aroclor 1221	0.02U	0.04U	0.02U	0.02U
Aroclor 1232	0.02U	0.04U	0.02U	0.02U
Aroclor 1242	0.02U	0.04U	0.02U	0.02U
Aroclor 1248	0.02U	0.04U	0.02U	0.02U
Aroclor 1254	0.02U	0.04U	0.02U	0.02U
Aroclor 1260	0.02U	0.04U	0.02U	0.02U
Chlorinated Pesticides (µg/L)				
2,4'-DDD	0.005U	0.01U	0.005U	0.005U
2,4'-DDE	0.005U	0.01U	0.005U	0.005U
2,4'-DDT	0.005U	0.01U	0.005U	0.005U
4,4'-DDD	0.005U	0.01U	0.005U	0.005U
4,4'-DDE	0.005U	0.01U	0.005U	0.005U
4,4'-DDT	0.005U	0.01U	0.005U	0.005U
Total DDT	0.005U	0.005U	0.005U	0.005U
Aldrin	0.005U	0.01U	0.005U	0.005U
Dieldrin	0.005U	0.01U	0.005U	0.005U
Endrin	0.005U	0.01U	0.005U	0.005U
Endrin aldehyde	0.005U	0.01U	0.005U	0.005U
Endrin ketone	0.005U	0.01U	0.005U	0.005U
alpha-BHC	0.005U	0.01U	0.005U	0.005U
beta-BHC	0.005U	0.01U	0.005U	0.005U
delta-BHC	0.005U	0.01U	0.005U	0.005U
gamma-BHC (Lindane)	0.005U	0.01U	0.005U	0.005U
Endosulfan I	0.005U	0.01U	0.005U	0.005U
Endosulfan II	0.005U	0.01U	0.005U	0.005U
Endosulfan sulfate	0.005U	0.01U	0.005U	0.005U
alpha-Chlordane	0.011	0.01U	0.005U	0.005U
gamma-Chlordane	0.009	0.01U	0.005U	0.005U
Heptachlor	0.005U	0.01U	0.005U	0.005U
Heptachlor epoxide	0.005U	0.01U	0.005U	0.005U
Oxychlordane	0.005U	0.01U	0.005U	0.005U
cis-Nonachlor	0.005U	0.01U	0.005U	0.005U
trans-Nonachlor	0.006	0.01U	0.005U	0.005U
Total Chlordane	0.026	0.01U	0.005U	0.005U
Methoxychlor	0.005U	0.01U	0.005U	R
Mirex	0.005U	0.01U	0.005U	0.005U
Toxaphene	0.05U	0.1U	0.05U	0.05U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.4 Los Cerritos Channel Stormwater Chemistry Results: 2005/2006. (continued)

Analytical Parameter	18-Oct-05	2-Jan-06	28-Feb-06	3-Mar-06
Organophosphates (µg/L)				
Bolstar (Sulprofos)	0.02U	0.04U	0.02U	0.004U
Chlorpyrifos	0.01U	0.02U	0.01U	0.002U
Demeton	0.02U	0.04U	0.02U	0.002U
Diazinon	0.01U	0.02U	0.01U	0.004U
Dichlorvos	0.02U	0.04U	0.02U	0.006U
Dimethoate	0.01U	0.02U	0.01U	0.006U
Disulfoton	0.02U	0.04U	0.02U	0.002U
Ethoprop	0.02U	0.04U	0.02U	0.002U
Fensulfothion	0.02U	0.04U	0.02U	0.002U
Fenthion	0.02U	0.04U	0.02U	0.004U
Malathion	**0.299**[7,8]	**0.190**[7,8]	0.039	0.006UJ
Merphos	0.02U	0.04U	0.02U	0.002U
Methyl Parathion	0.02U	0.04U	0.02U	0.002U
Mevinphos	0.02U	0.04U	0.02U	0.016U
Phorate	0.02U	0.04U	0.02U	0.012U
Ronnel	0.02U	0.04U	0.02U	0.004U
Tetrachlorvinphos (Stirophos)	0.02U	0.04U	0.02U	0.004U
Tokuthion (Prothiofos)	0.02U	0.04U	0.02U	0.006U
Trichloronate	0.02U	0.04U	0.02U	0.002U
Triazines (µg/L)				
Ametryn	0.01U	0.02U	0.01U	0.01U
Atraton	0.01U	0.02U	0.01U	0.01U
Atrazine	0.01U	0.02U	0.01U	0.01U
Cyanazine	0.01U	0.02U	0.01U	0.01U
Prometon	0.01U	0.02U	0.022	0.01U
Prometryn	0.01U	0.02U	0.01U	0.01U
Propazine	0.01U	0.02U	0.01U	0.01U
Secbumeton	0.01U	0.02U	0.01U	0.01U
Simazine	0.01U	0.02U	0.01U	0.01U
Simetryn	0.01U	0.02U	0.01U	0.01U
Terbutryn	0.01U	0.02U	0.01U	0.01U
Terbutylazine	0.01U	0.02U	0.01U	0.01U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J-=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.5 Dominguez Pump Station Stormwater Chemistry Results: 2005/2006.

Analytical Parameter	29-Mar-06	5-Apr-06
Conventionals (mg/L) *unless noted*		
pH (pH Units)	**6.18**[2]	7.06
Conductivity (µmhos/cm)	93	80
Alkalinity as CaCO3	26	23
Hardness as CaCO3	21	21
Biochemical Oxygen Demand	6.5	6.1
Chemical Oxygen Demand	35	35
Total Organic Carbon	10	9.5
Chloride	6.2	4.8
Fluoride	0.097J	0.1U
MBAS	0.067J	0.12
Oil and Grease	5.0U	1.2J
Total Ammonia (as N)	0.32	0.13
Total Kjeldahl Nitrogen	1.3	1
Nitrate (as N)	0.33	0.24
Nitrite (as N)	0.1U	0.1U
Total Orthophosphate (as P)	0.22	0.19
Total Phosphorus	0.32	0.29
Total Recoverable Phenolics	0.1U	0.1U
Total Dissolved Solids	73	54
Total Suspended Solids	26	14
Total Volatile Solids	7.4	4.2
Turbidity (NTU)	23	20
Dissolved Metals (µg/L)		
Aluminum	55	65
Arsenic	1.4	1.5
Cadmium	0.27	0.053J
Chromium	0.7	0.76
Copper	**7.2**[5,6]	**7.8**[5,6]
Iron	250	140
Lead	**2.4**[5]	**1.3**[5]
Nickel	2	1.9
Selenium	1U	1U
Silver	0.018J	0.2U
Zinc	28	**32**[5]
Total Metals (µg/L)		
Aluminum	**810**[7]	**660**[7]
Arsenic	1.8	1.7
Cadmium	0.12J	0.12J
Chromium	2	1.8
Copper	11	11
Iron	**1300**[7]	960
Lead	6.7	5.3
Nickel	3	2.8
Selenium	0.65J	1U
Silver	0.018J	0.019J
Zinc	54	52

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.5 Dominguez Pump Station Stormwater Chemistry Results: 2005/2006. (continued)

Analytical Parameter	29-Mar-06	5-Apr-06
Bacteria (MPN/100 ml)		
Enterococcus	**1723**[2]	**185**[2]
Fecal Coliform	**5000**[1,2]	**5000**[1,2]
Total Coliform	**70,000**[1,2]	**50,000**[1,2]
Aroclors (µg/L)		
Aroclor 1016	0.02U	0.02U
Aroclor 1221	0.02U	0.02U
Aroclor 1232	0.02U	0.02U
Aroclor 1242	0.02U	0.02U
Aroclor 1248	0.02U	0.02U
Aroclor 1254	0.02U	0.02U
Aroclor 1260	0.02U	0.02U
Chlorinated Pesticides (µg/L)		
2,4'-DDD	0.005U	0.005U
2,4'-DDE	0.005U	0.005U
2,4'-DDT	0.005U	0.005U
4,4'-DDD	0.005U	0.005U
4,4'-DDE	0.005U	0.005U
4,4'-DDT	0.005U	0.005U
Total DDT	0.005U	0.005U
Aldrin	0.005U	0.005U
Dieldrin	0.005U	0.005U
Endrin	0.005U	0.005U
Endrin aldehyde	0.005U	0.005U
Endrin ketone	0.005U	0.005U
alpha-BHC	0.005U	0.005U
beta-BHC	0.005U	0.005U
delta-BHC	0.005U	0.005U
gamma-BHC (Lindane)	0.005U	0.005U
Endosulfan I	0.005U	0.005U
Endosulfan II	0.005U	0.005U
Endosulfan sulfate	0.005U	0.005U
alpha-Chlordane	0.005U	0.005U
gamma-Chlordane	0.005U	0.003J
Heptachlor	0.005U	0.005U
Heptachlor epoxide	0.005U	0.005U
Oxychlordane	0.005U	0.005U
cis-Nonachlor	0.005U	0.005U
trans-Nonachlor	0.005U	0.001J
Total Chlordane	0.005U	0.0038
Methoxychlor	0.005U	0.005U
Mirex	0.005U	0.005U
Toxaphene	0.05U	0.05U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.5 Dominguez Pump Station Stormwater Chemistry Results: 2005/2006. (continued)

Analytical Parameter	29-Mar-06	5-Apr-06
Organophosphates (µg/L)		
Bolstar (Sulprofos)	0.004U	0.004U
Chlorpyrifos	0.002U	0.002U
Demeton	0.002U	0.002U
Diazinon	0.004U	0.004U
Dichlorvos	0.006U	0.006U
Dimethoate	0.006U	0.006U
Disulfoton	0.002U	0.002U
Ethoprop	0.002U	0.002U
Fensulfothion	0.002U	0.002U
Fenthion	0.004U	0.004U
Malathion	**0.119**[7,8]	0.070
Merphos	0.002U	0.002U
Methyl Parathion	0.002U	0.002U
Mevinphos	0.016U	0.016U
Phorate	0.012U	0.012U
Ronnel	0.004U	0.004U
Tetrachlorvinphos (Stirophos)	0.004U	0.004U
Tokuthion (Prothiofos)	0.006U	0.006U
Trichloronate	0.002U	0.002U
Triazines (µg/L)		
Ametryn	0.01U	0.01U
Atraton	0.01U	0.01U
Atrazine	0.01U	0.01U
Cyanazine	0.01U	0.01U
Prometon	0.01U	0.046
Prometryn	0.01U	0.01U
Propazine	0.01U	0.01U
Secbumeton	0.01U	0.01U
Simazine	0.01U	0.0216
Simetryn	0.01U	0.01U
Terbutryn	0.01U	0.01U
Terbutylazine	0.01U	0.01U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J–=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.6 Summary of Results for TSS Events: 2005/2006.

	TSS in mg/L		
Storm Event	**Belmont Pump**	**Bouton Creek**	**Los Cerritos Channel**
18-Oct-05	-	250	-
19-Feb-06	-	-	320
03-Mar-06	120	-	-
29-Mar-06	-	-	96
05-Apr-06	50	54	63
15-Apr-06	32	31	97

Table 6.7 Belmont Pump Station Load Calculations (pounds) for Storm Events.

Analytical Parameter	18-Oct-05	2-Jan-06	19-Feb-06	28-Feb-06	29-Mar-06
Conventionals					
Alkalinity as $CaCO_3$	420	850	250	680	650
Hardness as $CaCO_3$	450	1000	300	680	580
Biochemical Oxygen Demand	590	500	140	340	250
Chemical Oxygen Demand	1900	5600	660	2400	2600
Total Organic Carbon	230	440	100	360	240
Chloride	260	600	330	290	360
Fluoride	2.2	3.4	1.3	2.2	2.4
MBAS	0.47	ND	1.2	3.7	3.6
Oil and Grease	36	140	ND	91	170
Total Ammonia (as N)	6.8	15	2.3	13	11
Total Kjeldahl Nitrogen	34	110	17	42	32
Nitrate (as N)	12	20	8.7	21	14
Nitrite (as N)	0.78	ND	ND	ND	ND
Total Orthophosphate (as P)	4.4	12	1	9.1	6.2
Total Phosphorus	15	41	3.6	31	17
Total Recoverable Phenolics	ND	ND	ND	ND	ND
Total Dissolved Solids	1300	2800	1400	2300	2100
Total Suspended Solids	5600	9100	870	2300	3200
Total Volatile Solids	1500	2900	300	1100	1000
Dissolved Metals					
Aluminum	ND	0.38	0.062	1	0.91
Arsenic	0.024	0.025	0.0078	0.042	0.039
Cadmium	0.00054	0.0022	0.00041	0.0013	0.001
Chromium	0.0079	0.013	0.0026	0.026	0.024
Copper	0.095	0.25	0.074	0.35	0.28
Iron	1.2	2.6	0.28	1.4	1.7
Lead	0.012	0.026	0.003	0.019	0.022
Nickel	0.045	0.094	0.022	0.068	0.055
Selenium	ND	ND	0.0016	ND	ND
Silver	ND	ND	ND	ND	ND
Zinc	0.78	3.4	0.45	1.9	1.4
Total Metals					
Aluminum	53	210	21	61	78
Arsenic	0.042	0.066	0.019	0.068	0.071
Cadmium	0.012	0.047	0.0054	0.012	0.017
Chromium	0.11	0.53	0.054	0.15	0.2
Copper	0.7	3.1	0.45	1.2	1.4
Iron	95	380	29	80	110
Lead	0.71	1.9	0.21	0.57	0.97
Nickel	0.14	0.56	0.074	0.22	0.24
Selenium	0.0029	0.013	0.0031	ND	0.029
Silver	0.0017	ND	ND	0.0021	0.0021
Zinc	0.82	20	2.6	6.8	9.4

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.7 Belmont Pump Station Load Calculations (pounds) for Storm Events. (continued)

Analytical Parameter	18-Oct-05	2-Jan-06	19-Feb-06	28-Feb-06	29-Mar-06
Aroclors					
Aroclor 1016	ND	ND	ND	ND	ND
Aroclor 1221	ND	ND	ND	ND	ND
Aroclor 1232	ND	ND	ND	ND	ND
Aroclor 1242	ND	ND	ND	ND	ND
Aroclor 1248	ND	ND	ND	ND	ND
Aroclor 1254	ND	ND	ND	ND	ND
Aroclor 1260	ND	ND	ND	ND	ND
Chlorinated Pesticides					
2,4'-DDD	ND	ND	ND	ND	ND
2,4'-DDE	ND	ND	ND	ND	ND
2,4'-DDT	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	0.00073
4,4'-DDT	ND	ND	ND	ND	ND
Total DDT	ND	ND	ND	ND	0.00073
Aldrin	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND
Endrin aldehyde	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND
alpha-BHC	ND	ND	ND	ND	ND
beta-BHC	ND	ND	ND	ND	ND
delta-BHC	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND
alpha-Chlordane	0.00017	ND	0.000023	ND	0.00078
gamma-Chlordane	0.00017	0.00029	0.000037	ND	0.00063
Heptachlor	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND
cis-Nonachlor	0.0001	ND	ND	ND	0.00036
trans-Nonachlor	0.00017	0.00066	0.000072	ND	0.00057
Total Chlordane	0.00061	0.00095	0.00013	ND	0.0023
Methoxychlor	ND	ND	ND	ND	ND
Mirex	ND	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND	ND

ND indicates that an analysis was performed but the analyte was not detected.

A blank cell (-) indicates that the analysis was not performed.

Table 6.7 Belmont Pump Station Load Calculations (pounds) for Storm Events. (continued)

Analytical Parameter	18-Oct-05	2-Jan-06	19-Feb-06	28-Feb-06	29-Mar-06
Organophosphates					
Bolstar (Sulprofos)	ND	ND	ND	ND	ND
Chlorpyrifos	ND	ND	ND	ND	ND
Demeton	ND	ND	ND	ND	ND
Diazinon	ND	ND	ND	ND	ND
Dichlorvos	0.00052	ND	ND	ND	ND
Dimethoate	ND	ND	ND	ND	ND
Disulfoton	ND	ND	ND	ND	ND
Ethoprop	ND	ND	ND	ND	ND
Fensulfothion	ND	ND	ND	ND	ND
Fenthion	ND	ND	ND	ND	ND
Malathion	0.0026	0.017	0.00028	0.0027	0.0064
Merphos	ND	ND	ND	ND	ND
Methyl Parathion	ND	ND	ND	ND	ND
Mevinphos	ND	ND	ND	ND	ND
Phorate	ND	ND	ND	ND	ND
Ronnel	ND	ND	ND	ND	ND
Tetrachlorvinphos (Stirophos)	ND	ND	ND	ND	ND
Tokuthion (Prothiofos)	ND	ND	ND	ND	ND
Trichloronate	ND	ND	ND	ND	ND
Triazines					
Ametryn	ND	ND	ND	ND	ND
Atraton	ND	ND	ND	ND	ND
Atrazine	ND	ND	ND	ND	ND
Cyanazine	ND	ND	ND	ND	ND
Prometon	ND	ND	0.00039	0.002	ND
Prometryn	ND	ND	ND	ND	ND
Propazine	ND	ND	ND	ND	ND
Secbumeton	ND	ND	ND	ND	ND
Simazine	ND	ND	ND	ND	ND
Simetryn	ND	ND	ND	ND	ND
Terbutryn	ND	ND	ND	ND	ND
Terbutylazine	ND	ND	ND	ND	ND

ND indicates that an analysis was performed but the analyte was not detected.

A blank cell (-) indicates that the analysis was not performed.

Table 6.8 Bouton Creek Load Calculations (pounds) for Storm Events.

Analytical Parameter	2-Jan-06	19-Feb-06	28-Feb-06	3-Mar-06	29-Mar-06
Conventionals					
Alkalinity as $CaCO_3$	8300	1200	4800	1100	3000
Hardness as $CaCO_3$	15000	3500	5900	1600	4400
Biochemical Oxygen Demand	2600	730	2000	1900	1500
Chemical Oxygen Demand	21000	3300	12000	7900	13000
Total Organic Carbon	3800	620	2200	720	1800
Chloride	14000	8100	5900	1500	4400
Fluoride	36	14	20	ND	14
MBAS	ND	5	ND	ND	17
Oil and Grease	500	ND	360	ND	250
Total Ammonia (as N)	140	1.5	130	23	44
Total Kjeldahl Nitrogen	620	46	290	120	140
Nitrate (as N)	210	23	120	29	66
Nitrite (as N)	ND	ND	ND	ND	ND
Total Orthophosphate (as P)	48	0.94	40	8.6	21
Total Phosphorus	170	7.5	130	46	72
Total Recoverable Phenolics	ND	ND	ND	ND	ND
Total Dissolved Solids	41000	19000	22000	5600	17000
Total Suspended Solids	21000	1500	13000	17000	17000
Total Volatile Solids	6700	560	4000	3900	4900
Dissolved Metals					
Aluminum	4.8	0.42	15	2.7	11
Arsenic	0.17	0.035	0.29	0.072	0.19
Cadmium	0.019	0.00098	0.0071	0.0042	0.0099
Chromium	0.22	0.017	0.24	0.1	0.25
Copper	2.4	0.35	1.8	0.45	1.3
Iron	14	1.7	14	4.5	15
Lead	0.31	0.014	0.23	0.056	0.17
Nickel	0.64	0.23	0.4	0.1	0.3
Selenium	ND	0.0065	ND	ND	ND
Silver	ND	ND	ND	ND	ND
Zinc	15	1.3	9.5	2.3	6.3
Total Metals					
Aluminum	600	37	400	450	590
Arsenic	0.33	0.067	0.45	0.24	0.46
Cadmium	0.14	0.0058	0.057	0.064	0.097
Chromium	2.1	-	2.6	1	1.7
Copper	9.5	0.83	5	4	6.6
Iron	1000	60	480	540	800
Lead	5.5	0.21	2.4	3.8	4.2
Nickel	1.9	0.6	1.1	0.93	1.4
Selenium	0.11	0.011	0.059	0.086	0.19
Silver	0.036	0.0017	0.0088	0.0093	0.013
Zinc	62	4	31	27	40

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.8 Bouton Creek Load Calculations (pounds) for Storm Events. (continued)

Analytical Parameter	2-Jan-06	19-Feb-06	28-Feb-06	3-Mar-06	29-Mar-06
Aroclors					
Aroclor 1016	ND	-	ND	ND	ND
Aroclor 1221	ND	-	ND	ND	ND
Aroclor 1232	ND	-	ND	ND	ND
Aroclor 1242	ND	-	ND	ND	ND
Aroclor 1248	ND	-	ND	ND	ND
Aroclor 1254	ND	-	ND	ND	ND
Aroclor 1260	ND	-	ND	ND	ND
Chlorinated Pesticides					
2,4'-DDD	ND	ND	ND	ND	ND
2,4'-DDE	ND	ND	ND	ND	ND
2,4'-DDT	ND	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND	ND
Total DDT	ND	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	ND
Endrin aldehyde	ND	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND	ND
alpha-BHC	ND	ND	ND	ND	ND
beta-BHC	ND	ND	ND	ND	ND
delta-BHC	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ND	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND	ND
alpha-Chlordane	ND	ND	ND	ND	0.0017
gamma-Chlordane	ND	ND	ND	ND	0.00099
Heptachlor	ND	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND	ND
cis-Nonachlor	ND	ND	ND	ND	0.00034
trans-Nonachlor	ND	ND	ND	ND	0.001
Total Chlordane	ND	ND	ND	ND	0.0041
Methoxychlor	ND	ND	ND	-	ND
Mirex	ND	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND	ND

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.8 Bouton Creek Load Calculations (pounds) for Storm Events. (continued)

Analytical Parameter	2-Jan-06	19-Feb-06	28-Feb-06	3-Mar-06	29-Mar-06
Organophosphates					
Bolstar (Sulprofos)	ND	ND	ND	ND	ND
Chlorpyrifos	ND	ND	ND	ND	ND
Demeton	ND	ND	ND	ND	ND
Diazinon	ND	ND	ND	ND	ND
Dichlorvos	ND	ND	ND	ND	ND
Dimethoate	ND	ND	ND	ND	ND
Disulfoton	ND	ND	ND	ND	ND
Ethoprop	ND	ND	ND	ND	ND
Fensulfothion	ND	ND	ND	ND	ND
Fenthion	ND	ND	ND	ND	ND
Malathion	0.016	ND	0.0092	ND	ND
Merphos	ND	ND	ND	ND	ND
Methyl Parathion	ND	ND	ND	ND	ND
Mevinphos	ND	ND	ND	ND	ND
Phorate	ND	ND	ND	ND	ND
Ronnel	ND	ND	ND	ND	ND
Tetrachlorvinphos (Stirophos)	ND	ND	ND	ND	ND
Tokuthion (Prothiofos)	ND	ND	ND	ND	ND
Trichloronate	ND	ND	ND	ND	ND
Triazines					
Ametryn	ND	ND	ND	ND	ND
Atraton	ND	ND	ND	ND	ND
Atrazine	ND	ND	ND	ND	ND
Cyanazine	ND	ND	ND	ND	ND
Prometon	ND	ND	0.0049	0.0019	ND
Prometryn	ND	ND	ND	ND	ND
Propazine	ND	ND	ND	ND	ND
Secbumeton	ND	ND	ND	ND	ND
Simazine	ND	ND	ND	ND	ND
Simetryn	ND	ND	ND	ND	ND
Terbutryn	ND	ND	ND	ND	ND
Terbutylazine	ND	ND	ND	ND	ND

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.9 Los Cerritos Channel Station Load Calculations (pounds) for Storm Events.

Analytical Parameter	18-Oct-05	2-Jan-06	28-Feb-06	3-Mar-06
Conventionals				
Alkalinity as $CaCO_3$	10000	13000	18000	5700
Hardness as $CaCO_3$	9200	15000	18000	7700
Biochemical Oxygen Demand	4700	3900	7100	6000
Chemical Oxygen Demand	27000	34000	40000	27000
Total Organic Carbon	3900	6800	9000	3300
Chloride	1300	4400	3200	1100
Fluoride	41	52	49	ND
MBAS	8.3	ND	ND	ND
Oil and Grease	550	800	1700	ND
Total Ammonia (as N)	110	240	240	100
Total Kjeldahl Nitrogen	530	920	870	600
Nitrate (as N)	200	340	490	120
Nitrite (as N)	14	ND	100	ND
Total Orthophosphate (as P)	41	100	150	40
Total Phosphorus	440	330	470	470
Total Recoverable Phenolics	ND	ND	ND	ND
Total Dissolved Solids	19000	42000	58000	18000
Total Suspended Solids	58000	45000	76000	140000
Total Volatile Solids	16000	14000	16000	20000
Dissolved Metals				
Aluminum	4.7	41	470	20
Arsenic	0.45	0.34	1.3	0.37
Cadmium	0.034	0.074	0.12	0.02
Chromium	0.27	0.6	1.4	0.31
Copper	1.9	3.5	7	1.6
Iron	25	57	320	67
Lead	0.27	0.41	0.94	0.17
Nickel	0.81	1	1.7	0.4
Selenium	ND	ND	ND	ND
Silver	0.025	ND	ND	ND
Zinc	19	30	54	6.7
Total Metals				
Aluminum	690	2100	3800	5000
Arsenic	0.66	0.74	2.6	1.6
Cadmium	0.22	0.37	0.51	0.5
Chromium	1.7	4.6	7.7	8.3
Copper	7.2	13	22	21
Iron	1200	3300	4500	5000
Lead	5.9	8	13	20
Nickel	2.5	4.7	8.7	11
Selenium	0.033	0.19	0.37	0.47
Silver	0.028	0.05	0.044	0.11
Zinc	-	110	170	170

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.9 Los Cerritos Channel Station Load Calculations (pounds) for Storm Events. (continued)

Analytical Parameter	18-Oct-05	2-Jan-06	28-Feb-06	3-Mar-06
Aroclors				
Aroclor 1016	ND	ND	ND	ND
Aroclor 1221	ND	ND	ND	ND
Aroclor 1232	ND	ND	ND	ND
Aroclor 1242	ND	ND	ND	ND
Aroclor 1248	ND	ND	ND	ND
Aroclor 1254	ND	ND	ND	ND
Aroclor 1260	ND	ND	ND	ND
Chlorinated Pesticides				
2,4'-DDD	ND	ND	ND	ND
2,4'-DDE	ND	ND	ND	ND
2,4'-DDT	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND
Total DDT	ND	ND	ND	ND
Aldrin	ND	ND	ND	ND
Dieldrin	ND	ND	ND	ND
Endrin	ND	ND	ND	ND
Endrin aldehyde	ND	ND	ND	ND
Endrin ketone	ND	ND	ND	ND
alpha-BHC	ND	ND	ND	ND
beta-BHC	ND	ND	ND	ND
delta-BHC	ND	ND	ND	ND
gamma-BHC (Lindane)	ND	ND	ND	ND
Endosulfan I	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND
Endosulfan sulfate	ND	ND	ND	ND
alpha-Chlordane	0.0017	ND	ND	ND
gamma-Chlordane	0.0014	ND	ND	ND
Heptachlor	ND	ND	ND	ND
Heptachlor epoxide	ND	ND	ND	ND
Oxychlordane	ND	ND	ND	ND
cis-Nonachlor	ND	ND	ND	ND
trans-Nonachlor	0.001	ND	ND	ND
Total Chlordane	0.0041	ND	ND	ND
Methoxychlor	ND	ND	ND	-
Mirex	ND	ND	ND	ND
Toxaphene	ND	ND	ND	ND

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.9 Los Cerritos Channel Station Load Calculations (pounds) for Storm Events. (continued)

Analytical Parameter	18-Oct-05	2-Jan-06	28-Feb-06	3-Mar-06
Organophosphates				
Bolstar (Sulprofos)	ND	ND	ND	ND
Chlorpyrifos	ND	ND	ND	ND
Demeton	ND	ND	ND	ND
Diazinon	ND	ND	ND	ND
Dichlorvos	ND	ND	ND	ND
Dimethoate	ND	ND	ND	ND
Disulfoton	ND	ND	ND	ND
Ethoprop	ND	ND	ND	ND
Fensulfothion	ND	ND	ND	ND
Fenthion	ND	ND	ND	ND
Malathion	0.047	0.12	0.04	ND
Merphos	ND	ND	ND	ND
Methyl Parathion	ND	ND	ND	ND
Mevinphos	ND	ND	ND	ND
Phorate	ND	ND	ND	ND
Ronnel	ND	ND	ND	ND
Tetrachlorvinphos (Stirophos)	ND	ND	ND	ND
Tokuthion (Prothiofos)	ND	ND	ND	ND
Trichloronate	ND	ND	ND	ND
Triazines				
Ametryn	ND	ND	ND	ND
Atraton	ND	ND	ND	ND
Atrazine	ND	ND	ND	ND
Cyanazine	ND	ND	ND	ND
Prometon	ND	ND	0.023	ND
Prometryn	ND	ND	ND	ND
Propazine	ND	ND	ND	ND
Secbumeton	ND	ND	ND	ND
Simazine	ND	ND	ND	ND
Simetryn	ND	ND	ND	ND
Terbutryn	ND	ND	ND	ND
Terbutylazine	ND	ND	ND	ND

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.10 Dominguez Gap Pump Station Load Calculations (pounds) for Storm Events.

Analytical Parameter	29-Mar-06	5-Apr-06
Conventionals		
Alkalinity as $CaCO_3$	1100	690
Hardness as $CaCO_3$	870	630
Biochemical Oxygen Demand	270	180
Chemical Oxygen Demand	1400	1100
Total Organic Carbon	410	290
Chloride	260	140
Fluoride	4	ND
MBAS	2.8	3.6
Oil and Grease	ND	36
Total Ammonia (as N)	13	3.9
Total Kjeldahl Nitrogen	54	30
Nitrate (as N)	14	7.2
Nitrite (as N)	ND	ND
Total Orthophosphate (as P)	9.1	5.7
Total Phosphorus	13	8.7
Total Recoverable Phenolics	ND	ND
Total Dissolved Solids	3000	1600
Total Suspended Solids	1100	420
Total Volatile Solids	310	130
Dissolved Metals		
Aluminum	2.3	2
Arsenic	0.058	0.045
Cadmium	0.011	0.0016
Chromium	0.029	0.023
Copper	0.3	0.23
Iron	10	4.2
Lead	0.099	0.039
Nickel	0.083	0.057
Selenium	ND	ND
Silver	0.00074	ND
Zinc	1.2	0.96
Total Metals		
Aluminum	33	20
Arsenic	0.074	0.051
Cadmium	0.005	0.0036
Chromium	0.083	0.054
Copper	0.45	0.33
Iron	54	29
Lead	0.28	0.16
Nickel	0.12	0.084
Selenium	0.027	ND
Silver	0.00074	0.00057
Zinc	2.2	1.6

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.10 Dominguez Gap Pump Station Load Calculations (pounds) for Storm Events. (continued)

Analytical Parameter	29-Mar-06	5-Apr-06
Aroclors		
Aroclor 1016	ND	ND
Aroclor 1221	ND	ND
Aroclor 1232	ND	ND
Aroclor 1242	ND	ND
Aroclor 1248	ND	ND
Aroclor 1254	ND	ND
Aroclor 1260	ND	ND
Chlorinated Pesticides (µg/L)		
2,4'-DDD	ND	ND
2,4'-DDE	ND	ND
2,4'-DDT	ND	ND
4,4'-DDD	ND	ND
4,4'-DDE	ND	ND
4,4'-DDT	ND	ND
Total DDT	ND	ND
Aldrin	ND	ND
Dieldrin	ND	ND
Endrin	ND	ND
Endrin aldehyde	ND	ND
Endrin ketone	ND	ND
alpha-BHC	ND	ND
beta-BHC	ND	ND
delta-BHC	ND	ND
gamma-BHC (Lindane)	ND	ND
Endosulfan I	ND	ND
Endosulfan II	ND	ND
Endosulfan sulfate	ND	ND
alpha-Chlordane	ND	ND
gamma-Chlordane	ND	0.000084
Heptachlor	ND	ND
Heptachlor epoxide	ND	ND
Oxychlordane	ND	ND
cis-Nonachlor	ND	ND
trans-Nonachlor	ND	0.00003
Total Chlordane	ND	0.00011
Methoxychlor	ND	ND
Mirex	ND	ND
Toxaphene	ND	ND

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.10 Dominguez Gap Pump Station Load Calculations (pounds) for Storm Events. (continued)

Analytical Parameter	29-Mar-06	5-Apr-06
Organophosphates (µg/L)		
Bolstar (Sulprofos)	ND	ND
Chlorpyrifos	ND	ND
Demeton	ND	ND
Diazinon	ND	ND
Dichlorvos	ND	ND
Dimethoate	ND	ND
Disulfoton	ND	ND
Ethoprop	ND	ND
Fensulfothion	ND	ND
Fenthion	ND	ND
Malathion	0.0079	0.0021
Merphos	ND	ND
Methyl Parathion	ND	ND
Mevinphos	ND	ND
Phorate	ND	ND
Ronnel	ND	ND
Tetrachlorvinphos (Stirophos)	ND	ND
Tokuthion (Prothiofos)	ND	ND
Trichloronate	ND	ND
Triazines (µg/L)		
Ametryn	ND	ND
Atraton	ND	ND
Atrazine	ND	ND
Cyanazine	ND	ND
Prometon	ND	0.0014
Prometryn	ND	ND
Propazine	ND	ND
Secbumeton	ND	ND
Simazine	ND	0.00065
Simetryn	ND	ND
Terbutryn	ND	ND
Terbutylazine	ND	ND

ND indicates that an analysis was performed but the analyte was not detected.
A blank cell (-) indicates that the analysis was not performed.

Table 6.11 Load Calculations (pounds) for TSS Storm Events at Each Station.

Storm Event	Belmont Pump	Bouton Creek	Los Cerritos Channel
18-Oct-05	-	760	-
19-Feb-06	-	-	16000
03-Mar-06	430	-	-
29-Mar-06	-	-	98000
05-Apr-06	1600	7200	31000
15-Apr-06	120	1200	3300

Table 6.12 Monitored Dry Weather Events, 1999-2006.

Station	1 - 10/4/00	2 - 6/21/00	3 - 6/29/00	4 - 6/5/01	5 - 8/16/01	6 - 5/9,14/02	7 - 9/5/02	8 - 5/20/03	9 - 9/11/03	10 - 5/4/04	11 – 8/4/04	12 – 5/4/05	13 – 8/18/05	14 – 5/11/06
Bouton Creek		•	•	•	•	•	•	•	•	•	•	•	•	•
Belmont Pump		•	•	•	•	•	•	•	•	•	•	•	•	•
Los Cerritos Channel				•	•	•	•	•	•	•	•	•	•	•
Dominguez Gap		•[1]	•[1]	•[1]	•[1]	•[1]	•[1]	•[1]	•[1]	•[1]	•[1]	•[1]	•[1]	•[1]
Alamitos Bay	•	•	•	•	•	•								

1. Intake to basin was observed to be dry. Therefore, no samples were collected.

Shading indicates 2005/2006 Dry Weather Surveys included in this report.

Table 6.13 Field Measurements for Bouton Creek, Belmont Pump, and Los Cerritos Channel, Dry Weather Season (2005/2006).

	Belmont Pump		Bouton Creek		Los Cerritos Channel	
Date	**18-Aug-05**	**11-May-06**	**18-Aug-05**	**11-May-06**	**18-Aug-05**	**11-May-06**
Time	**07:00**	**09:15**	**07:40**	**07:45**	**09:30**	**10:45**
Temperature (^{0}C)	22.5	18.6	20.5	17.7	22.5	20.8
pH	8.3	8.2	8.0	7.5	8.3	8.8
Specific Conductivity (mS/cm)	2.25	2.76	7.07	6.13	7.71	1.02
Flow (cfs)	0.052[2]	0.045[2]	0.68[1&4]	-[3]	3.13[1]	0.73
Dissolved Oxygen (mg/L)	6.7	6.3	4.1	4.1	10.21	14.1

1. Flow was determined by measuring the depth and width of the water channel, as well as the velocity of a floating object in the water.
2. The flow rate was determined by observing changes in water level in the sump area over a 24-hour period.
3. The flow was not determined. The rising tide flooded the channel before the measurement could be made. A suggested flow would be 1.07 cfs, which was the flow calculated during the May 05 dry weather event. Observed water depth was similar this year. Water covered the entire width of the channel
4. This measurement was made the morning of the 18th when the flow was down the middle of the channel. While the sampling bottle was being changed at 2000 during the evening of the 17th the flow was observed across the full 88 foot width of the Cerritos channel. No determination of depth was made at that time. This was determined to be effects of an extreme tidal range.

Table 6.14 Summary of Chemical Analyses of Dry Weather Monitoring, 2005/2006.

Analyte Name	Belmont Pump 18-Aug-2005	Belmont Pump 11-May-2006	Bouton Creek 18-Aug-2005	Bouton Creek 11-May-2006	Los Cerritos Channel 18-Aug-2005	Los Cerritos Channel 11-May-2006
Bacteria (MPN/100 ml)						
Enterococcus	**6000** [2]	**5400** [2]	**510** [2]	**5100** [2]	**4200** [2]	**57600** [2]
Fecal Coliform	**13000** [1,2]	**1100** [1,2]	**800** [1,2]	170	**3000** [1,2]	**2100** [1,2]
Total Coliform	**24000** [1,2]	**22000** [1,2]	3000	**90000** [1,2]	**50000** [1,2]	**30000** [1,2]
Conventionals (mg/L) *unless noted*						
pH (pH units-field measurements)	8.3	8.2	8.0	7.6	8.3	**8.8** [2]
Conductivity (µmhos/cm)	2400	2600	8100	5700	2200	890
Alkalinity as CaCO3	400	500	150	170	130	140
Hardness as CaCO3	350	290	840	630	270	140
Biochemical Oxygen Demand	2.6	3.1	4.4	15	20	30
Chemical Oxygen Demand	110	130	370	270	210	140
Total Organic Carbon	7.7	8	14	22	34	39
Chloride	520	520	2600	1900	590	120
Fluoride	1.6	1.5	0.7	0.86	0.7	0.62
MBAS	0.025U	0.45	0.025U	**0.85** [2]	0.025U	**0.60** [2]
Oil and Grease	5U	5UJ	5U	5UJ	5U	4.5J
Total Ammonia (as N)	0.1U	0.16	0.1U	0.1U	0.1U	0.1U
Total Kjeldahl Nitrogen	0.96	1.1	1.5	1.8	3.7	4.5
Nitrate (as N)	1.2	1.2	0.5U	0.1U	0.1U	0.1U
Nitrite (as N)	0.1U	0.1U	0.5U	0.1U	0.1U	0.1U
Total Orthophosphate (as P)	0.83	0.73	0.039	0.098	0.015	0.01U
Total Phosphorus	0.78	0.73	0.093	0.18	0.26	0.32
Total Recoverable Phenolics	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
Total Dissolved Solids	1400	1600	4900	3900	1300	580
Total Suspended Solids	2.7	1.9	6.5	6.6	44	72
Total Volatile Solids	-	1.3U	-	6	-	37
Turbidity (NTU)	4.6	2.4	5.2	4	18	26

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J-=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.14 Summary of Chemical Analyses of Dry Weather Monitoring, 2005/2006. (continued).

Analyte Name	Belmont Pump 18-Aug-2005	Belmont Pump 11-May-2006	Bouton Creek 18-Aug-2005	Bouton Creek 11-May-2006	Los Cerritos Channel 18-Aug-2005	Los Cerritos Channel 11-May-2006
Dissolved Metals (µg/L)						
Aluminum	50U	18J	50U	21J	50U	3.8J
Arsenic	5.7	3.6	8	3.7	5.7	4.9
Cadmium	0.2U	0.4U	0.2U	0.064J	0.2U	0.23
Chromium	0.65	0.75	0.23	0.34J	0.23	0.67
Copper	**3.7** [6]	1.4	**8.0** [6]	3.1	**12** [6]	**15** [5,6]
Iron	43	46	125U	42	25U	38
Lead	0.5U	0.39J	0.5U	0.64	0.6	1.1
Nickel	1U	2.1	1U	2.7	1U	4.4
Selenium	1U	0.63J	1U	0.65J	1U	1.6
Silver	0.2U	0.034J	0.2U	0.4U	0.2U	0.009J
Zinc	8.5	11	12	28	R	19
Total Metals (µg/L)						
Aluminum	89	56	50U	99	170	400
Arsenic	4.1	2.4	7.2	2.1	5.1	5.8
Cadmium	0.2U	0.4U	0.2U	0.062J	0.26	0.32
Chromium	0.84	0.51	0.36	0.5U	0.62	1.5
Copper	4.1J	2.7	12J	5.3	**17J** [2]	**22** [2]
Iron	260	170	100U	160	120	560
Lead	1.2	0.91	0.94	1.8	2.8	3.6
Nickel	1U	1.3	1U	2.1	1U	6.5
Selenium	0.21J-	0.28J	0.1UJ	0.42J	0.39J-	1.4
Silver	0.2U	0.2U	0.2U	0.012J	0.2U	0.022J
Zinc	15	18	16	37	40	68
Aroclors (µg/L)100						
Aroclor 1016	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U
Aroclor 1221	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U
Aroclor 1232	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U
Aroclor 1242	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U
Aroclor 1248	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U
Aroclor 1254	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U
Aroclor 1260	0.02U	0.02U	0.02U	0.02U	0.02U	0.02U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J-=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.14 Summary of Chemical Analyses of Dry Weather Monitoring, 2005/2006. (continued).

Analyte Name	Belmont Pump 18-Aug-2005	Belmont Pump 11-May-2006	Bouton Creek 18-Aug-2005	Bouton Creek 11-May-2006	Los Cerritos Channel 18-Aug-2005	Los Cerritos Channel 11-May-2006
Chlorinated Pesticides (µg/L)						
2,4'-DDD	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
2,4'-DDE	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
2,4'-DDT	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDD	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDE	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDT	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Total DDT	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Aldrin	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Dieldrin	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin aldehyde	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin ketone	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
alpha-BHC	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
beta-BHC	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
delta-BHC	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
gamma-BHC (Lindane)	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan I	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan II	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan sulfate	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
alpha-Chlordane	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
gamma-Chlordane	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Heptachlor	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Heptachlor epoxide	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Oxychlordane	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
cis-Nonachlor	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
trans-Nonachlor	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Total Chlordane	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Methoxychlor	0.05U	0.05U	0.05U	0.05U	0.05U	0.05U
Mirex	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U
Toxaphene	0.005U	0.005U	0.005U	0.005U	0.005U	0.005U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J-=value is considered to be a low estimate, J+=values is considered to be a high estimate.

Table 6.14 Summary of Chemical Analyses of Dry Weather Monitoring, 2005/2006. (continued).

Analyte Name	Belmont Pump 18-Aug-2005	Belmont Pump 11-May-2006	Bouton Creek 18-Aug-2005	Bouton Creek 11-May-2006	Los Cerritos Channel 18-Aug-2005	Los Cerritos Channel 11-May-2006
Organophosphates (µg/L)						
Bolstar (Sulprofos)	0.02U	0.004U	0.02U	0.004U	0.02U	0.004U
Chlorpyrifos	0.01U	0.002U	0.01U	0.002U	0.01U	0.002U
Demeton	0.02U	0.002U	0.02U	0.002U	0.02U	0.002U
Diazinon	0.01U	0.004U	0.01U	0.004U	0.01U	0.004U
Dichlorvos	0.02U	0.006U	0.02U	0.006U	0.02U	0.006U
Dimethoate	0.01U	0.006U	0.01U	0.006U	0.01U	0.006U
Disulfoton	0.02U	0.002U	0.02U	0.002U	0.02U	0.002U
Ethoprop	0.02U	0.002U	0.02U	0.002U	0.02U	0.002U
Fensulfothion	0.02U	0.002U	0.02U	0.002U	0.02U	0.002U
Fenthion	0.02U	0.004U	0.02U	0.004U	0.02U	0.004U
Malathion	0.01U	0.006U	0.01U	0.006U	0.01U	0.006U
Merphos	0.02U	0.002U	0.02U	0.002U	0.02U	0.002U
Methyl Parathion	0.02U	0.002U	0.02U	0.002U	0.02U	0.002U
Mevinphos	0.02U	0.016U	0.02U	0.016U	0.02U	0.016U
Phorate	0.02U	0.012U	0.02U	0.012U	0.02U	0.012U
Ronnel	0.02U	0.004U	0.02U	0.004U	0.02U	0.004U
Tetrachlorvinphos (Stirophos)	0.02U	0.004U	0.02U	0.004U	0.02U	0.004U
Tokuthion (Prothiofos)	0.02U	0.006U	0.02U	0.006U	0.02U	0.006U
Trichloronate	0.02U	0.002U	0.02U	0.002U	0.02U	0.002U
Triazines (µg/L)						
Ametryn	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Atraton	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Atrazine	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Cyanazine	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Prometon	0.0187	0.0515	0.01U	0.01U	0.01U	0.01U
Prometryn	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Propazine	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Secbumeton	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Simazine	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Simetryn	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Terbutryn	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U
Terbutylazine	0.01U	0.01U	0.01U	0.01U	0.01U	0.01U

Bolded values with superscripts exceed criteria 1-Ocean Plan, 2-LA Basin Plan, 3-Cal. Fish&Game Freshwater 4-Cal Fish&Game Saltwater, 5-Cal Toxics Rule Freshwater, 6-Cal Toxics Rule Saltwater, 7- National Non Priority Pollutant Freshwater, 8- National Non Priority Pollutant Saltwater; U=not detected at the detection limit, J=value is considered an estimate, J-=value is considered to be a low estimate, J+=values is considered to be a high estimate.

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7.0 TOXICITY RESULTS

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7.0 TOXICITY RESULTS

Toxicity tests were conducted on subsamples of the composites collected for chemical analysis. Wet weather samples were collected from five storm events: October 18, 2005, January 2, 2006, February 28, 2006, March 3, 2006, and March 29, 2006. Composite samples were collected during each of the storm events and were tested with two species, the water flea *Ceriodaphnia dubia* (freshwater crustacean), and the sea urchin *Strongylocentrotus purpuratus* (marine echinoderm).

Dry weather sampling occurred on August 18, 2005 and May 11, 2006.

7.1 Wet Weather Discharge

Toxicity tests were conducted in stormwater discharges from three of the mass emission monitoring sites which included the Belmont Pump Station, Bouton Creek and Los Cerritos Channel. Toxicity testing is not required for discharges from the Dominguez Pump Station.

7.1.1 Belmont Pump

Toxicity results from the Belmont Pump station are presented in Table 7.1 and Figure 7.1. The first sample from the Belmont Pump station was collected on October 18, 2005. This sample caused measurable toxic effects both in the water flea and the sea urchin. Water flea survival and reproduction each showed NOECs of 50% (2 TU_c) and LOECs of 100% sample. The LC50 for survival was 75% (1.33 TU_a) and the EC50 for reproduction was 83% sample (1.21 TU_a). The urchin fertilization test showed a NOEC of 12.5% sample (8 TU_c) and a LOEC of 25% sample. The EC50 was >50% sample (no concentration tested produced a reduction of fertilization as high as 50%), and there were <2 TU_a in this sample.

The second Belmont Pump sample was collected on January 2, 2006. Due to limited sample volume only the 100% concentration of Belmont Pump water was tested. There was no water flea mortality (100% survival) and there was excellent reproduction (27.7 neonates per surviving female). The NOECs for both survival and reproduction were 100% sample (1 TU_c). Because only the 100% sample concentration was tested, the LC50 and EC50 were not calculable. Note that survival of the control daphnids was below test acceptability criteria (TAC), and therefore this bioassay was not technically valid. The results, while they strongly suggest that the sample was not toxic to water fleas, should be viewed with caution. There was minor toxicity detected in the sea urchin fertilization test, where the NOEC was 25% sample (4 TU_c) and the EC50 was >50% sample (<2 TU_a).

The third Belmont Pump sample was collected on February 28, 2006, and produced no toxic responses in water flea survival or reproduction (NOECs > 100%, <1 TU_c). The water flea LC50 and EC50 were both >100% (<1 TU_a). The sea urchin test NOEC was 12.5% sample (8 TU_c) and the EC50 was >50% sample (<2 TU_a).

The fourth Belmont Pump sample was collected on March 29, 2006, and produced no toxic responses in water flea survival or reproduction (NOECs 100%, 1 TU_c). The urchin fertilization NOEC was < 3.1% sample (>32TU_c) and the EC50 was 9.1% sample (11 TU_a). This level of toxicity triggered a sea urchin TIE.

7.1.2. Bouton Creek

Toxicity results from the Bouton Creek station are presented in Table 7.2 and Figure 7.2. The first sample from the Bouton Creek station was collected on January 2, 2006. The water flea bioassay showed no mortality in any test concentration, and reproduction was not significantly reduced from control levels (NOECs > 100% sample, <1 TU_c). The LC50 and EC50 were both >100% (<1 TU_a). Note that survival of the control daphnids was

below test acceptability criteria (TAC), and therefore this bioassay was not technically valid. The results, while they strongly suggest that the sample was not toxic to water fleas, should be viewed with caution. The sea urchin fertilization bioassay showed a NOEC of 6.25% sample (16 TU_c) and an EC50 of 45.7% sample (2.19 TU_a).

The second Bouton Creek sample was collected on February 28, 2006 and produced no toxic responses in water flea survival/reproduction (NOEC 100% sample, 1 TU_c; LC/EC50 >100%, <1 TU_a). The sea urchin fertilization NOEC was 12.5% sample (8 TU_c) and the EC50 was 37.1% sample (2.7 TU_a).

The third Bouton Creek sample was collected on March 3, 2006 and produced no toxic responses in water flea survival/reproduction (NOEC 100% sample, 1 TU_c; LC/EC50 = >100%, <1 TU_a). Likewise, no toxicity was detected in the sea urchin fertilization test (NOEC 50% sample, 2 TU_c and EC50>50%, <2 TU_a).

The fourth Bouton Creek sample was collected on March 29, 2006 and produced no toxic response in water flea survival/reproduction. (NOEC 100% sample, 1 TU_c; LC/EC50 >100%, <1 TU_a). Substantial toxicity to sea urchin fertilization was apparent, with a NOEC of <3.1% sample (32 TU_c) and an IC50 of 4.6% (21.7 TU_a). A sea urchin TIE was triggered by this sample.

7.1.3. Los Cerritos Channel

Toxicity results from the Los Cerritos Channel station are presented in Table 7.3 and Figure 7.3. The first sample from the Los Cerritos Channel station was collected on October 18, 2005. This sample produced mild toxic responses in both water flea survival/reproduction and sea urchin fertilization. The NOEC for water flea survival was 50% sample (2 TU_c) and the LC50 was 75% sample (1.33 TU_a). For water flea reproduction, the NOEC was 50% sample (2 TU_c) and the EC50 was 83.6% sample (1.2 TU_a). For sea urchin fertilization the NOEC was 25% sample (4 TU_c) and the IC50 was >50% sample (<2 TU_a).

The second Los Cerritos Channel sample was collected on January 2, 2006. Water flea survival averaged 90% in undiluted Cerritos water and 100% in all other test water concentrations. Mean reproduction ranged from about 27 to 36 neonates per surviving female in Cerritos water. NOEC for survival was 100% sample (1 TU_c). Note that both survival and reproduction of the control daphnids were below test acceptability criteria (TAC), and therefore this bioassay was not technically valid. The results, while they strongly suggest that the sample was not toxic to water fleas, should be viewed with caution. The sea urchin test showed measurable toxicity. The NOEC for fertilization was 12.5% sample (8 TU_c). The EC50 was >50% sample (<2 TU_a).

The third Los Cerritos Channel sample was collected on February 28, 2006, and showed no toxicity to water flea survival or reproduction; NOECs for both test endpoints were100% sample (1 TU_c) and LC/EC50s were >100% (<1 TU_a). The sea urchin test also showed no toxicity. The NOEC for fertilization was 50% sample (2 TU_c) and the EC50 was >50% sample (<2 TU_a).

The fourth Los Cerritos Channel sample was collected on March 3, 2006. This sample produced no toxic responses in water flea survival/reproduction (NOECs 100% sample or 1 TU_c; LC/EC50 >100% or <1 TU_a). The sample showed minor toxicity to sea urchin fertilization. The NOEC for fertilization was 25% sample (4 TU_c), and the EC50 was >50% sample (<2 TU_a).

7.2 Dry Weather Discharge

Toxicity results from the dry weather samples are presented in Table 7.4 and Figures 7.4-7.6. Toxicity tests were conducted on samples from dry weather sampling events, on August 18, 2005 and May 11, 2006. The Bouton Creek sample collected in August 2005 contained, about 4.6‰ salinity, which is about 1.28X the LC50

for the water flea. This level of salinity is considered to have a potential to affect the water flea toxicity data. The May 2006 Bouton Creek sample contained a slightly lower salinity level (3.7‰) but is still considered to potentially affect water flea toxicity responses.

7.2.1 Belmont Pump Station

In August 2005, no concentration of the Belmont Pump sample produced either measurably decreased survival/reproduction in the water flea, or a measurable decrease in sea urchin fertilization.

The May 2006 dry weather sample likewise did not produce measurable toxic responses in either water flea survival/reproduction or sea urchin fertilization.

7.2.2 Bouton Creek

The August 2005 bioassays showed significantly decreased survival of *Ceriodaphnia* in all five test concentrations. The NOEC for survival was <6.25% sample (>16 TU_c) and the LC50 for survival was 3.125% sample (32 TU_a). There was also significantly decreased water flea reproduction in all five sample concentrations. The NOEC for reproduction was <6.25% sample (>16 TU_c) and the EC50 for reproduction was 3.125% sample (32 TU_a). A water flea TIE was initiated for this sample.

In the May 2006 dry weather sample there was significantly decreased survival and reproduction of *Ceriodaphnia* in the 100% sample. The NOEC for both survival and reproduction was 50% sample (2 TU_c), the LC50 was 73.6% sample (1.36 TU_a) and the EC50 was 75% sample (1.33 TU_a).

No measurable toxicity to sea urchins (NOEC >50%, IC50 >50%) was demonstrated in either the August 2005 or the May 2006 Bouton Creek dry weather samples.

7.2.3 Los Cerritos Channel

The August 2005 dry weather sample from Los Cerritos Channel produced complete mortality of *Ceriodaphnia* in all test concentrations. The NOEC for survival was <6.25% sample (>16 TU_c) and the LC50 for survival was 3.125% sample (32 TU_a). There was significantly decreased water flea reproduction in all five sample concentrations. The NOEC for reproduction was <6.25% sample (>16 TU_c) and the EC50 for reproduction was 3.125% sample (32 TU_a). A water flea TIE was initiated for this sample.

The August 2005 dry weather sample from Cerritos produced significantly decreased fertilization of sea urchin eggs in the 50% concentration. The NOEC was 25% sample (4 TU_c) and the EC50 was >50% (<2 TU_a).

The May 2006 Los Cerritos Channel dry weather sample showed no measurable decrease in either survival or reproduction in *Ceriodaphnia.* The NOEC for both test endpoints was 100% (1 TU_c) and the LC and EC50s were >100% (<1 TU_a).

In May 2006 the sea urchin fertilization test showed significantly decreased fertilization in the 50% concentration of Los Cerritos Channel sample. The NOEC was 25% (4 TU_c) and the EC50 was 43.2% (2.31 TU_a).

7.3 Toxicity Identification Evaluations (TIEs)

A TIE was initiated when a LC50 of ≤50% (equivalent to ≥2 acute TU) was obtained for water flea survival or an EC50 of ≤33% (≥3 acute TU) was obtained for the sea urchin fertilization test. Sample manipulations were performed when the TIE trigger was exceeded, but the manipulated samples were subjected to toxicity evaluations only if the baseline toxicity showed persistent toxicity above the TIE triggers for each test. TIE activity is summarized in Table 7.5.

7.3.1 Stormwater Toxicity Identification Evaluations (TIEs)

Sea urchin TIEs were triggered for the March 29 sampling event by samples from the Belmont Pump and Bouton Creek stations. The initial 96-hour sample toxicities were 11 and 21.7 TUa, respectively. TIEs were initiated twice on April 1, but control organisms failed to achieve minimally acceptable fertilization levels in either attempt. A third attempt to initiate the TIE evaluation bioassays was made on April 4, but again control fertilization failed to meet TAC. Broodstock urchins were obtained from a different supplier and TIEs were initiated for the fourth time on April 11. Controls met TAC this time, but baseline toxicity had fallen to <2 TU_a, so the TIE was abandoned.

7.3.2 Dry Weather Toxicity Identification Evaluations (TIEs)

On August 21, 2005, water flea TIEs were initiated on the August 18, 2005 dry weather samples from the Bouton Creek and Los Cerritos Channel stations.

For the Bouton Creek sample (Figure 7.7), baseline 96-hour toxicity decreased to 27.9 TU_a from the initial toxicity of 32 TU_a. Sample toxicity was slightly reduced by centrifugation, and was virtually eliminated by C18 SPE treatment. PBO treatments produced either slightly decreased sample toxicity (to 14.3 TU_a at the lowest concentration) or enhanced toxicity (to 32 TU_a) at the higher PBO concentrations. Both EDTA and STS treatments resulted in elevated toxicity (45-102 TU_a), with no blank toxicity.

- The C18 results suggest that a non-polar organic compound was the primary toxicant.
- The slight reduction of toxicity produced by sample centrifugation suggests that particle bound toxicants may have contributed to sample toxicity.
- Because PBO treatment both increased and decreased toxicity it is possible that both organophosphate and pyrethroid pesticides contributed to toxicity in this sample (since PBO both reduces OP toxicity and synergizes pyrethroid toxicity). Sample toxicity decreased about 16% with the addition of 125 ppb of PBO, but increased by 450% with 250 ppb and 500 ppb of PBO. Since PBO may act as a pyrethroid synergist, this effect suggests that pyrethroid pesticides may have contributed to sample toxicity.
- Since neither EDTA nor STS had any significant toxicity-reducing effect, divalent metals and reducible contaminants are not suggested as toxicants.

The Los Cerritos Channel (Figure 7.8) showed baseline toxicity that had diminished to <16 TU_a (>50% reduction) from the initial toxicity measurement. There was not sufficient toxicity measured in the baseline sample and the TIE was abandoned.

Upon later review of watershed toxicity during the time period in question, and because of the unexplained large decrease of baseline toxicity, it was decided to retest the original Cerritos Channel sample for toxicity and, if sufficient acute toxicity was found, to proceed with a second TIE. The toxicity retest was initiated after 41

days of sample storage using only 50% and 100% concentrations. Both sample concentrations produced complete mortality of *Ceriodaphnia* within 24 hours, producing a calculated LC50 of 25% sample (4 TU_a). Having now confirmed the persistence of sufficient toxicity, a TIE retest was initiated 43 days after sample collection. In addition to the usual sample manipulations, aeration was added to screen for surfactant toxicity because evidence from another TIE done on samples from the upper watershed had suggested surfactant toxicity. In the TIE retest, exposure concentrations were based on the 32 TU_a of toxicity observed in the original screening bioassays done on August 19.

Baseline toxicity in the retest decreased by 29% to 22.6 TU_a from the original 32 TU_a. Centrifugation increased sample toxicity to 32 TU_a, a 40% increase from baseline. Aeration had no effect on sample toxicity. C18 treatment eliminated measurable toxicity (to < 4TU_a). PBO treatments produced either slightly increased toxicity (40% increase at the 125 and 500 ppb concentrations) or slightly decreased toxicity (37% decrease at 250 ppb). EDTA effects likewise depended upon the EDTA concentration used, with a 40% toxicity increase at the lowest (0.125ml) EDTA dose and 45% and 62% toxicity decreases at 0.05 ml and 0.2 ml EDTA doses, respectively STS treatment uniformly increased sample toxicity. The highest STS concentration used produced 20% mortality in the blank.

- The C18 results suggest that a non-polar organic compound was the primary toxicant
- PBO treatment both increased and decreased toxicity but there was not a linear relationship between PBO concentration and effect. It is possible that both organophosphate and pyrethroid pesticides contributed to toxicity in this sample (since PBO both reduces OP toxicity and synergizes pyrethroid toxicity), but chemical analysis failed to detect OP pesticides and there was no chemical analysis performed for pyrethroids.
- EDTA treatment had a significant toxicity-reducing effect at the higher concentrations used, suggesting that divalent cations may have contributed to sample toxicity. Again, however, chemical analysis failed to detect divalent metals concentrations high enough to cause the toxicity levels seen in the initial and baseline bioassays.
- Additionally, several candidate metals, including the divalent cations of Cd, Cu, Hg, Mn, Pb and Zn should have been reduced by STS treatment and therefore removed as sample toxicants when, in fact, STS *increased* sample toxicity.
- The fact that centrifugation increased toxicity by about 40% suggests that particulates in the sample either were protective or competed for toxicants.
- The TIE retest of the Cerritos Channel sample was problematic in several respects. The unexplained decrease in toxicity indicated by the first baseline bioassay is confusing, as is the restoration of toxicity in the second baseline bioassay after 43 days of storage. Variable biological response to both PBO and EDTA suggested possible involvement of OP/ pyrethroid pesticides and divalent metals in sample toxicity, but chemical analysis was either lacking (pyrethroids) or the analytical results did not support their significant role in sample toxicity. The extended storage time of the sample prior to the TIE retest may have contributed to confusing results.

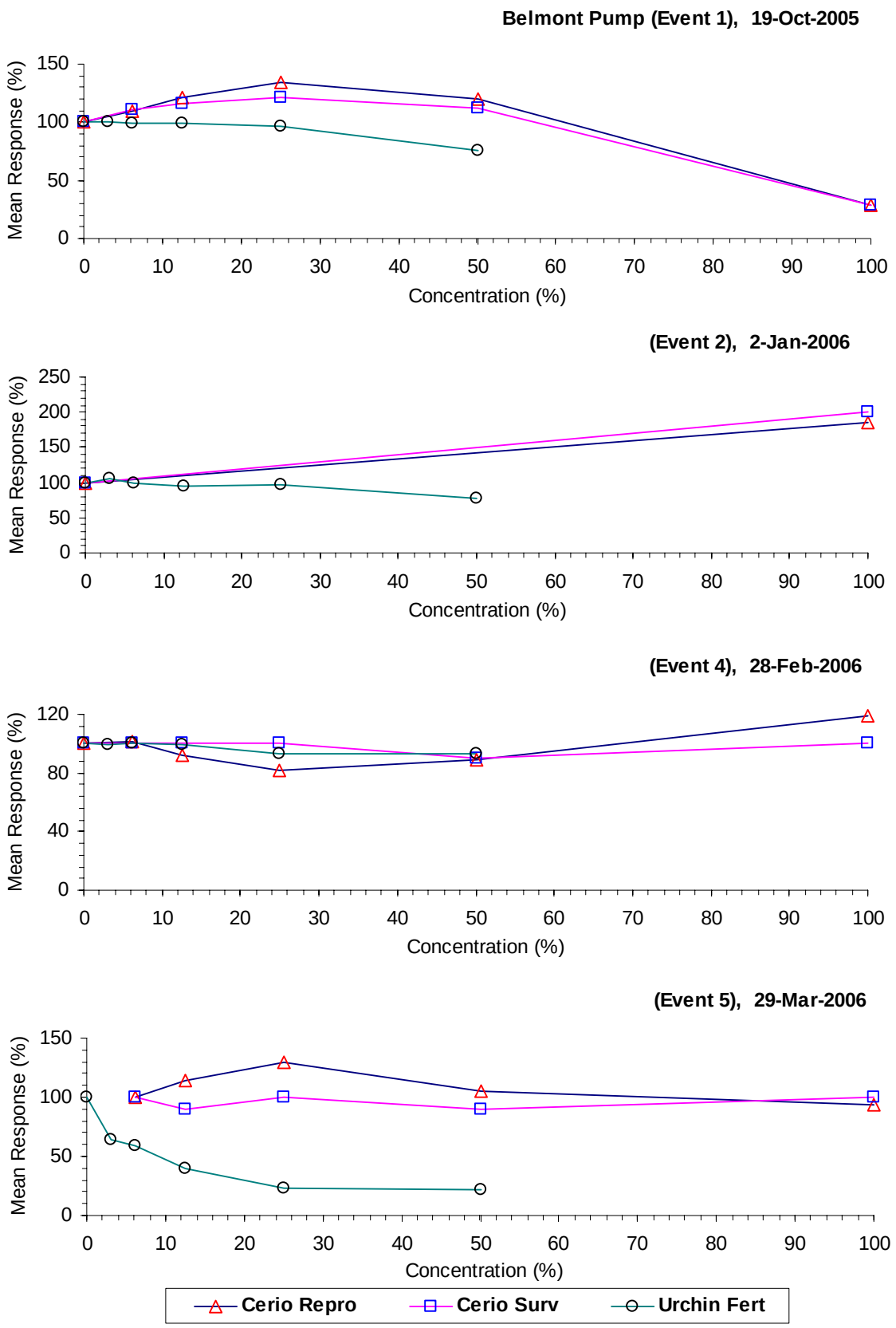

Figure 7.1 Toxicity Dose Response Plots for Stormwater Samples Collected from Belmont Pump, 2005/2006.

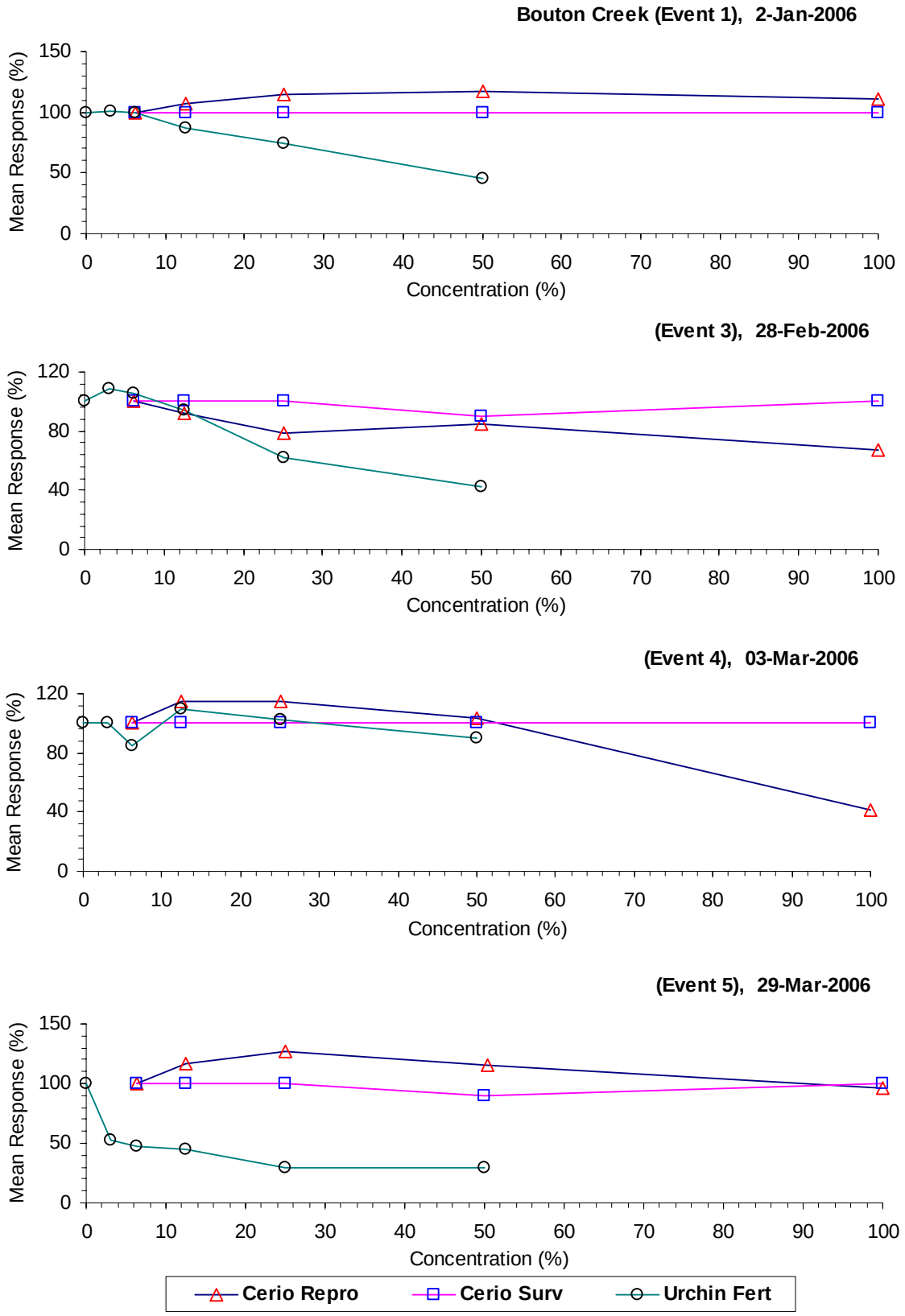

Figure 7.2 Toxicity Dose Response Plots for Stormwater Samples Collected from Bouton Creek, 2005/2006.

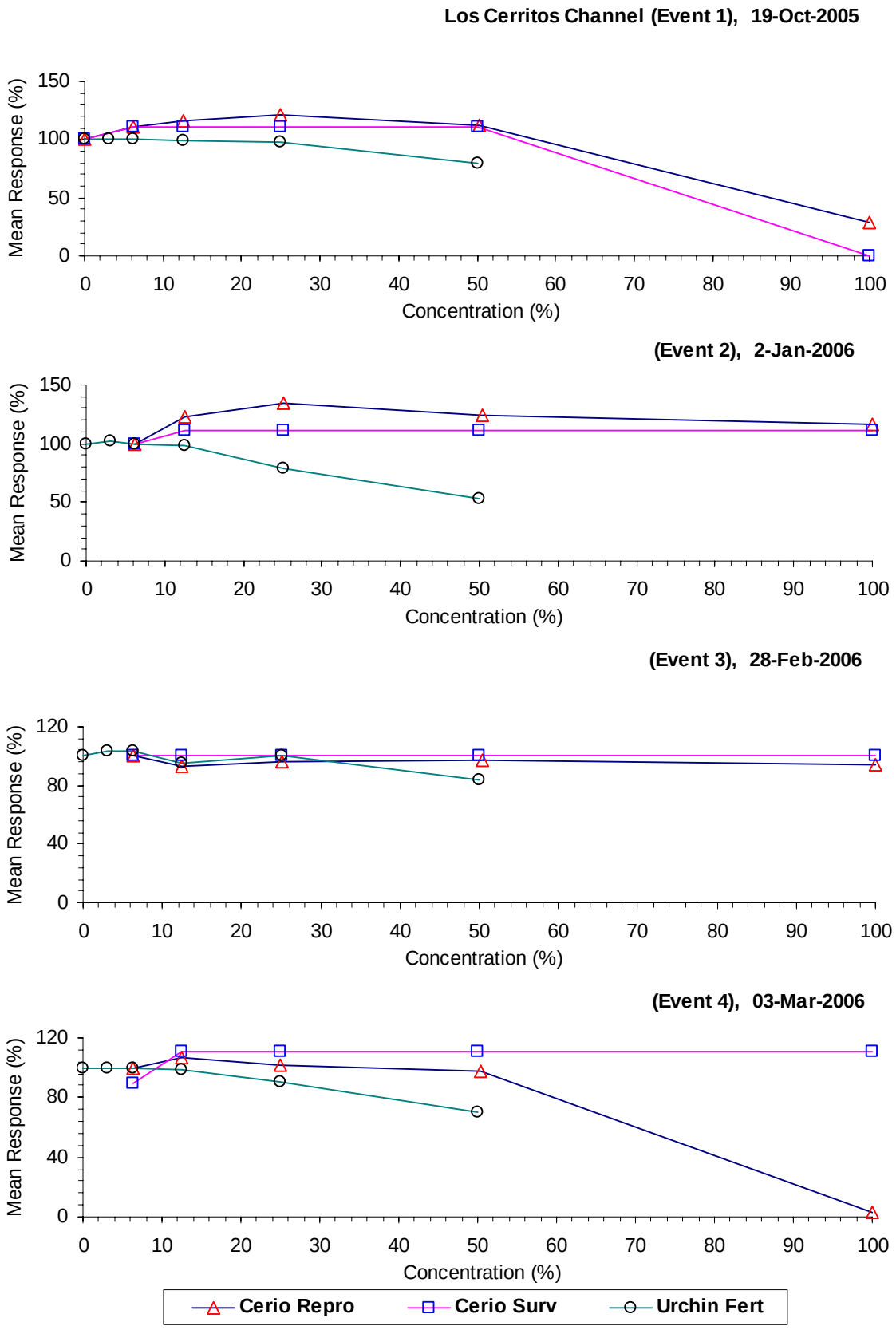

Figure 7.3 Toxicity Dose Response Plots for Stormwater Samples Collected from Los Cerritos Channel, 2005/2006.

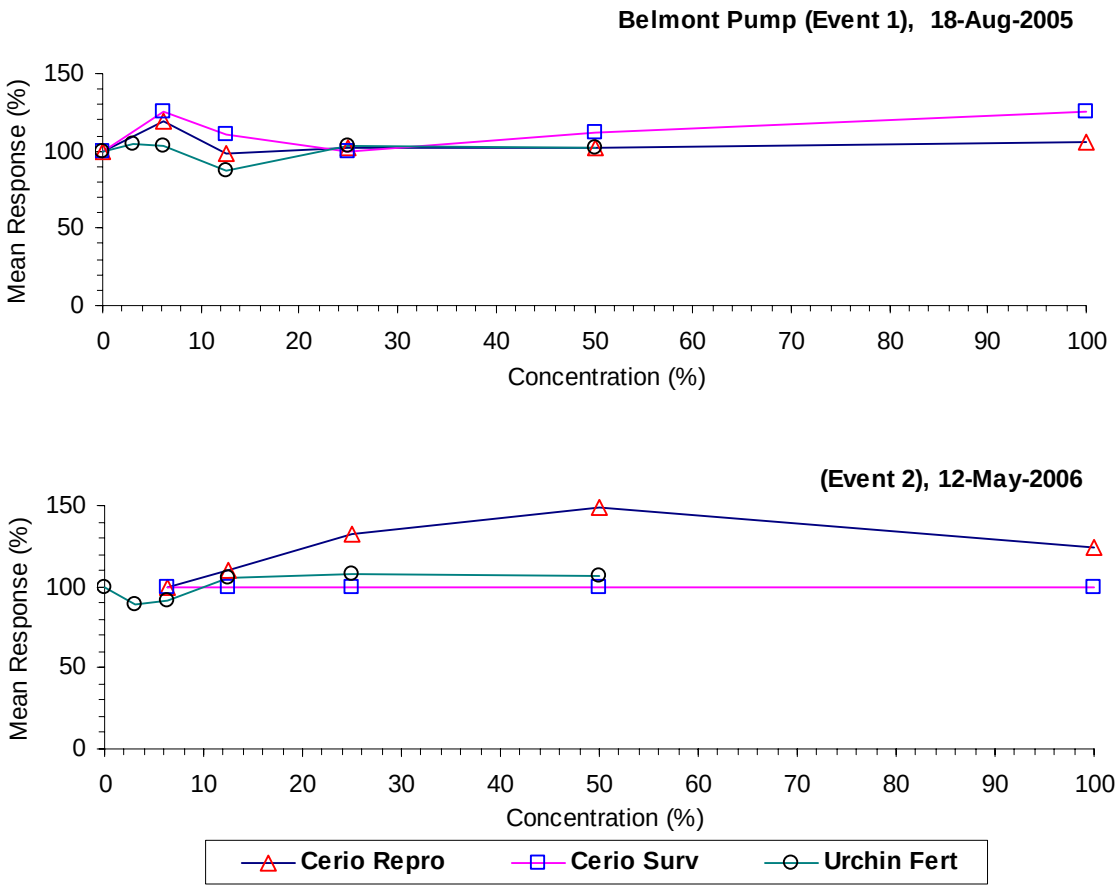

Figure 7.4 Toxicity Dose Response Plots for Dry Weather Samples Collected from Belmont Pump Station, 2005/2006.

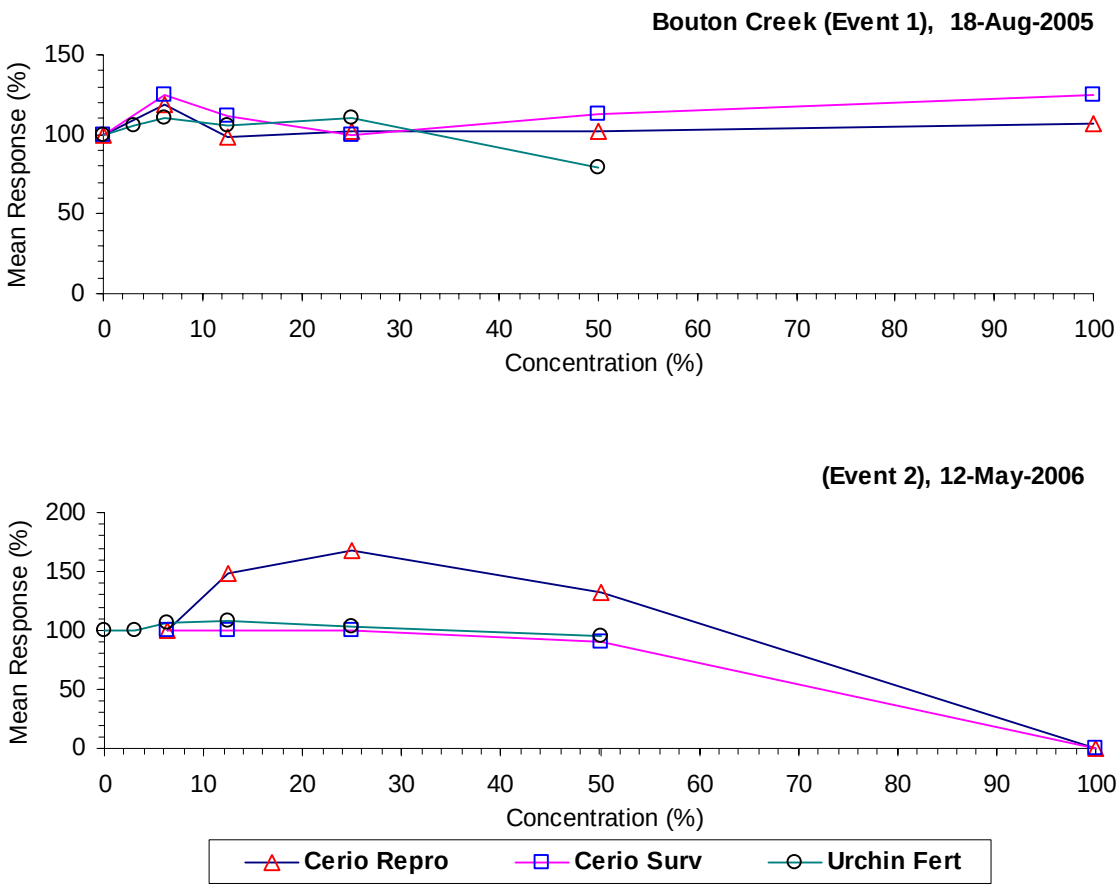

Figure 7.5 Toxicity Dose Response Plots for Dry Weather Samples Collected from Bouton Creek, 2005/2006.

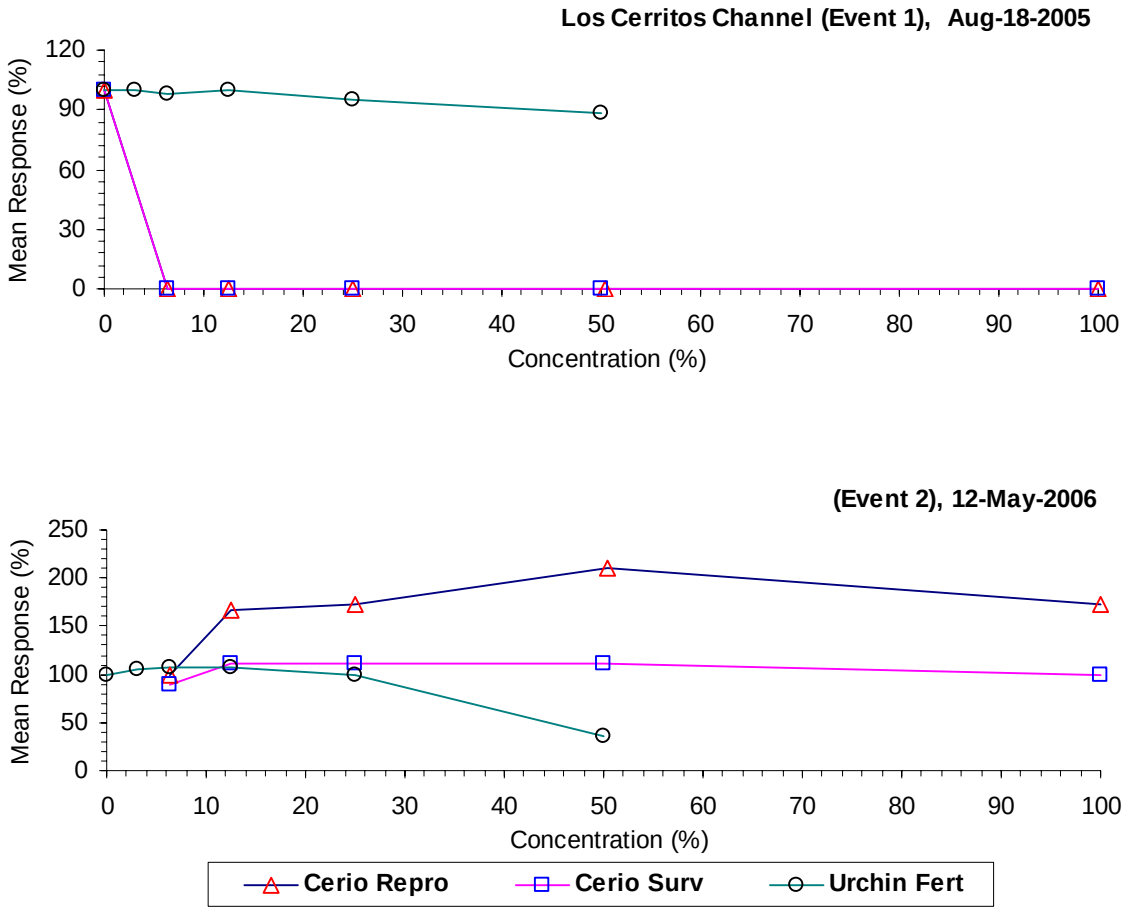

Figure 7.6 Toxicity Dose Response Plots for Dry Weather Samples Collected from Los Cerritos Channel, 2005/2006.

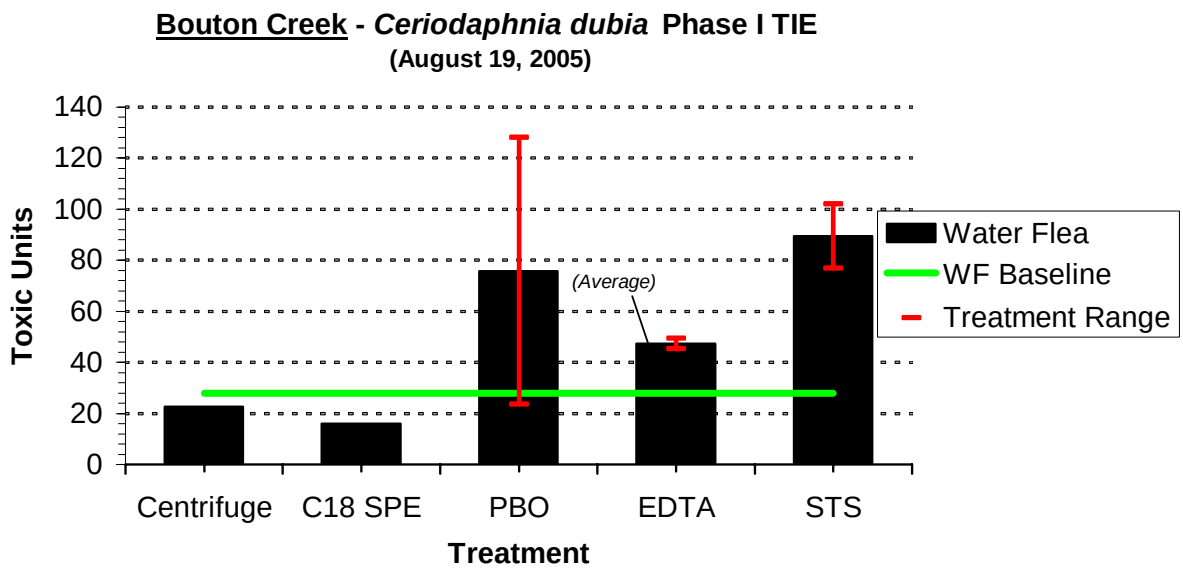

Figure 7.7 **Summary of Phase I TIE Analyses on Dry Weather Samples from the Bouton Creek Station.**

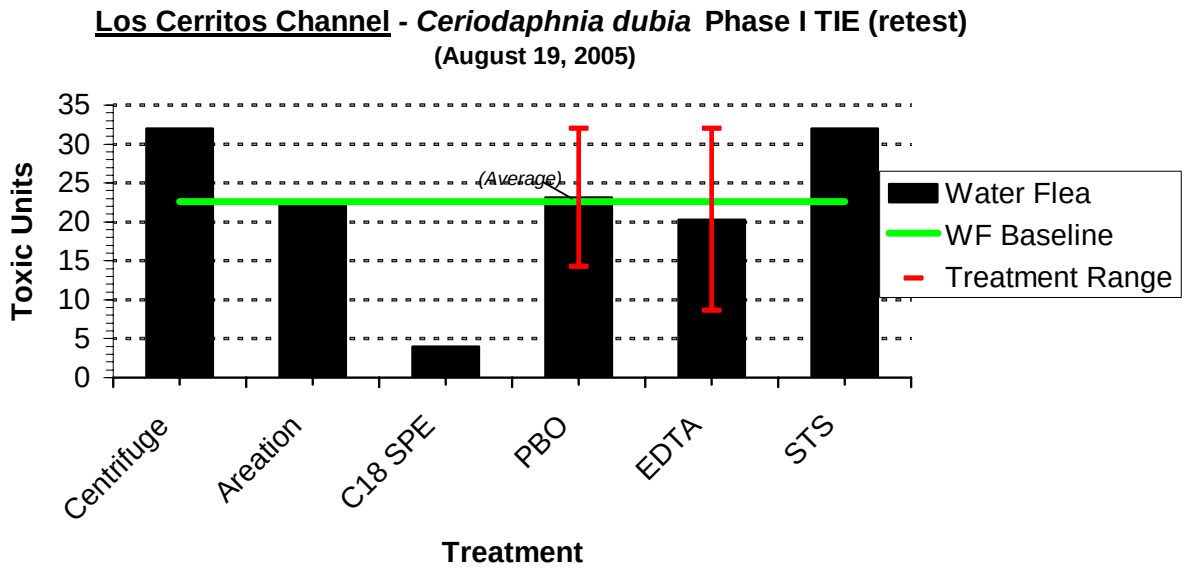

Figure 7.8 **Summary of Phase I TIE Analyses on Dry Weather Samples from the Los Cerritos Channel Station.**

Table 7.1 Toxicity of Wet Weather Samples Collected from the City of Long Beach Belmont Pump Station during the 2005/2006 Monitoring Season.

Date	Test	Test Response (% sample)			TU_c[d]
		NOEC[a]	LOEC[b]	Median Response[c]	
10/18/05	**Water Flea Survival**	**50**	**100**	**75**	**2**
10/18/05	**Water Flea Reproduction**	**50**	**100**	**83**	**2**
10/18/05	**Sea Urchin Fertilization**	**12.5**	**25**	**>50**	**8**
1/2/06	*Water Flea Survival	100	>100	NC	1
1/2/06	*Water Flea Reproduction	100	>100	NC	1
1/2/06	**Sea Urchin Fertilization**	**25**	**50**	**>50**	**4**
2/28/06	Water Flea Survival	100	>100	>100	1
2/28/06	Water Flea Reproduction	100	>100	>100	1
2/28/06	**Sea Urchin Fertilization**	**12.5**	**25**	**>50**	**8**
3/29/06	Water Flea Survival	100	>100	>100	1
3/29/06	Water Flea Reproduction	100	>100	>100	1
3/29/06	**Sea Urchin Fertilization**	**<3.1**	**3.1**	**9.1**	**>32**

Test results indicating toxicity are shown in bold type.
* *Ceriodaphnia* were tested only at the 100% sample concentration due to limited volume, and the controls did not meet the TAC for survival (see Section 7.1.1).

Table 7.2 Toxicity of Wet Weather Samples Collected from the City of Long Beach Bouton Creek Station during the 2005/2006 Monitoring Season.

Date	Test	Test Response (% sample)			TU_c[d]
		NOEC[a]	LOEC[b]	Median Response[c]	
1/2/06	*Water Flea Survival	100	>100	>100	1
1/2/06	*Water Flea Reproduction	100	>100	>100	1
1/2/06	**Sea Urchin Fertilization**	**6.25**	**12.5**	**45.7**	**16**
2/28/06	Water Flea Survival	100	>100	>100	1
2/28/06	Water Flea Reproduction	100	>100	>100	1
2/28/06	**Sea Urchin Fertilization**	**12.5**	**25**	**37.1**	**8**
3/03/06	Water Flea Survival	100	>100	>100	1
3/03/06	Water Flea Reproduction	100	>100	>100	1
3/03/06	Sea Urchin Fertilization	50	>50	>50	2
3/29/06	Water Flea Survival	100	>100	>100	1
3/29/06	Water Flea Reproduction	100	>100	>100	1
3/29/06	**Sea Urchin Fertilization**	**<3.1**	**3.1**	**4.6**	**32**

Test results indicating toxicity are shown in bold type.
* *Ceriodaphnia* bioassay did not meet TAC (See Section 7.1.2)

Table 7.3 Toxicity of Wet Weather Samples Collected from the City of Long Beach Los Cerritos Channel Station during the 2005/2006 Monitoring Season.

Date	Test	Test Response (% sample)			TU_c[d]
		NOEC[a]	LOEC[b]	Median Response[c]	
10/18/05	**Water Flea Survival**	**50**	**100**	**75**	**2**
10/18/05	**Water Flea Reproduction**	**50**	**100**	**83.6**	**2**
10/18/05	**Sea Urchin Fertilization**	**25**	**50**	**>50**	**4**
1/2/06	*Water Flea Survival	100	>100	>100	1
1/2/06	*Water Flea Reproduction	100	>100	>100	1
1/2/06	**Sea Urchin Fertilization**	**12.5**	**25**	**>50**	**8**
2/28/06	Water Flea Survival	100	>100	>100	1
2/28/06	Water Flea Reproduction	100	>100	>100	1
2/28/06	Sea Urchin Fertilization	50	>50	>50	2
3/3/06	Water Flea Survival	100	>100	>100	1
3/3/06	Water Flea Reproduction	100	>100	>100	1
3/3/06	**Sea Urchin Fertilization**	**25**	**50**	**>50**	**4**

Test results indicating toxicity are shown in bold type.
* *Ceriodaphnia* bioassays did not meet TAC (See Section 7.1.3)

Table 7.4 Toxicity of Dry Weather Samples from the City of Long Beach during the 2005/2006 Monitoring Season.

Station	Date	Test	Test Response (% sample)			TU_c[d]
			NOEC[a]	LOEC[b]	Median Response[c]	
Belmont	8/18/05	Water Flea Survival	100	>100	>100	1
Belmont	8/18/05	Water Flea Reproduction	100	>100	>100	1
Belmont	8/18/05	Sea Urchin Fertilization	50	>50	>50	2
Bouton	**8/18/05**	**Water Flea Survival**	**<6.25**	**6.25**	**3.125**	**>16**
Bouton	**8/18/05**	**Water Flea Reproduction**	**<6.25**	**6.25**	**3.125**	**>16**
Bouton.	8/18/05	Sea Urchin Fertilization	50	>50	>50	2
Los Cerritos	**8/18/05**	**Water Flea Survival**	**<6.25**	**6.25**	**3.125**	**>16**
Los Cerritos	**8/18/05**	**Water Flea Reproduction**	**<6.25**	**6.25**	**3.125**	**>16**
Los Cerritos	**8/18/05**	**Sea Urchin Fertilization**	**25**	**50**	**>50**	**4**
Belmont	5/11/06	Water Flea Survival	100	>100	>100	1
Belmont	5/11/06	Water Flea Reproduction	100	>100	>100	1
Belmont	5/11/06	Sea Urchin Fertilization	50	>50	>50	2
Bouton	**5/11/06**	**Water Flea Survival**	**50**	**100**	**73.6**	**2**
Bouton	**5/11/06**	**Water Flea Reproduction**	**50**	**100**	**75**	**2**
Bouton	5/11/06	Sea Urchin Fertilization	50	>50	>50	2
Los Cerritos	5/11/06	Water Flea Survival	100	>100	>100	1
Los Cerritos	5/11/06	Water Flea Reproduction	100	>100	>100	1
Los Cerritos	**5/11/06**	**Sea Urchin Fertilization**	**25**	**50**	**43.2**	**4**

Test results indicating toxicity are shown in bold type.

Table 7.5 Summary of TIE Activities. Acute Toxic Units (TU_as) for the initial (TU-I) and TIE baseline (TU-B) tests are shown (96 hr exposure time for water flea), along with the TIE-related action taken. TIEs were abandoned when the baseline TU_a value fell below 2.0.

		Water Flea			Sea Urchin		
Date	**Test**	**TU-I**	**TU-B**	**Action**	**TU-I**	**TU-B**	**Action**
Wet Weather Events							
3/29/06	Belmont				11	<2	Abandon
3/29/06	Bouton				21.7	<2	Abandon
Dry Weather Events							
8/10/05	Bouton	32	27.9	Proceed			
8/10/05	*Los Cerritos	32	22.6	Proceed			

* Problematic TIE results (See Section 7.4)

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8.0 ALAMITOS BAY PILOT RECEIVING WATER STUDY RESULTS

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8.0 ALAMITOS BAY PILOT RECEIVING WATER STUDY RESULTS

8.1 Vertical and Horizontal Extent of the Stormwater Plume

Runoff during the October 18, 2005 storm resulted in a surface plume that extended from the lower reaches of Los Cerritos Channel to approximately 1 km in both directions from the mouth of the channel. Another plume was also recorded in the vicinity of the East 2nd Street Bridge (Figure 8.1). Total rainfall at the Long Beach mass emission sites was averaged slightly more than 0.5 inches over a period of two days. During a six hour period in the early morning hours of October 18th, rainfall measured at these sites ranged from 0.16 inches to 0.23 inches. The plume characteristics of were evaluated on the morning of October 18, 2005 from 0657 to 1114 hours.

Based upon the plume characteristics, the Los Cerritos Channel was the major source of stormwater entering Alamitos Bay. Measured surface salinity within Alamitos Bay ranged from 6.83 to 36‰. The lowest salinities were found within the lower reaches of the Los Cerritos Channel near the Pacific Coast Highway Bridge. The higher surface salinities occurred nearer the Bay entrance and offshore. The upper reaches of Marine Stadium had near open coast salinities (Cast # 1, Figure 8.3a), indicating that there was no plume from this portion of the watershed during this minor event. Surface salinity near the East 2nd Street Bridge was just above 20‰ (Cast # 12, Figure 8.3l), indicating a smaller freshwater source in this area.

The vertical extent of the stormwater plume was determined through the thirteen depth profiles taken in Cerritos Channel, throughout Alamitos Bay. The fresher stormwater formed a surface plume that was typically from a half foot to two feet in depth (Figures 8.3b to l). The layer was thickest and most distinct in Cerritos Creek (Casts # 3, #4 and #5, Figure 8.3c, d, e). The structure of the plume became increasing indistinct towards the entrance to Alamitos Bay (Casts # 10 and #13, Figure 8.3j and m), and in the upper reaches of Marine Stadium (Cast #1, Figure 8.3a).

The stormwater plume tended to be only slightly cooler than the underlying marine waters. Surface temperatures in the plume ranged from 0.3 to 1.56 degrees centigrade lower at the surface than the deeper marine waters. Turbidity in the surface plume ranged from 7 to 19 NTU. Marine water under the plume was relatively clear with turbidity measurements typically in the range of 2 to 3 NTU.

8.2 Chemical Characterization

After mapping the plume, four Receiving Water sites within the plume were selected on the basis of salinity. The location of these sites is shown in Figure 8.2. Sampling was initiated at RW3 where salinity within the plume was recorded by the sonde at 20.96‰. Three additional sites were sampled with sonde recorded salinities of 16.29‰ (RW2), 12.13‰ (RW1) and 24.46‰ (RW4). Influence of stormwater would, therefore, be highest at RW1 and lowest at RW4. The water quality results for the Receiving Laboratory water samples results are summarized in Table 8.1.

Total suspended solids (TSS) did not vary much amongst the four stations (ranging from 7.8 to 13 mg/L) and was correlated with surface salinity. Total metal concentrations increased with decreasing salinity (or increasing stormwater influence) for each of the metals tested. Concentrations were highest inside Cerritos Channel at station RW1 and almost double those of the lowest station, RW4, just outside of the Channel in the direction of the harbor. Total copper concentrations exceeded the 2005 California Ocean Plan (SWRCB, 2006) daily maximum concentration of 12µg/L at all stations except RW4 (which was only 0.1µg/L below the criterion. Total zinc concentrations exceeded the 2005 California Ocean Plan daily maximum concentration of 80 µg/L at stations RW1 and RW2.

The dissolved metals also showed a clear pattern of stormwater influence. Concentration increased as the salinity decreased. The only case where the pattern was interrupted was for copper at station RW3, which was lower than station RW4. Dissolved copper concentrations exceeded the California Toxics Rule (USEPA, 2000) for Saltwater Criterion Maximum Concentration of 4.8 µg/L and the Criterion Continuous Concentration of 3.1 µg/L at all receiving water stations. Dissolved zinc concentrations at stations RW1 and RW2 exceeded the California Toxics Rule for Saltwater Criterion Maximum Concentration of 81 µg/L. Station RW1 also exceeded the Criterion Continuous Concentration of 90 µg/L

Organophosphate (OP) pesticides were not measured in the receiving water samples for this year but their concentrations were below detection limits at all stations during the 2005/2006 monitoring year.

8.3 Toxicological Characterization

Water samples from the four plume sites were tested for toxicity using the sea urchin fertilization test. Samples from each of the Receiving Water stations were tested at five concentrations (3.1%, 6.25%, 12.5%, 25%, and 50%) and each showed negligible toxicity. (Table 8.2, Figure 8.4). All NOECs were 50% sample, and EC_{50}s were all >50% sample. The mean proportion of fertilized eggs in the highest (50%) sample concentrations ranged from 98.3% to 99.5% compared to laboratory control fertilization of 96.3% to 99.3%.

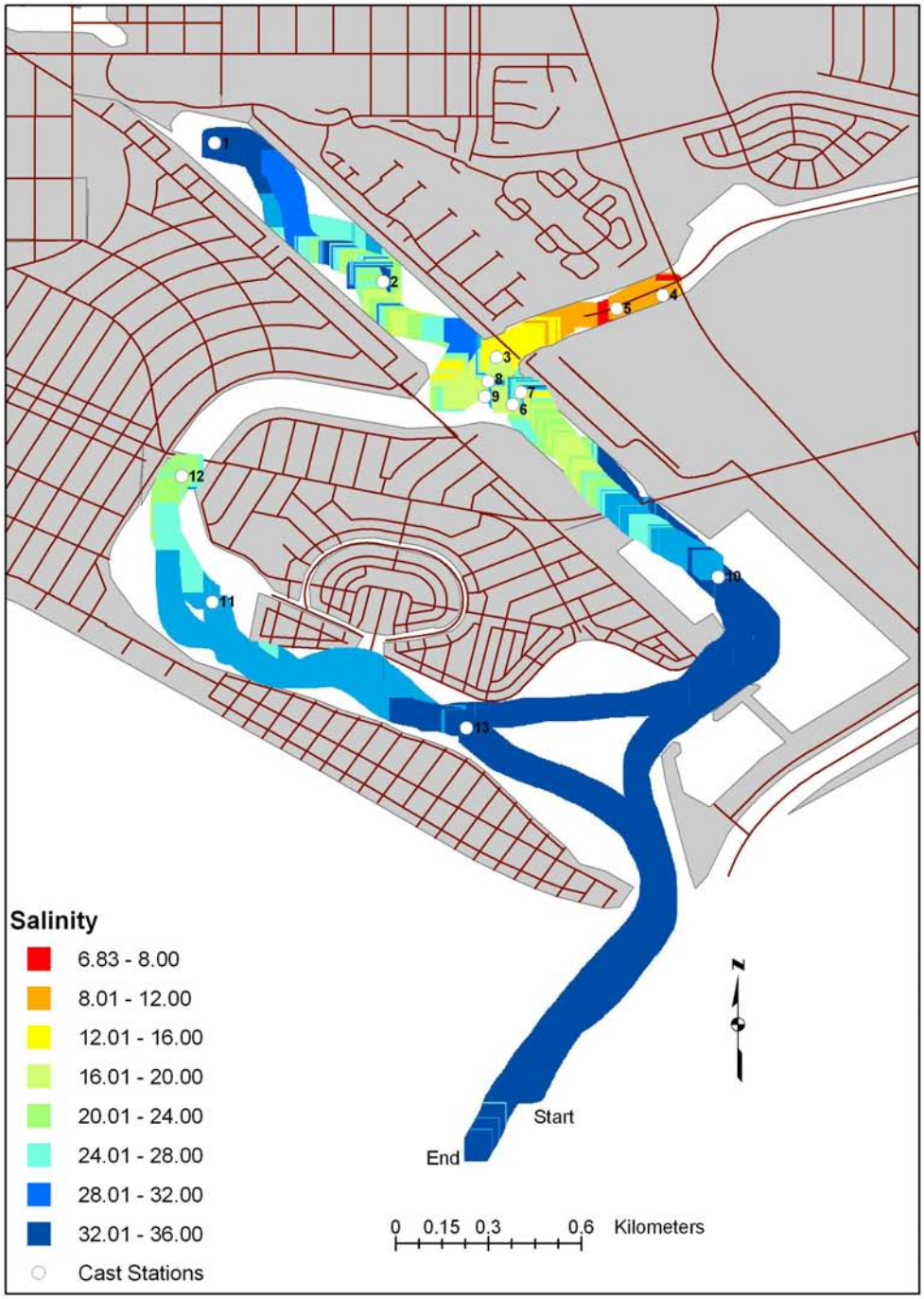

Figure 8.1 Map of Surface Salinity in Alamitos Bay with Locations of Thirteen Water Quality Profiling Sites, 10/18/2005.

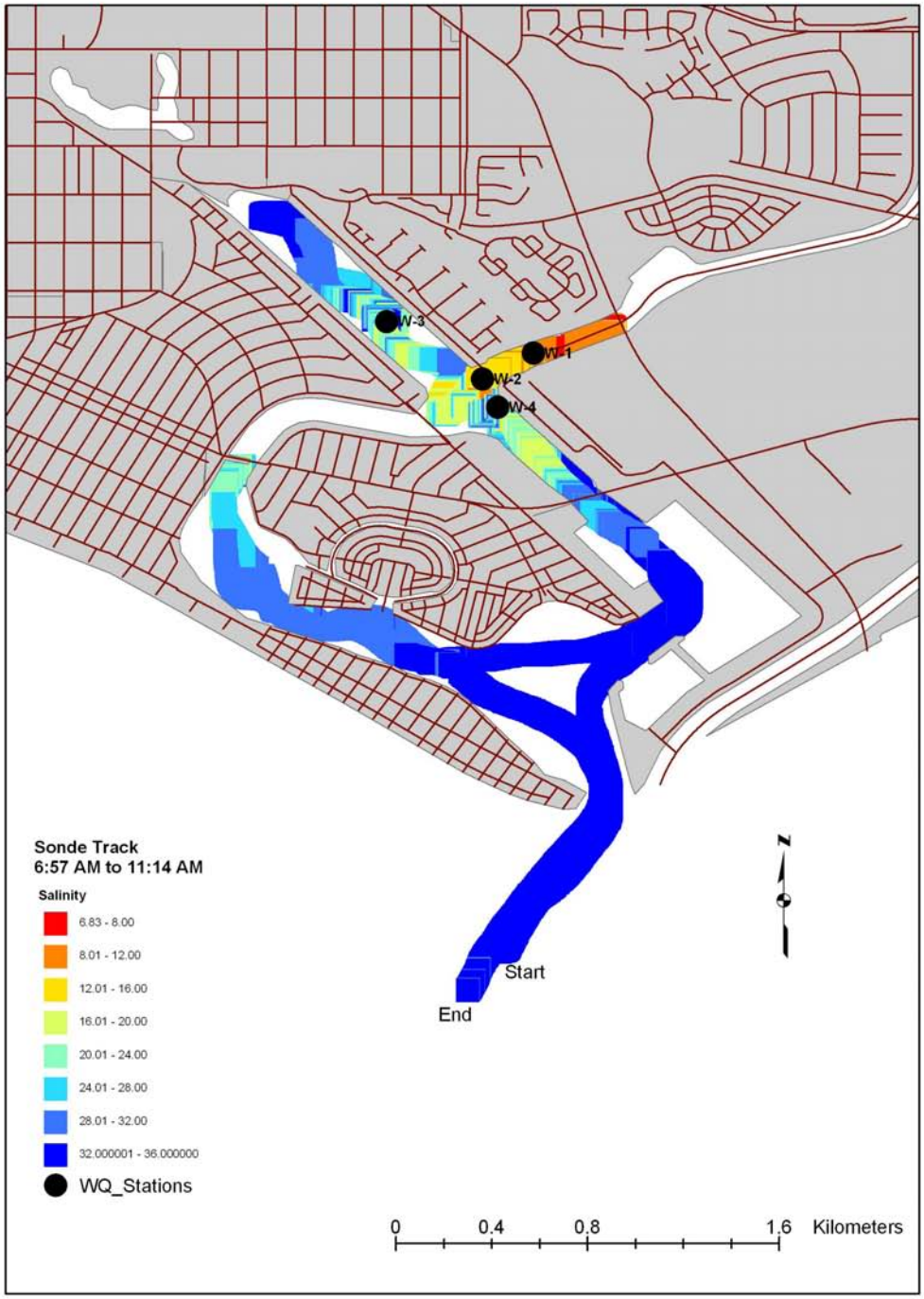

Figure 8.2 Map of Surface Salinity in Alamitos Bay with Water Quality Sampling Locations, 10/18/2005.

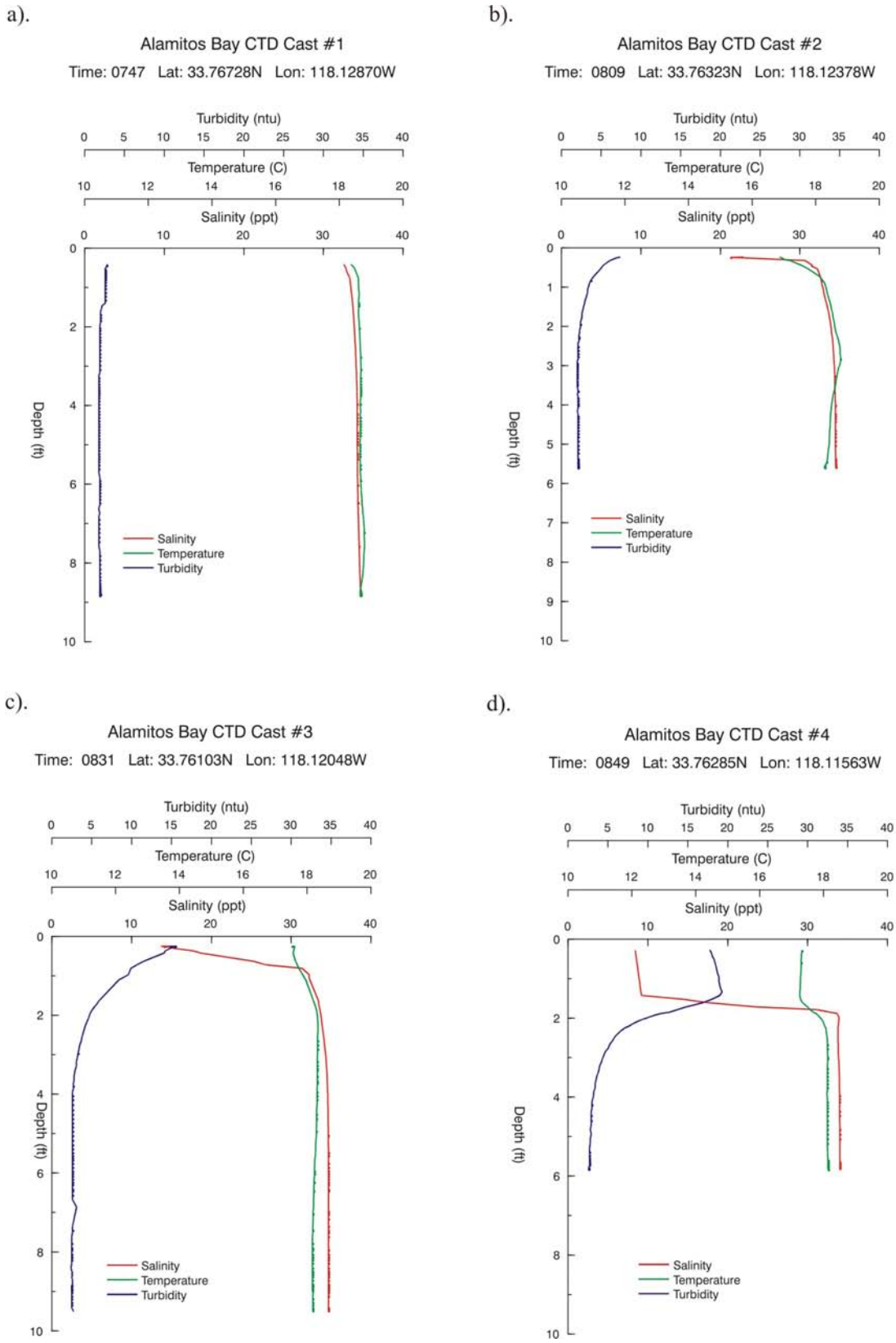

Figure 8.3(a-d) CTD Casts taken during Alamitos Bay Receiving Water Study. (Locations of each cast are shown on Figure 8.1)

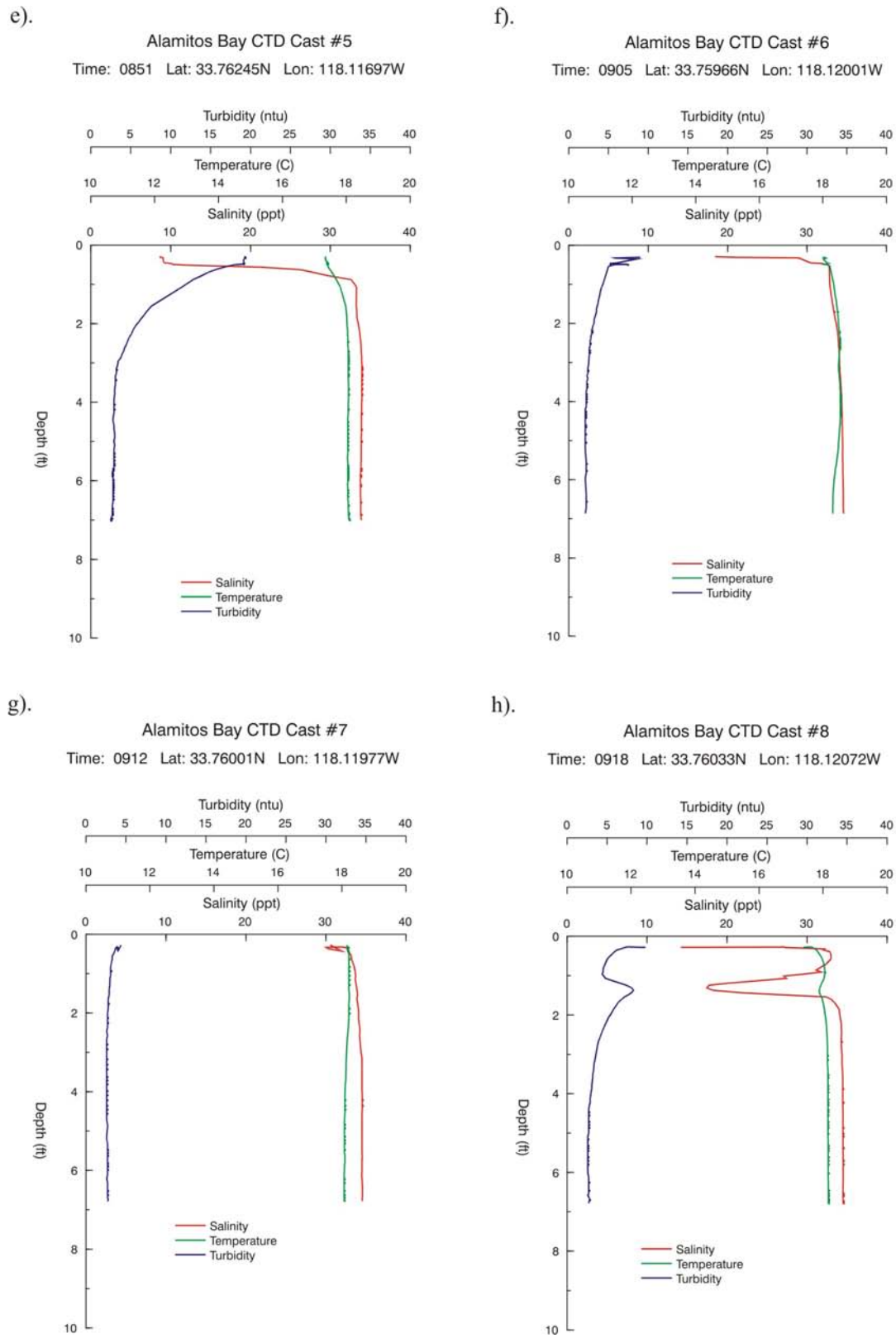

Figure 8.3(e-h) **CTD Casts taken during Alamitos Bay Receiving Water Study.** (Locations of each cast are shown on Figure 8.1)

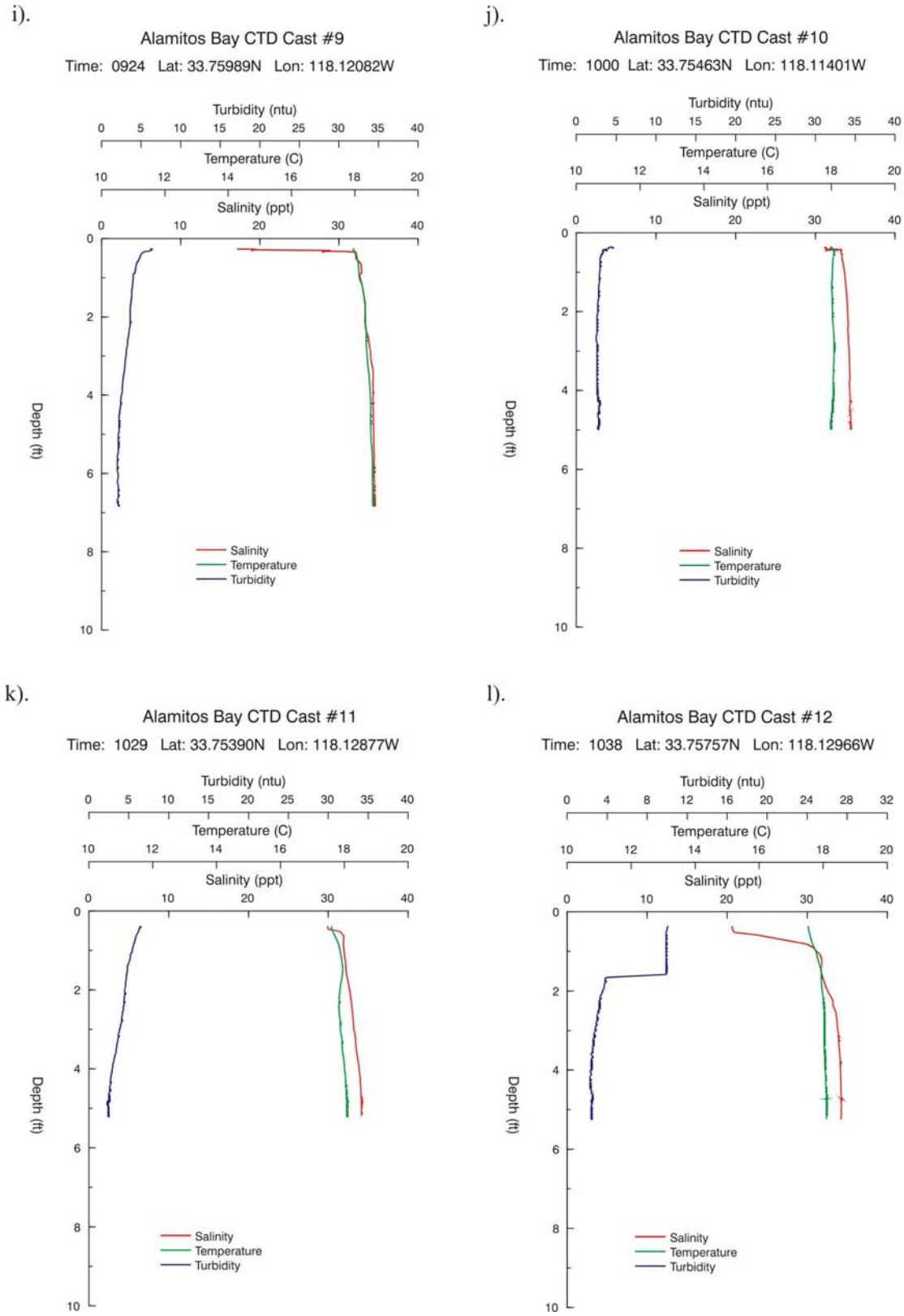

Figure 8.3(i-l) **CTD Casts taken during Alamitos Bay Receiving Water Study.** (Locations of each cast are shown on Figure 8.1)

m).

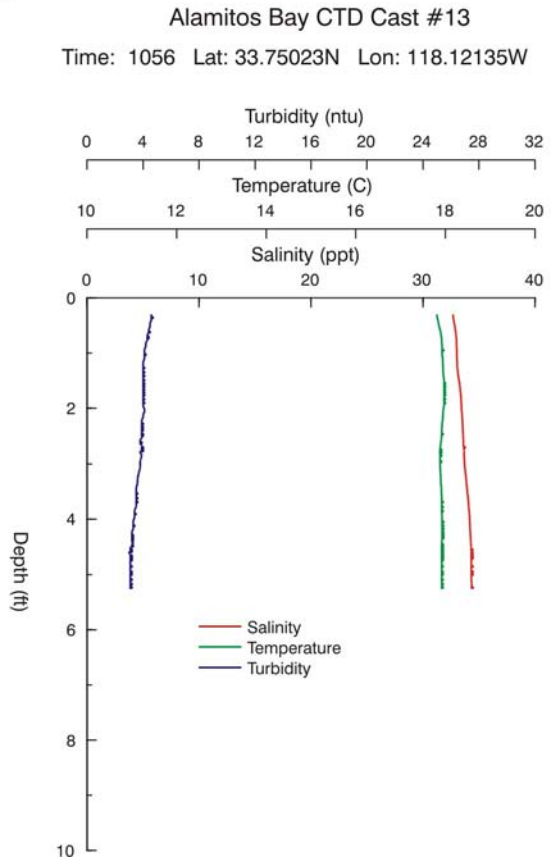

Figure 8.3(m) **CTD Casts taken during Alamitos Bay Receiving Water Study.** (Locations of each cast are shown on Figure 8.1)

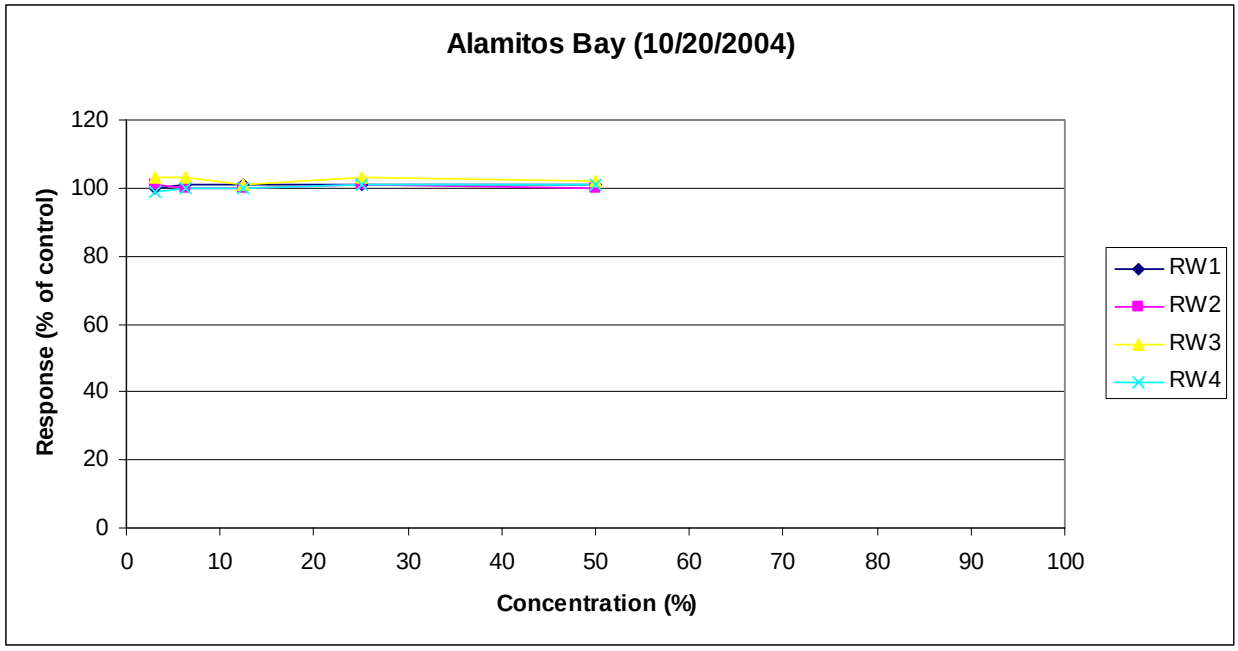

Figure 8.4 Toxicity Dose Response Plots for Sea Urchin Fertilization Tests using Stormwater Plume Samples collected from Alamitos Bay.

Table 8.1 Summary of Receiving Water Quality in Stormwater Plume Samples from Alamitos Bay.

Analyte	Receiving Water Monitoring Sites			
	RW1	RW2	RW3	RW4
Conventionals				
pH	7.27	7.28	7.39	7.46
Specific Conductance (EC – µmhos/cm)	18000	23000	28000	32000
Salinity (‰)	10	14	17	20
Total Suspended Solids (mg/L)	13	13	10	7.8
Ammonia as N (mg/L)	0.52	0.56	0.57	0.52
Total Metals (µg/L)				
Cd	0.151	0.109	0.098	0.062
Cu	18.2	19.8	13.6	11.9
Ni	4.73	4.42	3.32	2.4
Pb	6.11	5.43	4.03	3.11
Zn	91.6	82.4	69.7	52.8
Dissolved Metals (µg/L)				
Cd	0.218	0.144	0.129	0.122
Cu	9.25	9.15	5.31	6.76
Ni	5.02	4.37	3.29	2.6
Pb	1.06	0.921	0.674	0.446
Zn	80.4	73.9	59.7	44.4

Table 8.2 Toxicity of Receiving Water Samples Collected from Alamitos Bay during the 2005/2006 Storm Season.

		Receiving Water Monitoring Sites			
Test Species	**Endpoint**	**RW1**	**RW2**	**RW3**	**RW4**
S. purpuratus-Fertilization	EC_{50}	>50%	>50%	>50%	>50%
	NOEC	50%	50%	50%	50%
Approximate Percent Stormwater		71%	59%	50%	41%

EC_{50} based upon extrapolation using the probit method

9.0 DISCUSSION

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9.0 DISCUSSION

The following sections discuss the quality of stormwater and dry weather discharges from the four mass emission monitoring sites. Concentrations of contaminants measured in both stormwater and dry weather discharges are compared with various receiving water quality criteria. Temporal trends over the past seven years are examined for principal contaminants of concern. Loading rates calculated for each monitored watershed are examined to more effectively identify areas that contribute to excessive loads. Identification of such areas is intended to provide information needed to prioritize BMP implementation. Lastly, the toxicity of both stormwater and dry weather discharges is evaluated for the current year and general trends are examined over the duration of this permit.

9.1 Comparison to Water Quality Criteria

Numerical standards are not available for stormwater discharges. The State Board recently assembled a panel of stormwater experts from the academic and scientific communities to address the issue of the feasibility of developing numerical standards for stormwater discharges from municipal, industrial and construction activities. This group concurred that numerical standards for stormwater are still not technically feasible (Storm Water Panel, 2006). Water quality criteria or objectives, however, can provide valuable reference points for assessing the relative importance of various stormwater contaminants. Ultimately, specific beneficial uses of the receiving water body should be considered when selecting the appropriate benchmarks. Existing, potential and intermittent beneficial uses are provided in Table 9.1 for the receiving waters associated with each discharge point. Water quality criteria used as benchmarks are summarized in Table 9.2.

9.1.1 Wet Season Water Quality

Tables 9.3 through 9.6 provide a comparison of Event Mean Concentrations (EMCs) for each measured constituent with various water quality criteria. These benchmarks are intended to serve as a tool for interpreting the stormwater quality data and assuring beneficial uses are not impacted. Exceedances of these receiving water quality benchmarks do not necessarily indicate impairment. Other factors such as dilution, duration and transformation in the receiving waters must also be considered.

For comparative purposes, an EMC was considered to be an exceedance if the value was higher than any of the reference or benchmark values. In using these benchmarks, it is important that the source of the specific criterion is considered. For instance, metals concentrations derived from California Toxics Rule (CTR; USEPA, 2000) freshwater criteria for protection of aquatic life are based upon dissolved concentrations and are often a function of hardness. Values listed in Table 9.2 are based upon a default hardness of 50 mg/L. Evaluation of any possible exceedance is based upon the actual hardness EMC for that site and event. Saltwater objectives listed for metals under the CTR are also based upon dissolved concentrations while those listed under the California Ocean Plan (SWRCB, 2006) are based upon total recoverable measurements. Although Ocean Plan numbers are used for comparative purposes, the marine and estuarine receiving waters in the vicinity of Long Beach would only be subject the CTR saltwater values since Alamitos Bay and the coastal waters of Long Beach are considered enclosed bays and estuaries. Values provided for the Basin Plan are primarily based upon Title 22 drinking water standards. For two of the key organophosphate pesticides, the only available water quality criteria are those proposed by the California Department of Fish and Game (Siepmann and Finlayson, 2002). EPA (2006) National Recommended Water Quality Criteria provide an additional reference for many of the nonpriority pollutants included in the monitoring program.

As noted in previous years, the pH of stormwater runoff is typically slightly acidic. This is mostly due to dissolved carbon dioxide that the rain “scrubs” from the atmosphere. Other gases such as sulfur dioxide (SO_2) and nitrogen oxides (NO_x) can cause further acidification of the rainfall. In Southern California, the National

Atmospheric Deposition Program (NADP, 2005) indicates that pH associated with rainfall is typically 5.2. In contrast, rainfall in the northeastern portion of the United States is commonly much more acidic with average pH values of 4.3 to 4.5.

The water quality criteria for pH included in the Los Angeles Basin Plan (CRWQCB, Los Angeles, 1994) indicate that surface waters should be maintained in the range of 6.5 to 8.5. Due to the acidic nature of rainfall, low pH values are common but quite variable among years. Stormwater discharges with elevated pH values are less common but have occasionally occurred in 2 to 5 percent of the storm events. This is often attributed to the low buffering capacity in most stormwater runoff from highly urbanized areas.

During the 2005/2006 monitoring period 25 percent of the stormwater samples had measured pH values that were below the lower Basin Plan limits of 6.5. In each case pH concentrations were in the range of 6.1 to 6.5. The only upper exceedance of Basin Plan criteria was a slightly elevated pH of 8.9 in stormwater discharged from the Belmont Pump Station during the third and smallest rainfall event of the season (February 18, 2006).

All grab samples taken for bacteria exceeded Basin Plan water quality criteria. As previously noted in this and other stormwater programs, bacteria are commonly found at very high concentrations in stormwater. Recent updates to the Ocean Plan (SWRCB, 2006) have made bacterial water quality criteria common to both the 2005 Ocean Plan and the Los Angeles Basin Plan. Single sample criteria for enterococcus, total and fecal coliform were exceeded during all events at each site. The criteria for the ratio of fecal to total coliform was exceeded in half of the samples.

Benchmark reference values were commonly exceeded at least once for a total of four different total recoverable metals. These included aluminum, copper, lead, and zinc. The aluminum drinking water quality criteria of 1000 µg/L was exceeded in 100% of the samples from the Belmont Pump Station. Bouton Creek, and Los Cerritos Channel (Tables 9.3 through 9.6). Concentrations of total recoverable copper, lead and zinc in runoff from these same mass emission sites exceeded Ocean Plan criteria during all storm events. In contrast, concentrations of total copper, lead, and zinc were below Ocean Plan criteria in stormwater runoff from the two storm events monitored at the Dominguez Pump Station.

Total nickel exceeded Ocean Plan water quality criteria during the final event of the wet season in runoff from the Los Cerritos Channel. The high concentration of total nickel during this event was associated with a high TSS concentration of 450 mg/L.

In 1993 (USEPA, 1993) EPA recognized that, in most cases, measurement of metals in the dissolved form provided the most accurate assessment of potential stress to aquatic ecosystems. As a result water quality criteria promulgated by EPA as the "California Toxics Rule" (CTR; USEPA, 2000) were based upon the dissolved fraction for both freshwater and saltwater. The saltwater criteria included in the CTR are applicable in bays and estuaries of California.

Benchmark reference values have been frequently exceeded for dissolved forms of the three metals throughout the life of the permit (Kinnetic Laboratories, Inc. 2000, 2001, 2002, 2003, 2004 and 2005) common in stormwater runoff. This year, as well as the previous, dissolved copper was found to exceed both CTR freshwater and saltwater criteria. Concentrations of dissolved lead frequently exceed the CTR freshwater criterion but typically don't exceed the CTR saltwater criteria. This year 75 percent of the stormwater samples exceeded the CTR freshwater criteria but no samples exceeded the CTR saltwater criterion. Exceedances of the CTR freshwater chronic criteria are common due to significant effect of hardness on the criteria. In water with a hardness of 25 mg/L, which is common for stormwater from highly impervious catchments, the criteria for dissolved lead is 0.54 µg/L. With a hardness of 100 mg/L, the criteria for dissolved lead increases to 2.5 µg/L. The Stormwater Monitoring Coalition (SMC) laboratory guidance document (Gossett, Renfrew and Schiff, 2004) recommends use of a target reporting limit of 1.0 µg/L for lead which results in non-detects for dissolved

lead in most samples. If this reporting limit has been used this past year, dissolved lead would only have been detected in four stormwater samples, two of which occurred in water from the Dominguez Pump Station.

Exceedances of the CTR freshwater criterion for dissolved zinc were only slightly less common than observed for dissolved copper (Tables 9.3 through 9.6). Overall, the CTR freshwater criterion for zinc was exceeded in 63% percent of stormwater samples from the mass emission sites. As in 2004/2005, concentrations of dissolved zinc exceeded the criterion during all storm events monitored at the Belmont Pump Station. Exceedances of dissolved metals criteria have been uncommon in stormwater discharges from the Dominguez Gap Pump Station but the CTR freshwater criterion for zinc was exceeded during one of the two events this season.

Since stormwater sampling was first implemented in 2000, runoff from the four City of Long Beach mass emission sites has typically contained very few organic compounds in excess of available reference criteria. A few chlorinated pesticides including various chlordane compounds and 4-4' DDE were detected in stormwater at very low levels. Chlordane compounds (alpha-chlordane, gamma chlordane, cis-nonachlor and trans-nonachlor) were detected most frequently and were most common in runoff from the Belmont Pump Station.

The most striking trend in organic compounds this past year is the lack of measurable levels of diazinon and chlorpyrifos. In the past, diazinon was often present at concentrations in excess of the California Department of Fish and Game recommended objective of 0.08 µg/L. Malathion, another organophosphate pesticides, was detected in 63% of the stormwater composites. This included all five samples from the Belmont Pump Station and three of the four samples from the Los Cerritos Channel monitoring site. Concentrations were sufficient to exceed EPA Recommended Water Quality Criteria several times at each location. Concentrations of malathion measured during the first two storm events (0.301 µg/L and 0.552 µg/L) did not exert a toxic response in the daphnid bioassays. The reported LC50s for malathion range from 1.14 to 3.18 µg/L (TDC, 2003).

The triazine pesticides are primarily herbicides. These compounds continue to be uncommon in stormwater runoff. Prometon, simazine and cyanazine were the only triazines detected and all three typically occur at levels of less than 10 times the detection limit. The infrequent presence of these compounds in stormwater runoff and the low concentrations when they are detected suggests that this group of organic compounds should be considered for elimination from the analytical suite.

9.1.2 Dry Season Water Quality

Water quality of dry weather discharges has been generally consistent over the past seven years. Dry season water quality has not tended to vary greatly between sites or sampling dates. In general, the concentrations of suspended particulates and total recoverable metal concentrations are low in dry weather runoff. Trace metals are predominantly in the dissolved form. Hardness is also consistently high which tends to mitigate the effects of the dissolved metals (Table 9.7 through 9.9). As a result, most trace metals were below CTR freshwater criteria during both dry weather sampling events.

Copper is clearly the primary constituent of concern during dry weather. The CTR freshwater criterion for dissolved copper was exceeded in one of the six dry weather samples. The CTR saltwater criterion for dissolved copper was exceeded in 2/3 of the samples. Highest concentrations (12 µg/L and 15 µg/L) were encountered in dry weather flows from the Los Cerritos Channel mass emission station. In addition the Ocean Plan criterion for total copper was exceeded only in water samples from the Los Cerritos Channel site.

9.2 Temporal Trends of Stormwater Contaminants

We have continued to examine temporal trends for selected trace metals, two organophosphate pesticides, TSS and bacteria. The metals and organic compounds included in this assessment are those that are 1) often detected in both stormwater and dry weather discharges and/or 2) are suspected to be primary sources of toxicity (Figures 9.1 through 9.12). Time series are presented for total and dissolved concentrations of five trace metals including cadmium, copper, nickel, lead and zinc. Due to the typically large differences between total and dissolved lead concentrations, a separate graphic is included to detail changes in dissolved lead over time. Time series are also provided for two important organophosphate pesticides, chlorpyrifos and diazinon, which have been implicated as major sources of toxicity. Temporal comparisons of bacteria include total and fecal coliform as well as enterococcus (Figures 9.13 through 9.16). The figures include all wet and dry weather data for the past seven years at each monitoring site. Periods of dry weather are indicated by the shaded areas.

After seven years of monitoring few clear trends are evident. For the most part, dissolved concentrations of cadmium, copper, and nickel do not vary substantially during wet and dry weather periods. In the first few years of the permit, dissolved lead was also found to be comparable during both wet and dry weather periods. In recent years, concentrations of dissolved lead in dry weather discharges have tended to be lower than observed during stormwater events. Concentrations of dissolved lead measured in dry weather discharges over the past three years are typically at or near the detection limit of 0.5 µg/L. In the first two years of the program dissolved lead commonly ranged from 1 to 3 µg/L. This apparent pattern was noted last season and remains consistent in the 2005/2006 data set. Dissolved zinc concentrations differ from most other metals in that they are often higher during storm events. Elevation in dissolved zinc has often been associated with increasing toxicity in the sea urchin fertilization test.

Concentrations of total copper, lead and zinc are consistently higher in association with storm flows. Analysis of data from the first five years of this program (Kinnetic Laboratories, Inc., 2004) demonstrated that these metals, particularly lead, were strongly correlated with TSS. The relationship between concentrations of metals and TSS differed among sites with suspended solids from the Belmont Pump Station exhibiting substantially higher concentrations of copper, lead and zinc. Seasonal differences in total cadmium and nickel are less evident but the highest concentrations still tend to occur during winter storm events.

Stormwater discharges from the Dominguez Gap Pump Station continue to have the lowest concentrations of total metals. Total metals in stormwater discharges from this site were among the lowest encountered in the past seven years. This was due to the fact that both events were relatively small events that caused minimal discharges.

One of the most significant temporal trends has been the decline in concentrations of chlorpyrifos and diazinon. These two organophosphate pesticides were not detected in runoff at any of the four mass emission sites in 2005/2006. Residential use of both diazinon and chlorpyrifos has been phased out. The manufacture of diazinon for lawn, garden and turf use ended in June 2003 with all sales and distribution to retailers ending in August 2003. Retailers were allowed to sell any product on their shelves up until December 31, 2004. Manufacturing of chlorpyrifos products for most residential uses was terminated on December 1, 2000 and could no longer be sold through retail outlets after December 31, 2002. Use of chlorpyrifos as a preconstruction termiticide was allowed up until December 31, 2005. Although manufacturing of diazinon was allowed to continue until June 2003, annual production was decreased by 25 percent in 2002 and 50 percent in 2003.

Since 2000 commercial use of diazinon and chlorpyrifos in urban areas of California has declined dramatically while use of pyrethroid pesticides has increased (Wilen et al. 2005). Data from Orange and San Diego Counties indicate that use of diazinon and chorpyrifos for both structural and landscape applications continues to decline

while use of permethrin and cypermethrin are increasing. A survey of pesticide retailers in central California (Flint, 2003) indicated that permethrin-based products had become the most common pesticide by early 2003. Although the absence of residues of diazinon and chlorpyrifos in stormwater discharges from the City of Long Beach is very promising, the increase in use of pyrethroid pesticides is reason for some concern.

Fecal indicator bacteria typically exceed Basin Plan water quality criteria during both wet and dry weather monitoring (Figures 9.13 through 9.16). Concentrations of indicator bacteria are often slightly less than observed during wet weather conditions. This is most apparent in Bouton Creek where the dry weather concentrations of both total and fecal coliform bacteria are below Basin Plan criteria more than 50% of the time. In open channels like Bouton Creek and the Los Cerritos Channel, one would expect lower concentrations of indicator bacteria in dry weather flows due to the effects of sunlight on these shallow, generally clear discharges.

Although one of the goals of the stormwater monitoring is to document trends that may be associated with implementation of structural and non-structural BMPs it is clear that one must be cautious in assuming increasing or decreasing trends in concentrations of pollutants. The Event Mean Concentrations (EMCs) of most constituents have demonstrated a tremendous degree of variability. The EMCs are strongly influenced by antecedent conditions, annual rainfall patterns, storm magnitude and intensity as well as a number of known and unknown factors. Substantial and consistent changes in EMCs will be necessary to develop any degree of confidence with respect to long term increases or decreases in concentrations and loads.

9.3 Loading Rate Assessment

Estimates of pollutant loading rates were developed for selected constituents at each site by normalizing loads to a unit of 1000 acres. By normalizing the loads, direct comparisons can be made between drainage areas to assist in differentiating potential problem areas.

For illustration purposes, loading rates were developed for copper, lead, zinc, and diazinon (Figures 9.17 through 9.20). By normalizing loads to a standard area the effectiveness of the infiltration basin upstream of the Dominguez Pump Station becomes readily apparent. In addition, these graphics illustrate the reduced frequency of stormwater discharges at this site.

A large difference was also evident in loading rates for copper, lead, and zinc from the four sites. Loading rates of these metals at the Belmont Pump Station were noted to be substantially higher in 2005/2006 while loading rates for the same metal declined substantially in runoff at the Los Cerritos Channel site. This year loading rates for metals measured in runoff at the Los Cerritos site were generally comparable to those measured in runoff from Bouton Creek. In all previous years overall total metals loading rates from the Los Cerritos Channel tended to be among highest measured at the four mass emission sites.

9.4 Stormwater Toxicity

At each of three stations, four wet weather samples were analyzed for toxicity during the monitoring period. All twelve of those samples were tested with water fleas and sea urchins (24 total bioassays).

Five storms were collected over a period of approximately six months. The first storm was sampled in mid-October, the second storm was sampled in early January. Two additional storms were sampled during a three day period in late February and early March, and the final storm sample was collected in late March.

- The Belmont Pump station was sampled during the October, January, late February and late March storms. There was no toxicity to *Ceriodaphnia* in the Belmont Pump samples except for minor toxicity

in the first-of-the-year October storm. Sea urchin toxicity was minor to moderate except in the late March sample, where both chronic and acute toxicity were severe.

- The Bouton Creek samples were collected during the first four storms beginning with the October storm. No toxicity to water fleas was seen in any of the four storms. Moderate sea urchin toxicity was detected in the first storm of the year and in the late February (but not the early March) sample. Severe toxicity to urchins was observed in the late March sample.
- Samples from the Los Cerritos Channel station were collected during the first four storms. There was minor toxicity to *Ceriodaphnia* in the first-of-the-year sample, but no water flea toxicity was seen in the subsequent three samples. Minor to moderate toxicity to sea urchins was detected in the October, January and early March storm samples.

The toxicity of the wet weather samples to *Ceriodaphnia* during the monitoring period was very slightly less than that measured during the previous monitoring period, while sea urchin toxicity was generally higher than in the 2004/2005 storms (Figure 9.21). The Belmont Pump and Bouton Creek samples collected in the final storm both contained >32 TU_c of toxicity to sea urchins, and both samples also showed high acute toxicity (32 TU_a). Both Belmont Pump and Bouton Creek samples showed higher urchin toxicity than that measured in 2004/2005, though previous monitoring years had demonstrated equally high toxicity. Toxicity to the water flea was generally absent at these two monitoring stations during this monitoring period. Toxicity to urchins of Cerritos Channel samples was slightly lower than that seen in 2004/2005, and water flea toxicity at that station remained at the low level seen previously.

9.4.1 Dry Weather Toxicity

Neither the August 2005 nor the May 2006 dry weather discharge samples collected from Belmont Pump station produced any decrease in daphnid survival or reproduction (Figure 9.21). Results from the 2004/2005 monitoring period also showed the absence of measurable toxicity. There was no measurable decrease in sea urchin fertilization in either the August 2005 or the May 2006 Belmont Pump samples, and again the previous monitoring period showed no dry weather toxicity to sea urchins.

The salinity of the dry weather sample collected from Bouton Creek in August 2005 was 4.6‰. This elevated salinity was expected to have a potential to influence water flea toxicity data. This sample showed both lethal and reproductive toxicity to water fleas. The survival NOEC was <6.25% sample and the LC_{50} was 3.125% sample. The NOEC for reproduction was also <6.25% sample and the EC_{50} was 3.125% sample. In May 2006 there was somewhat lower but still elevated sample salinity (3.7‰) which was expected to possibly influence toxicity responses. There was a slight reduction of both survival and reproduction of water fleas (NOEC for both endpoints was 50%). The magnitude of the water flea toxicity in the August 2005 sample was greater than that seen in the August 2004 dry weather test probably because the elevated salinity of the 2005 sample affected the test performance of this freshwater organism. The Bouton Creek sample of May 2006 showed slightly higher toxicity than that of May 2005, probably because of higher salinity of the 2006 sample.

Neither the August 2005 nor the May 2006 dry weather samples from Bouton Creek was measurably toxic to sea urchins, with TU_c values of 2 and TU_a values of <2. Likewise there was no measurable toxicity in the Bouton Creek dry weather samples from the previous monitoring period (2004/2005).

The August 2005 dry weather sample from Los Cerritos Channel produced >16 TU_c of lethal toxicity and >16 TU_c of reproductive toxicity to water fleas, The May 2006 dry weather sample showed no toxicity to water fleas. The magnitude of dry weather toxicity to water fleas was generally comparable to that seen in the August 2004 sample, but the May 2006 dry weather sample was much less toxic than the May 2005 sample.

There was measurable sea urchin toxicity in the Cerritos dry weather samples in August 2005 and May 2006, with 4 TU_c in both samples. Acute toxicities were <2 TU_a in all four samples. Wet weather urchin chronic toxicity was present in all but one 2005/2006 Cerritos sample, where TU_cs ranged from 4 to 8. The magnitude of dry weather toxicity to urchins was greater than the 2 TU_c exhibited in September 2004 and May 2005.

In the 2000/2001 and 2001/2002 monitoring periods, dry weather samples collected in the spring generally tended to be less toxic than stormwater samples collected in those respective winters. These toxicity results were cited to support the indication that "there are significant differences in the composition of stormwater and dry weather discharge from the City of Long Beach" (Kinnetic Laboratories Inc. and Southern California Coastal Water Research Project, July 2002)

Data from the 2002/2003 monitoring period indicated that the magnitude of toxicity of spring dry weather samples was less than wet weather toxicity at the Belmont Pump station. At the Bouton Creek station, spring dry weather and wet weather toxicities were of similar magnitude, while at the Los Cerritos Channel station spring dry weather discharge showed generally greater toxicity than stormwaters, with particularly elevated toxicity to sea urchins in the May 2003 collection.

Toxicity results from the 2003/2004 monitoring period suggested that at the Belmont Pump Station, wet weather toxicity to sea urchins was greater than spring dry weather toxicity, while toxicity to water fleas was absent. Bouton Creek samples were more toxic to water fleas during both dry weather sampling periods than during storms, probably due in large part to elevated sample salinity during dry weather. Cerritos Channel samples generally showed no toxicity to sea urchins during both wet and dry weather (except for the second storm). Toxicity to water fleas was much enhanced in the spring dry weather sample.

During the 2004/2005 monitoring period toxicity to water fleas at Belmont Pump was very low during both wet and dry weather periods, with only the last wet weather sample showing measurable toxicity. Urchin toxicity at Belmont was present during three of four storms, but there was no measurable toxicity in either dry weather sample. Bouton Creek samples were measurably toxic to water fleas in the spring dry weather sample, but not in any storm sample or in the fall dry weather sample. Neither of the Bouton Creek dry weather samples was toxic to sea urchins, while moderate urchin toxicity was seen in the first and fourth storm samples. Toxicity to water fleas of dry weather Cerritos Channel samples was generally higher than that of wet weather samples. Only the first storm of the season produced *Ceriodaphnia* toxicity at Cerritos, while both Spring and Fall dry season samples showed sufficient toxicity to trigger water flea TIEs. In contrast, sea urchins showed no measurable dry weather toxicity while showing reduced fertilization in three of four wet weather samples from Cerritos Channel.

During the 2005/2006 monitoring period toxicity to water fleas at Belmont Pump was very low during both wet and dry weather periods, with only the first-of-the-year wet weather sample showing measurable toxicity. Urchin toxicity at Belmont was present during all four storms collected from this station, but there was no measurable toxicity in either dry weather sample. Bouton Creek samples were measurably toxic to water fleas in both the fall and spring dry weather samples, but not in any storm sample. There was sufficient toxicity in the fall sample to trigger a *Ceriodaphnia* TIE. Neither of the Bouton Creek dry weather samples was toxic to sea urchins, while moderate urchin toxicity was seen in the January, February and late March storm samples. Toxicity to water fleas of dry weather Cerritos Channel samples was generally higher than that of wet weather samples. Only the first storm of the season produced *Ceriodaphnia* toxicity at Cerritos, while the fall dry season sample showed toxicity high enough to trigger a water flea TIE. Sea urchins showed moderate dry weather toxicity in both spring and fall samples, while showing reduced fertilization in three of four wet weather samples from Cerritos Channel.

Toxicity data from the current and recent monitoring periods, then, do not support the hypothesis that spring dry weather samples, collected after the storm season has passed, show consistently decreased toxicity and seasonally-related composition.

Data from the current monitoring period continue to suggest a species-related toxicity difference with respect to wet and dry weather samples, with urchin tests showing more toxicity in wet weather samples and water fleas showing more toxicity in dry weather samples.

- Sea urchins at the Belmont and Bouton stations showed no toxicity in dry weather samples versus 4-32 TU_c of toxicity in 7 of 8 storm samples; at the Cerritos Channel station the wet-dry difference in urchin toxicity is not as apparent, with 4 TU_c of toxicity in both dry weather samples versus 4-8 TU_c in 3 of 4 storm samples.

- Minor stormwater toxicity to water fleas (2 TU_c) was seen at the Belmont and Cerritos stations only in the first-of-the-year storm samples, while 16 TU_c were recorded in the fall dry weather samples from Bouton and Cerritos. Bouton Creek samples showed toxicity in both dry weather samples, perhaps related to elevated salinity at that station, while the Belmont Pump samples showed no dry weather toxicity.

9.4.2 Temporal Toxicity Patterns

The toxicity data from the previous five monitoring periods suggest that seasonal flushing may be an important factor affecting the variability in stormwater toxicity, and current data from the 2005/2006 monitoring period generally support that suggestion for *Ceriodaphnia* results. There is less support for the importance of seasonal flushing when considering sea urchin toxicity data

Water flea bioassays documented sample toxicity only in two of twelve wet weather samples collected during the period; First-of-the-year samples collected on October 18, 2005 from the Belmont Pump and Cerritos Channel stations showed 2 TU_c of toxicity for both the survival and reproduction test endpoints. None of the later three samples collected from those stations showed measurable toxicity. There was no demonstrated toxicity to *Ceriodaphnia* in any of the four Bouton Creek stormwater samples.

The Belmont Pump station was sampled during the first three and the fifth storm events. The first-of-the-year storm sampled on October 18, 2005 showed 8 TU_c and <2 TU_a of sea urchin toxicity. The second storm, collected on January 2, 2006, also showed lower but significant toxicity to sea urchins (4 TU_c, <2 TU_a). The third storm, collected on February 28, 2006, showed restored urchin toxicity (back to 8 TU_c, <2 TU_a). The March 29 storm sample from Belmont Pump produced much increased toxicity to urchins (>32 TU_c and 11 TU_a).

Bouton Creek samples showed toxicity to sea urchins in the January (16 TU_c and 2.2 TU_a) and February (8TU_c and 2.7 TU_a) storms. The March 29 storm showed Bouton Creek toxicity that was much enhanced over earlier storms (>32 TU_c and 21.7 TU_a)

Cerritos Channel samples produced 4 TU_c of chronic toxicity to sea urchins in the first storm, 8 TU_c of urchin toxicity in the January storm, no measurable toxicity (2TU_c) in the February storm and minor (4TU_c) toxicity to urchins in the early March storm.

Thus the idea that seasonal flushing is importantly affecting stormwater toxicity is supported by the current year's water flea test data but not by the sea urchin data. The only wet weather toxicity to *Ceriodaphnia* was seen in the first storm of the year. Sea urchin toxicity, however, was distributed over the entire storm season

with peak toxicities at two stations occurring in runoff from the last storm collected (March 29). It is unfortunate that the TIEs performed on the March 29 samples from Belmont Pump and Bouton Creek yielded no information. When, after four attempts, the TIE evaluation bioassays finally met TAC, ten days had elapsed since the initial high toxicity was documented. This long delay, due to difficulties in procuring viable gametes, probably contributed to the disappearance of sample toxicity in the baseline bioassays and consequent lack of meaningful information.

9.4.3 Comparative Sensitivity of Test Species

There were a total of twelve wet weather samples tested for toxicity with both water fleas and sea urchins. Toxicity was detected to one or both species in ten of those samples and the sea urchin fertilization test was the most sensitive toxicity test method in all ten (100%) of those samples. In the two stormwater samples where water flea toxicity was seen, both the survival and reproduction endpoints showed minimal toxicity (2 TU_c), and in both those storms sea urchin toxicity was higher than *Ceriodaphnia* toxicity

There were six dry weather discharge samples tested using water fleas and sea urchins. Of those samples two showed toxicity to sea urchins and, three showed toxicity to water flea survival and reproduction. Of the four dry weather samples showing toxicity, the *Ceriodaphnia* test was the more sensitive in three (75%). The single sample where sea urchins were more sensitive did not show toxicity to water fleas.

This pattern of sensitivity (sea urchin>water flea) in storm waters was similar to that observed during the five previous monitoring programs and in a study of urban stormwater toxicity in San Diego (Southern California Coastal Water Research Project 1999). Species sensitivity in dry weather discharge samples was completely reversed (water flea>sea urchin). This dry weather species sensitivity reversal is similar to that seen in the 2004/2005 monitoring period, but is markedly different from data in recent monitoring periods. In 2001/2002, urchins were generally the more sensitive species in dry weather samples, while in both 2002/2003 and 2003/2004 the two species showed approximately equal sensitivities. The sensitivity data from 2004/2005 are consistent with those seen in the current monitoring period.

9.4.4 Relative Toxicity of Stormwater

Table 9.10 compares the frequency and magnitude of stormwater toxicity from the Long Beach stations in 2005/2006 with that of stormwater samples from Long Beach in previous years and with toxicity in other southern California watersheds. The data suggest an increase from the previous three monitoring periods in the frequency of Long Beach stormwater toxicity to sea urchins. The magnitude of 2005/2006 toxicity seems similar to previous years.

The frequency of toxicity to water fleas in 2005/2006 was in the same range seen each year since the 2002/2003 monitoring year, while magnitude of toxic responses was similar to that of the previous three monitoring periods..

We might expect results from Chollas Creek and Ballona Creek to be similar to Long Beach results, as these samples were obtained from smaller highly urbanized watersheds, relative to the samples from the L.A. River and San Gabriel River. The Chollas/Ballona data, showing frequency of sea urchin toxicity ranging from 85-100%, suggest such comparability for Long Beach samples from the first two monitoring periods, but Table 9.10 clearly indicates the decreased frequency of urchin toxicity seen during the 2002/2003, 2003/2004 and 2004/2005 monitoring periods. During the current monitoring program, however, the frequency of urchin toxicity returned to pre-2002 levels.

Toxicity in Long Beach samples and in those from other watersheds is variable among storms, and stormwater toxicity is most often detected using the sea urchin fertilization test.

9.4.5 Toxicity Characterization

The TIE testing program for this monitoring period was only marginally successful. Phase I TIEs were performed on two wet weather and two dry weather samples, only one of which yielded useful information (Table 9.11).

There were fewer successful TIEs performed during this monitoring period than in previous years. The two wet-weather sea urchin TIEs were abandoned because baseline toxicity essentially disappeared from the sample. Problems in securing broodstock that yielded gametes capable of meeting test performance requirements resulted in a delay of about 10 days after initial toxicity was assessed before TIE evaluation bioassays could be carried out. This delay probably contributed to the observed loss of toxicity in both samples.

The results of the 2005/2006 dry weather TIE performed on the Bouton Creek sample of August 18, 2005 suggested a non-polar organic compound as the primary toxicant, with a further suggestion of contributions to toxicity from both organophosphate and pyrethroid pesticides. Comparisons with last year's results are not possible since there was no TIE performed on a Bouton Creek dry weather sample in 2004/2005.

This year's water flea TIE data for the Cerritos Channel dry weather sample of 18 August 2005 were somewhat problematic, having been generated from a sample that was stored for 41 days (see Section 7.3.2). The results indicated that a non-polar organic was the primary toxicant since C18 treatment virtually eliminated sample toxicity. There were suggestions from the bioassay results that both divalent cationic metals and organophosphate or pyrethroid pesticides may have been contributing toxicants, but analytical chemistry results were either lacking or failed to confirm the presence of metals in toxic concentrations.

Correlation analysis of the toxicity and chemistry data provides an additional test of the association between stormwater toxicity and chemical contamination. The data from all storms monitoring periods in all monitoring periods from 2001/2002 through 2005/2006 were pooled for the correlation analyses. The correlation analyses generally confirm the conclusion from the previous study years, that the toxic responses measured in this study are related to the chemical composition of the stormwater samples. The toxic responses of sea urchins and/or water fleas were significantly correlated with increased concentrations of several stormwater constituents, including dissolved metals, TSS, TDS and TOC (Table 9.12). Dissolved lead, nickel and zinc were significantly correlated with toxicity to both species.

In last years report, nickel and copper showed equally strong correlations with reduced sea urchin fertilization, closely followed by nickel. There was a weaker correlation with lead. Results from the current testing year were slightly different from those rankings; copper showed the strongest correlation with urchin fertilization closely followed by nickel and zinc. Lead showed a weaker but still significant correlation with urchin effects. Data from 2003/2004 and 2002/2003 were similar to those from last year, but differed from monitoring data from earlier study years, which showed significant correlations only with dissolved copper and zinc.

A larger number of constituents were significantly correlated with toxicity to the water flea, including TSS, TDS, Hardness, TOC, and dissolved metals including lead, nickel and zinc (Table 9.12). Increased concentrations of the OP pesticide diazinon had significant correlations with water flea toxicity (r=0.40 to 0.45) that were very similar to the values reported in 2004/2005 (r=0.40-0.49) and slightly elevated from 2003/20034 (r=0.30-0.43). Correlations in 2002/2003 were substantially lower (r=0.22-0.24) but those in 2001/2002 were better (r=0.54).

Both water flea TIEs suggested that a non-polar organic compound was a primary toxicant and that organophosphate pesticides were possibly implicated as important toxicants. The TIE conducted on the Bouton Creek dry weather sample of August 21 2006 showed mixed responses to different concentrations of PBO, suggesting that both organophosphate and pyrethroid pesticides were implicated as toxicants. There was a slight toxicity reduction after centrifugation, suggesting a particle-associated toxicant. The TIE conducted on the August 21 dry weather sample from Los Cerritos Channel was completed after prolonged sample storage, which may have influenced the results. The data indicated that the primary toxicant at Cerritos was also a non-polar organic and suggested toxicity resulting from mixed organophosphate/pyrethroid pesticides, although the response to varying doses of PBO had no straightforward relationship to PBO concentration. Correlation analysis suggests that diazinon was significantly correlated with water flea toxicity, though both non-detect analytical results and the unavailability of organophosphate pesticides since January 2005 make it unlikely that organophosphate pesticides were important toxicants in this year's monitoring. Correlations provide information to help identify key constituents of concern, but the statistical results do not prove that those constituents are the cause of toxicity. The true cause of toxicity may be another (possibly unmeasured) constituent that has a similar pattern of occurrence in the samples.

A third method, comparing the measured and predicted toxic units of the samples was used to assess the importance of zinc, copper, and pesticides as a cause of the toxicity of Long Beach stormwater. The predicted acute toxicity of the sample was calculated from the measured concentrations of the chemical constituents and their corresponding EC_{50} or LC_{50}. These comparisons were performed for all toxicity tests conducted since 2000 for sea urchins (Figures 9.22a through 9.22f) and *Ceriodaphnia* (Figures 9.23a through 9.23e)

From 2000 through 2005, concentrations of zinc and, to a much lesser degree, copper have been sufficient to explain any observed toxicity. This condition changed during the 2005/2006 monitoring season. Ten of twelve wet weather samples from this past season showed measurable toxicity to the urchins. The toxicity of eight samples containing measurable toxicity could not be accounted for by the measured concentrations of zinc and copper, which accounted for between about 4% and 110% of the toxicity to sea urchins in these samples. In the case of the most toxic samples (Belmont Creek and Bouton Pump, March 29, >32 TU_a), measured toxicant concentration accounted for <5% of the observed toxicity. In two other samples (Belmont Pump, 2 January and Los Cerritos Channel, 18 October), the observed toxicity was completely accounted for by measured zinc and copper concentrations. In eight of ten toxic samples, however, the toxicity observed in the bioassays exceeded that predicted by measured metal concentrations, suggesting that additional unmeasured toxicants were present.

TIEs performed on such toxic samples may yield information that can be useful in discussing these predicted vs. measured analyses. In this case, however, the TIEs performed on the two stormwater samples that were most toxic to sea urchins yielded no useful results due to loss of baseline toxicity. This rapid loss of toxicity could be due to a number of reasons.

Most frequently such short-term losses in toxicity are considered to be due to volatiles that are lost during sample handling and storage. Pyrethroid pesticides which are now being used from many of the applications previously served by the diazinon and chlorpyrifos (organophosphate pesticides) may also play a role in the occurrence and rapid decline in toxicity. Unlike the organophosphate pesticides, the synthetic pyrethroid compounds that are serving as replacements are highly insoluble and tend to strongly associate with particles. Information on the toxicity of the pyrethroids in both the freshwater and marine environments is still very limited but available information suggests that many of these compounds are toxic in the low parts per trillion (ng/L) range (Lee, 2001; Lee and Jones-Lee, 2005; TDC Environmental. 2003). The sensitivity of the sea urchin fertilization test to pyrethroid pesticides has not been established. The only substantial toxicity information for marine species is available for mysids. Mysids are among the most sensitive species that have been tested with pyrethroid pesticides.

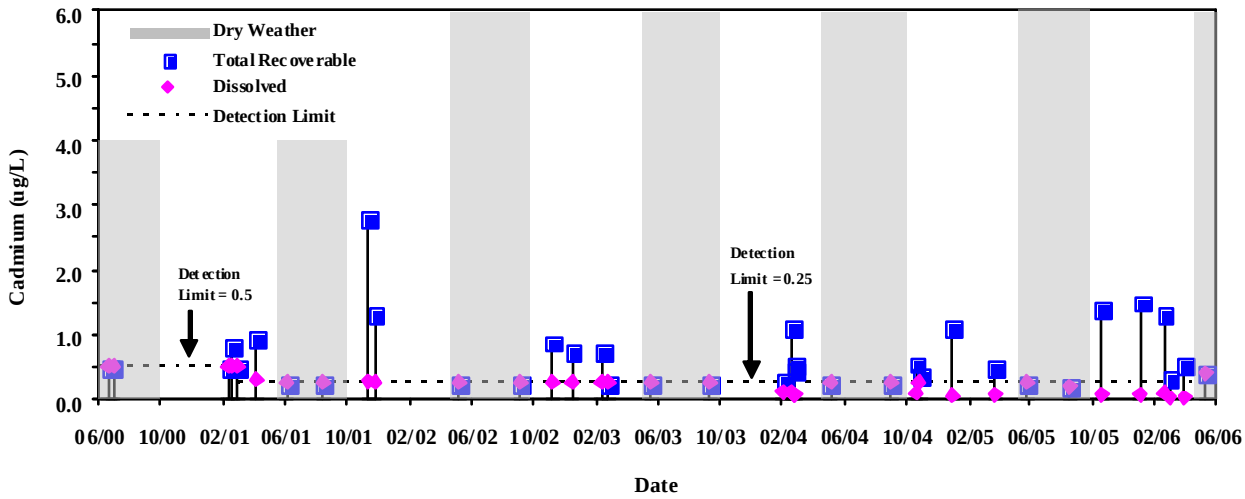
Measurement of toxicity of pyrethroid pesticides in aqueous samples has been identified as a significant problem due to the extreme hydrophobicity of these compounds. Wheelock et al. (2005) demonstrated that pyrethoids demonstrate rapid adsorption onto the walls of test containers can reduce the bioavailable portion of these pesticides by more than 50% in 24 hours. Thus holding times, storage, sample handling and testing have the potential to cause significant reductions in measured toxicity of environmental samples containing these pesticides.

Occurrences of toxicity to *Ceriodaphnia* have become less frequent through the years. During this storm year, only two wet weather samples showed measurable acute toxicity to water fleas, and the magnitude of that toxicity was not sufficient to trigger a TIE. Only one sample (at Belmont Pump from the January 2 storm) contained predicted toxicity to *Ceriodaphni*a in excess of that measured in the bioassay. The overall decline in the frequency that stormwater samples were toxic to water fleas can, at least partially, be attributed to the decreased availability and use of diazinon and chlorpyrifos.

If pyrethoid pesticides are playing a role in the increased level of toxicity observed in the case of sea urchins, one would also expected to see toxic responses in the water flea test. The California Department of Fish and Game (CDF&G Aquatic Toxicology Laboratory, 2000) determined that water fleas are very sensitive to bifenthrin, one of the more toxic pyrethroid compounds. The LC_{50} for bifenthrin was reported to be 0.078 (0.056-0.13) ppb.

Until recently analytical methods were not developed that could be reliably be used to measure pyrethroid pesticides in water and sediments so no information is available as to concentrations in stormwater, receiving waters and receiving water sediments. Pyrethroids, however, were recently (Bay et al. 2005) implicated as the contaminants responsible for sediment toxicity in Ballona Creek and the Dominguez Channel based upon TIE investigations. Based the rapidly increasing use of pyrethoid pesticides in urban areas and both the physical and chemical properties of these compounds, it will be important to incorporate assessment of these compounds in the stormwater program.

a)



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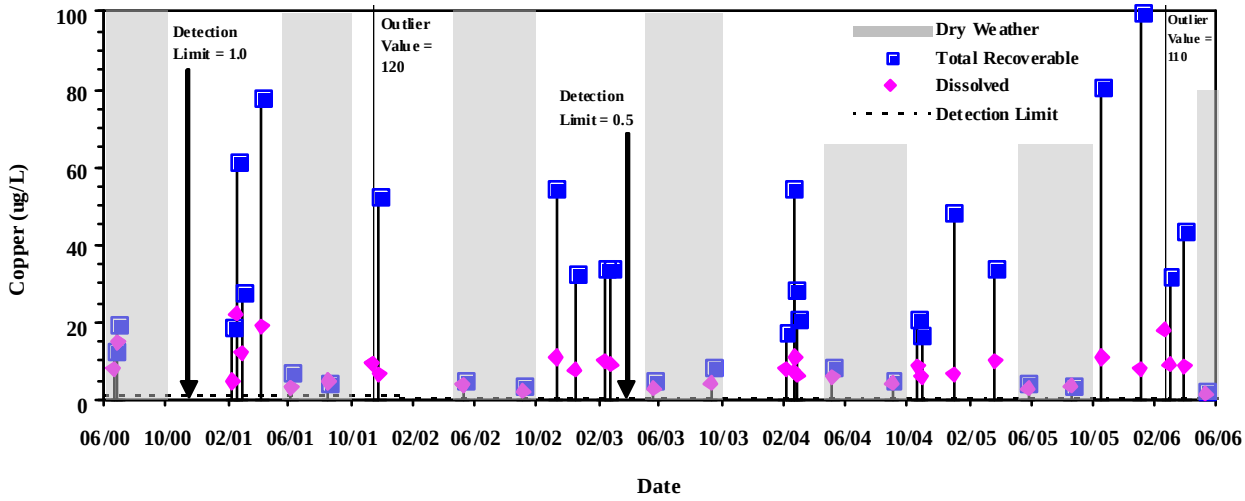

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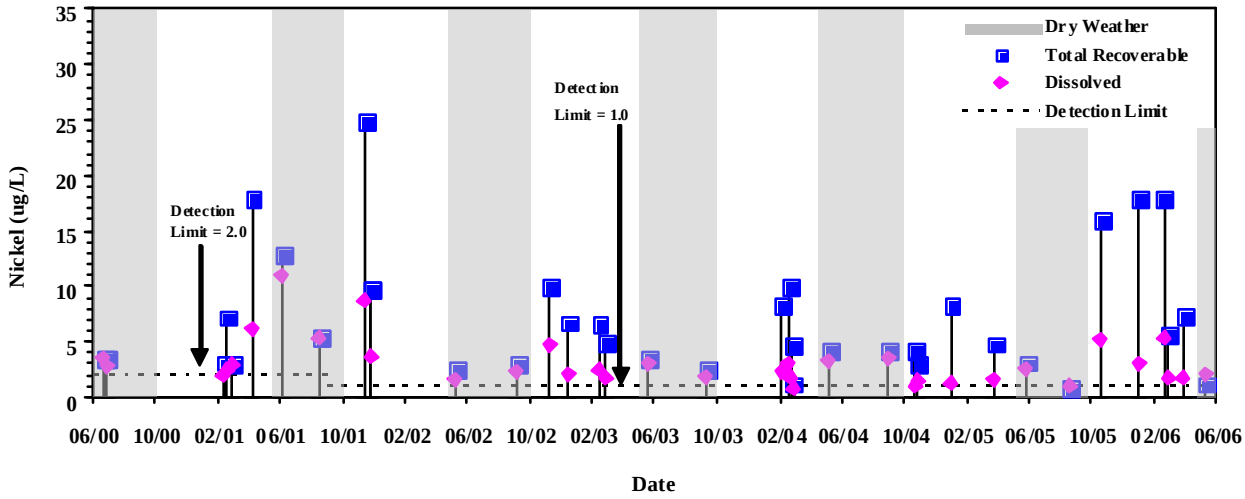
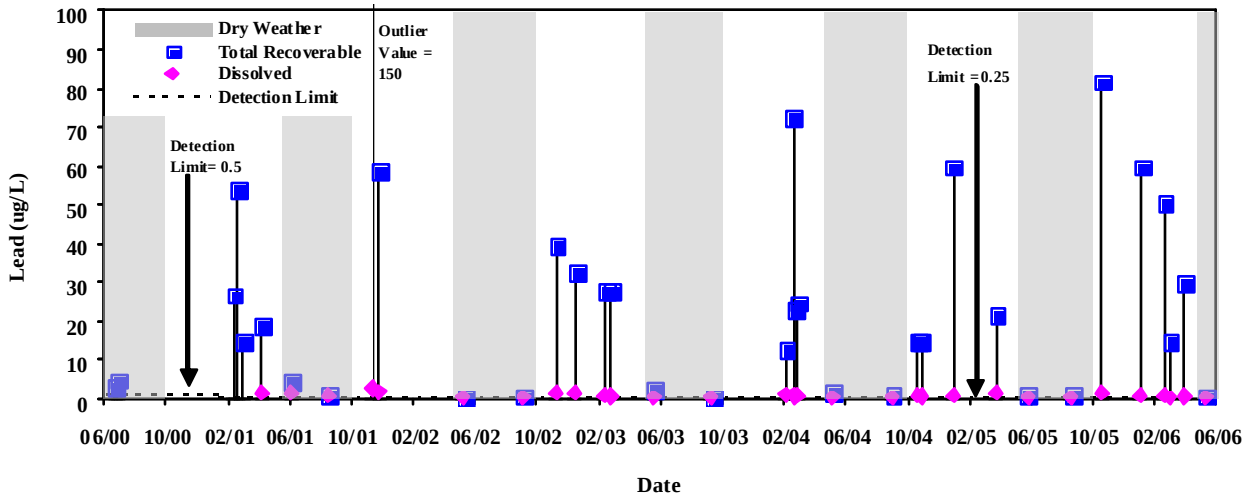


Figure 9.1 Belmont Pump Station Chemistry Results: a) Cadmium; b) Copper; c) Nickel.

a)



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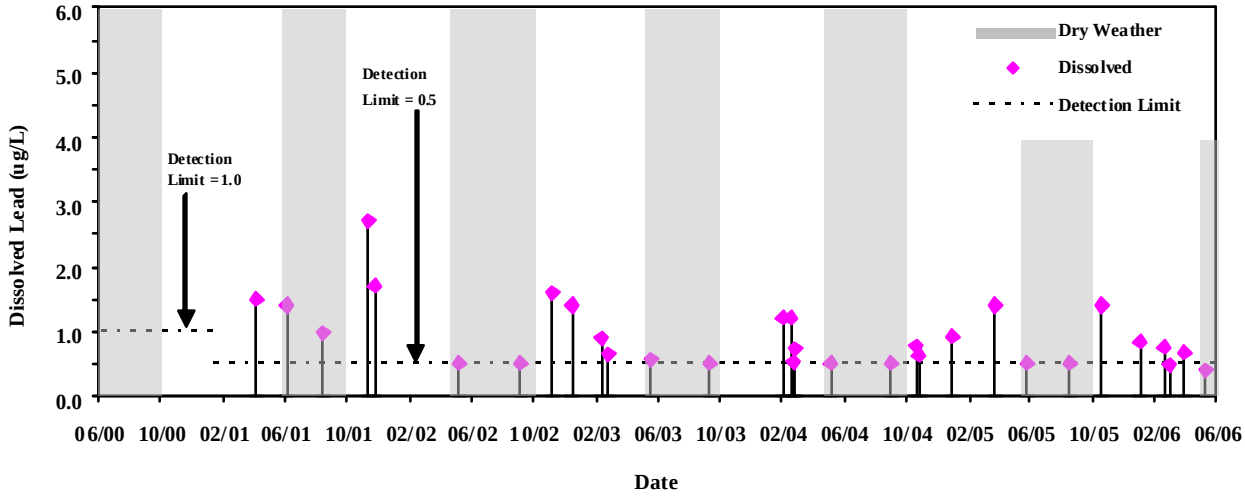

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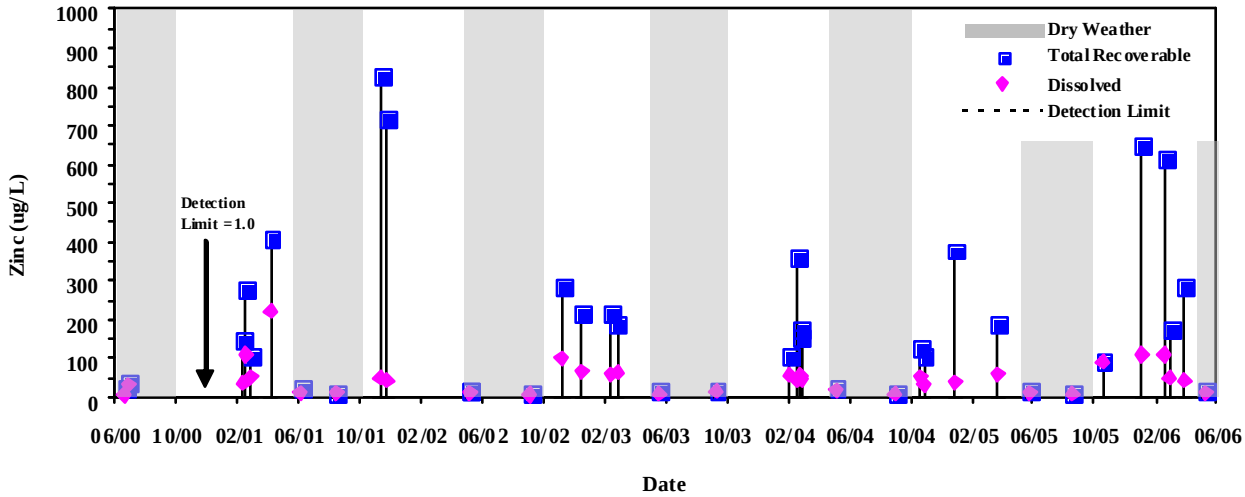
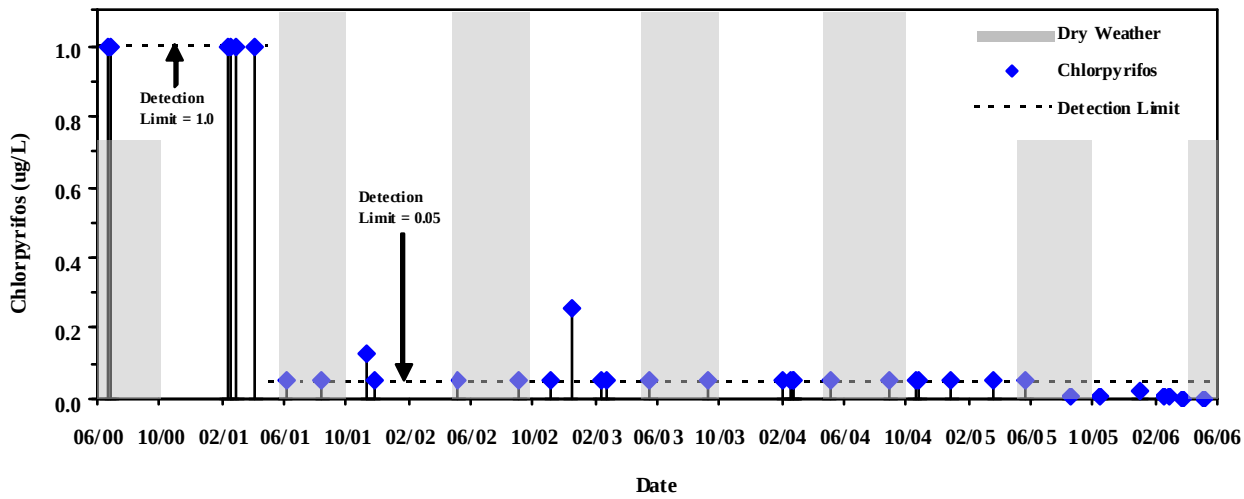


Figure 9.2 Belmont Pump Station Chemistry Results: a) Lead (total and dissolved); b) Lead (dissolved only); c) Zinc.

a)



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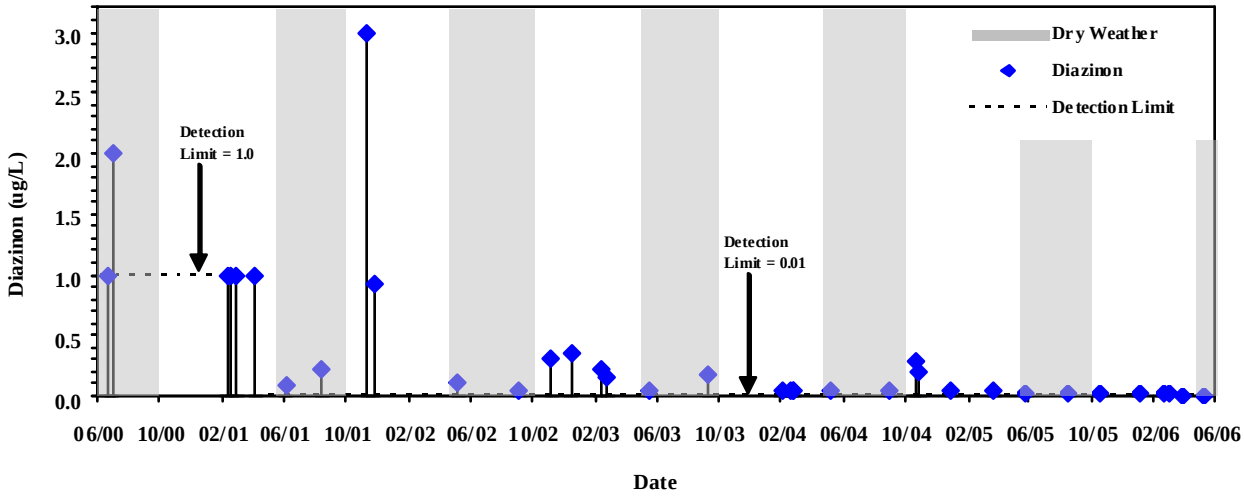

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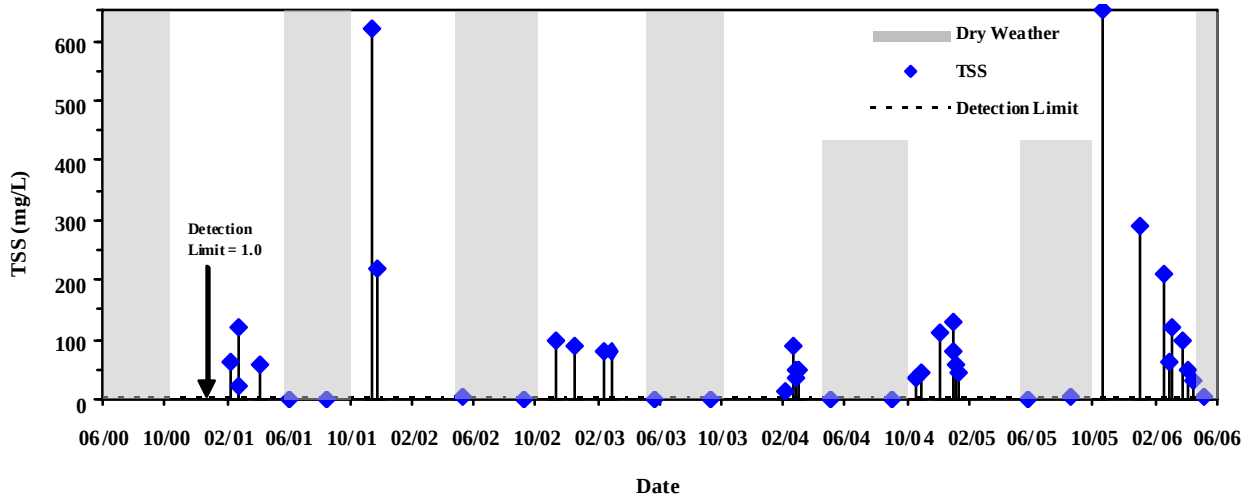
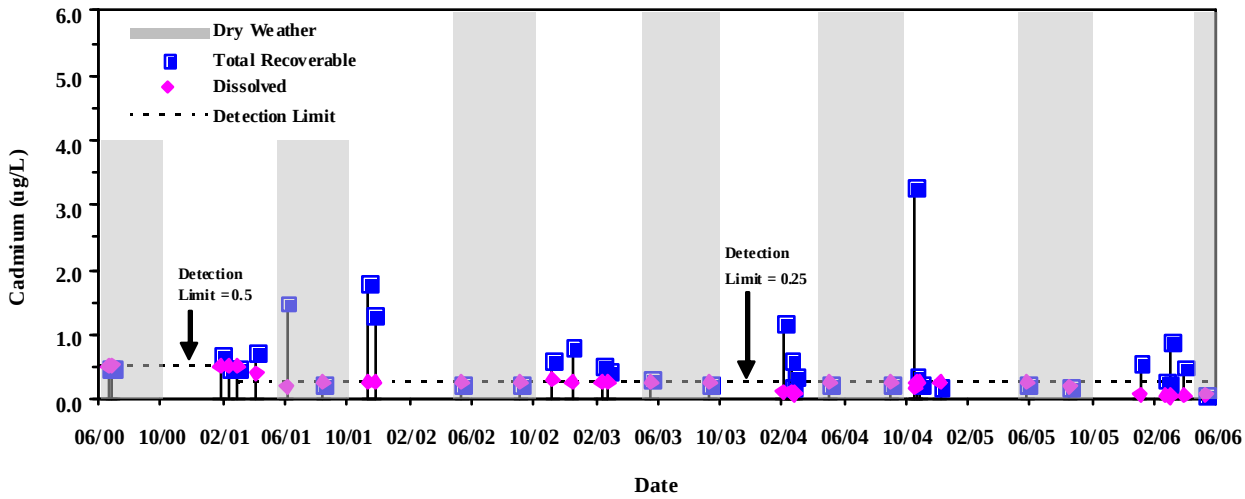


Figure 9.3 Belmont Pump Station Chemistry Results: a) Chlorpyrifos; b) Diazinon; c) TSS.

a)



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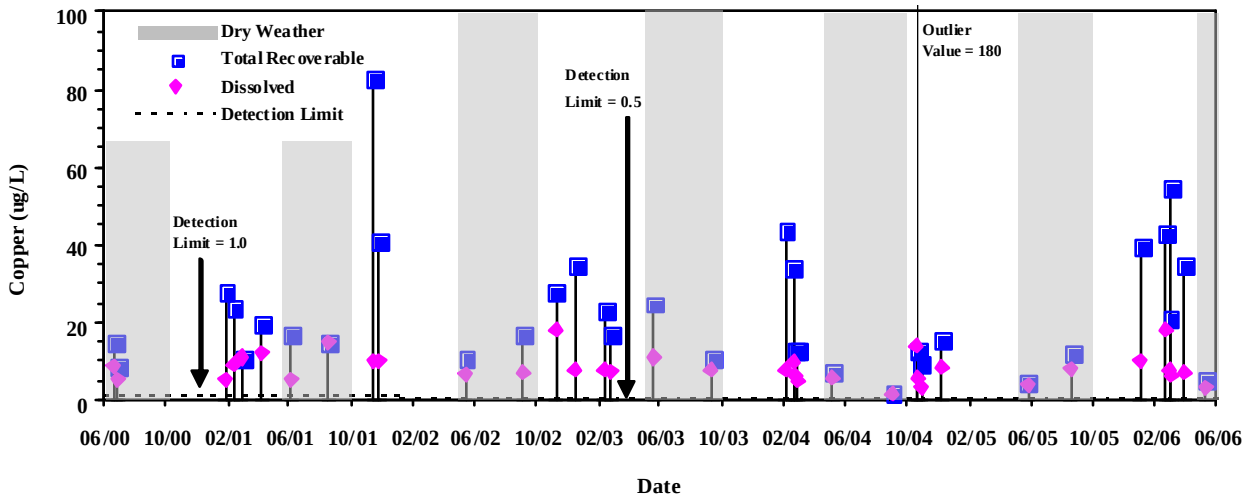

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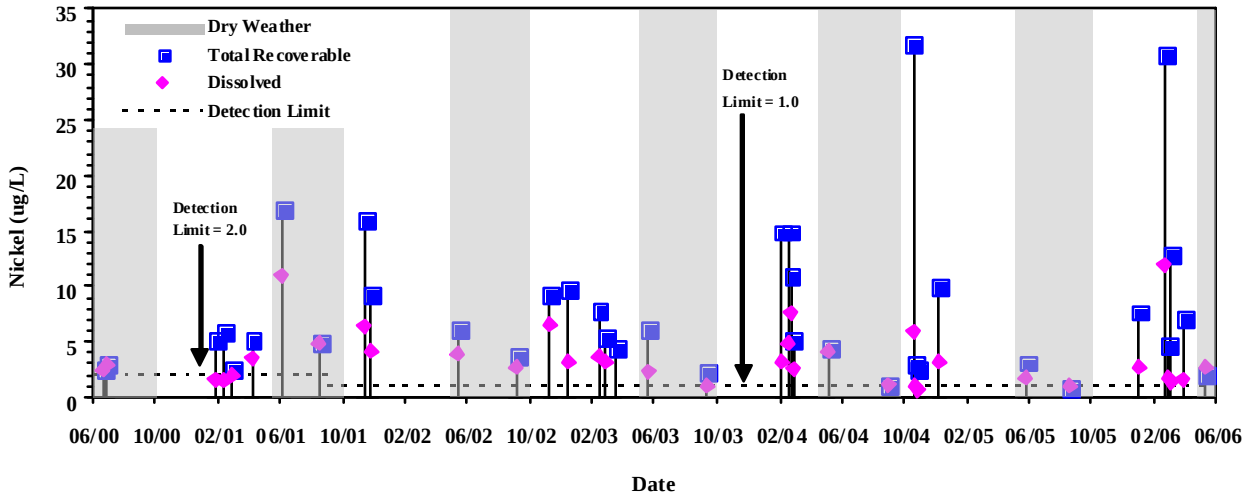
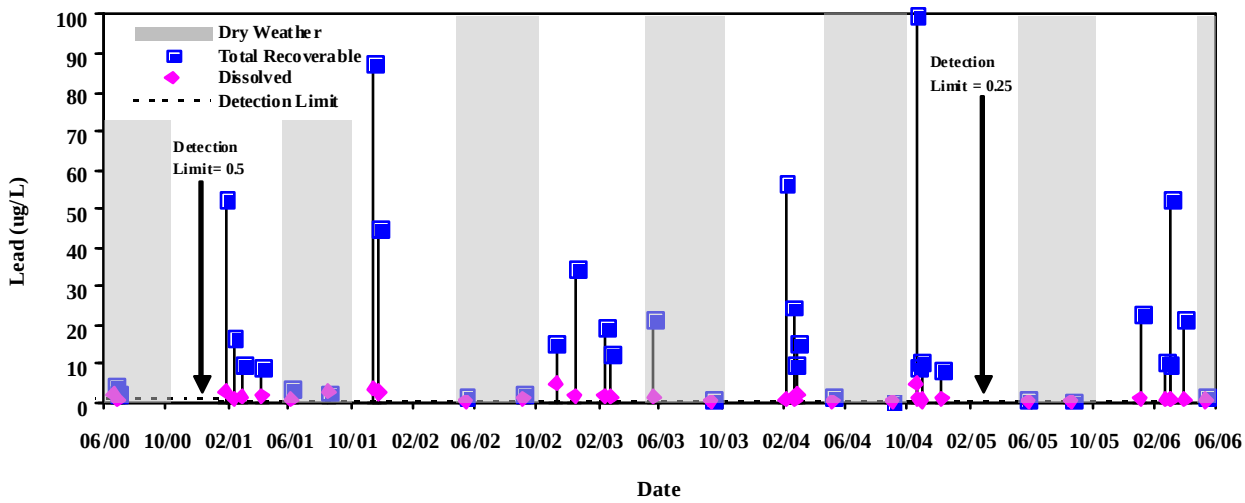


Figure 9.4 Bouton Creek Chemistry Results: a) Cadmium; b) Copper; c) Nickel.

a)



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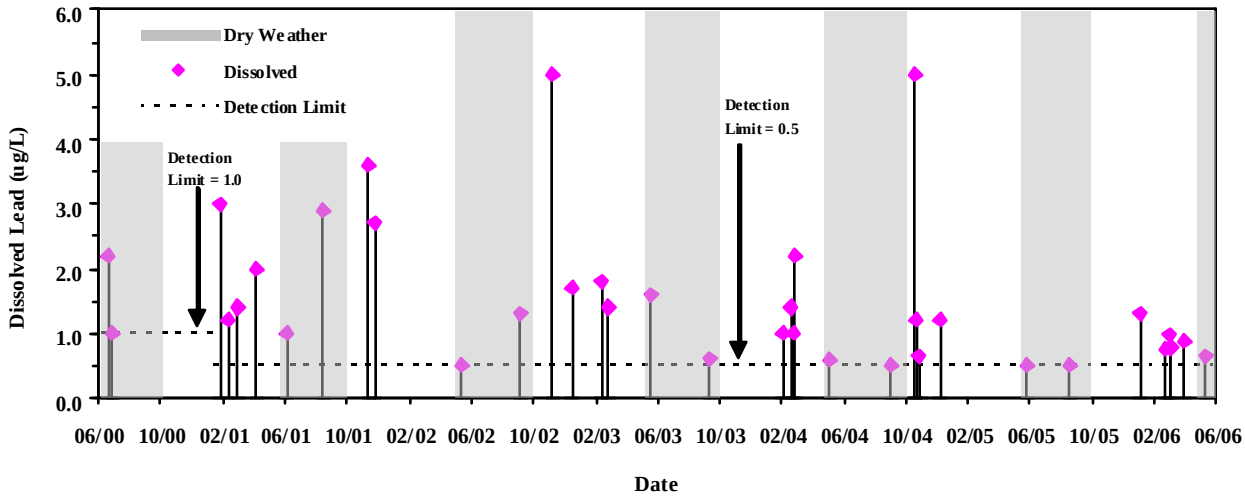

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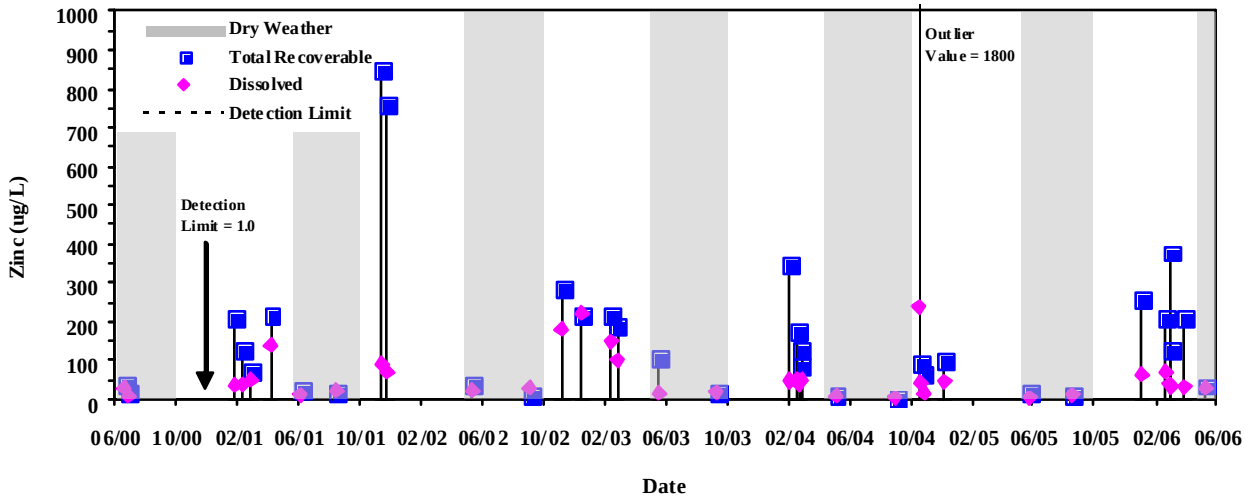
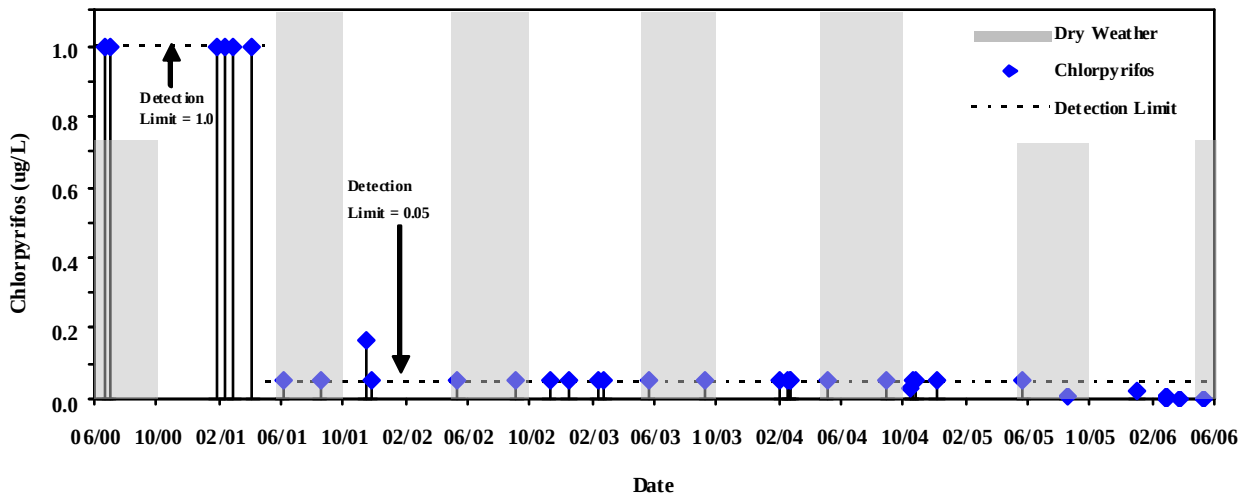


Figure 9.5 Bouton Creek Chemistry Results: a) Lead (total and dissolved); b) Lead (dissolved only); c) Zinc.

a)



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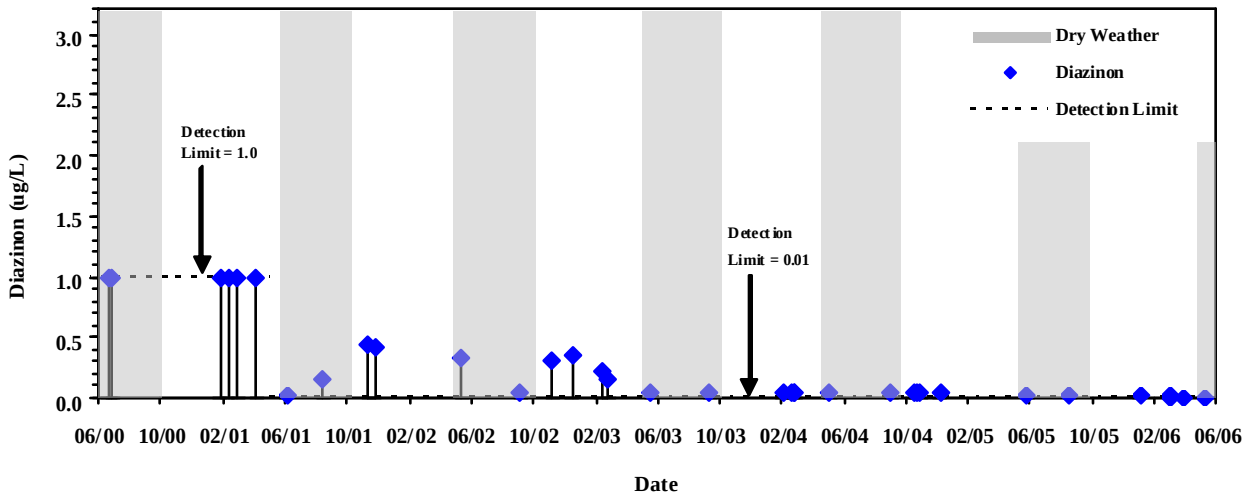

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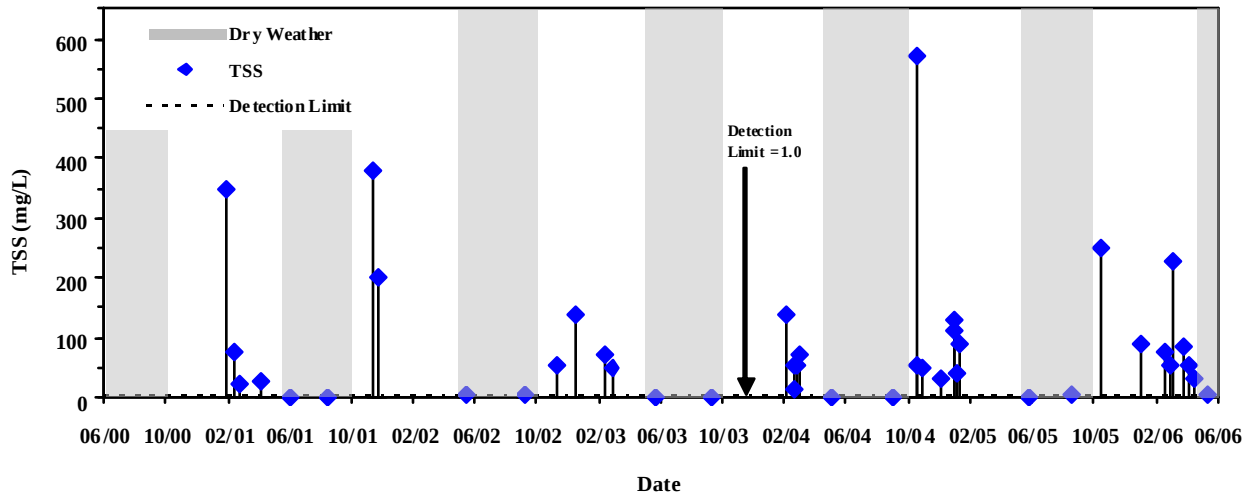
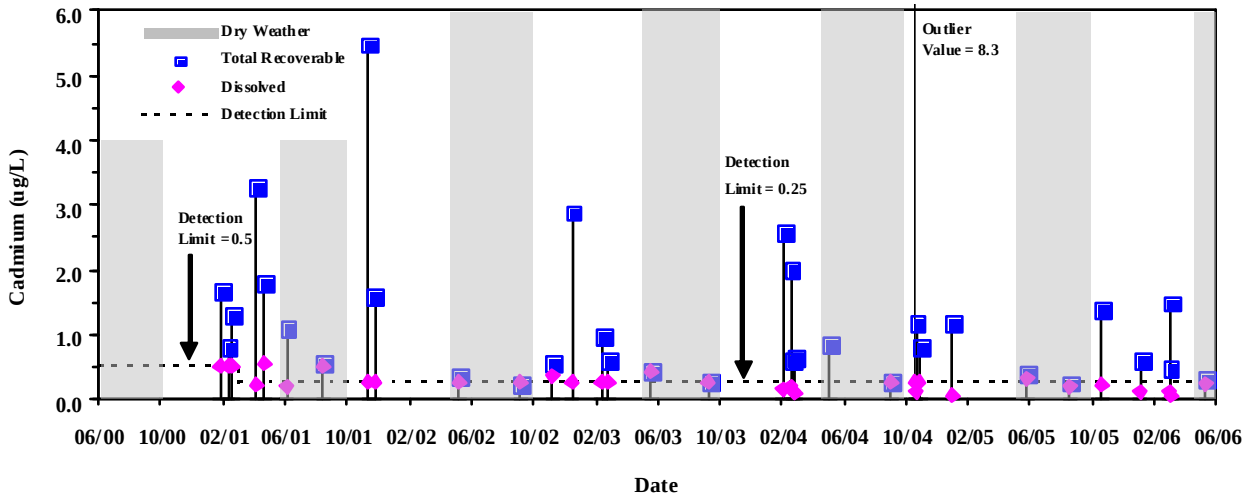


Figure 9.6 Bouton Creek Chemistry Results: a) Chlorpyrifos; b) Diazinon; c) TSS.

a)



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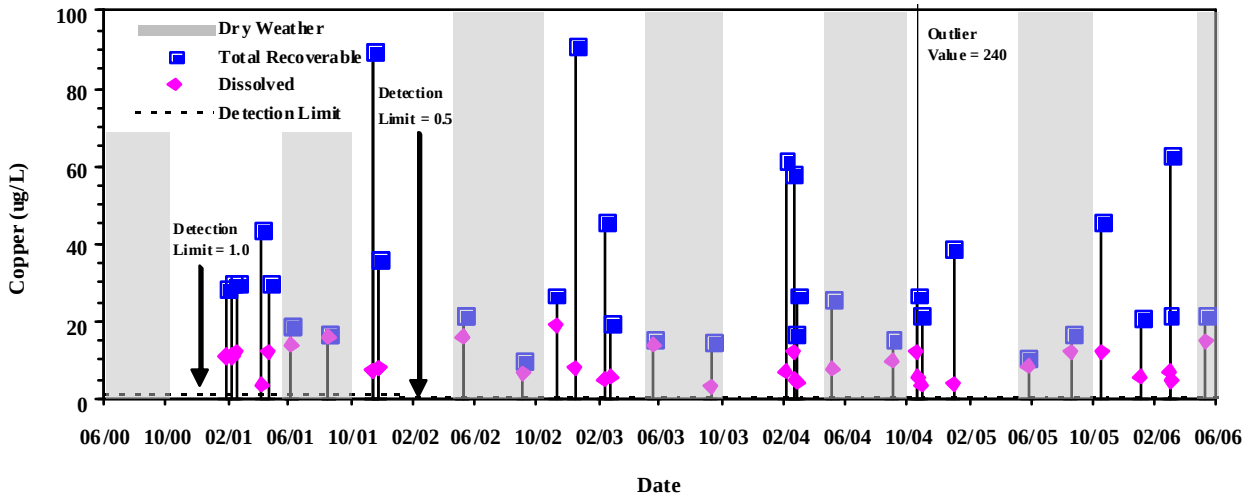

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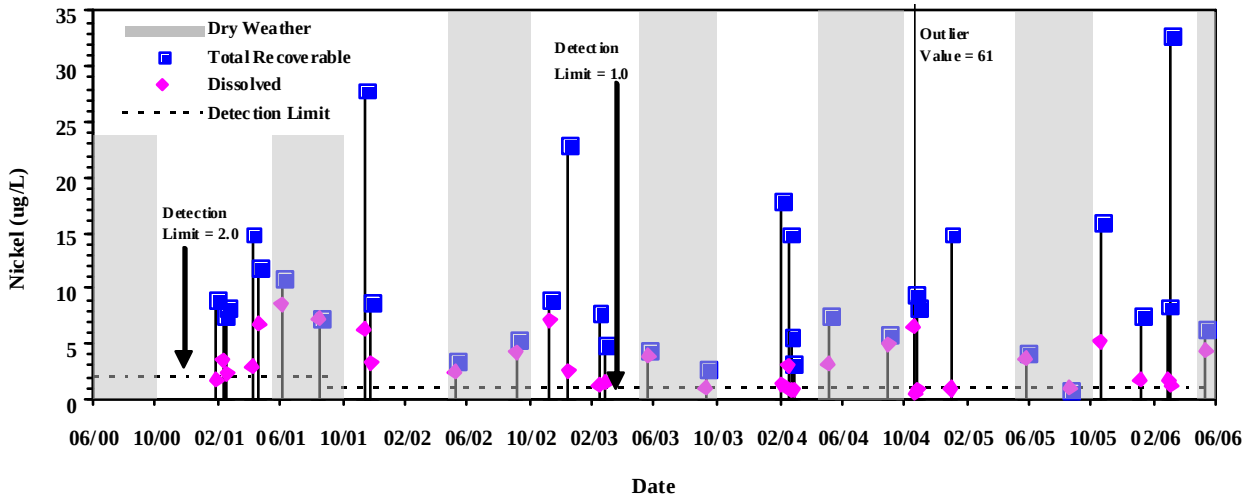
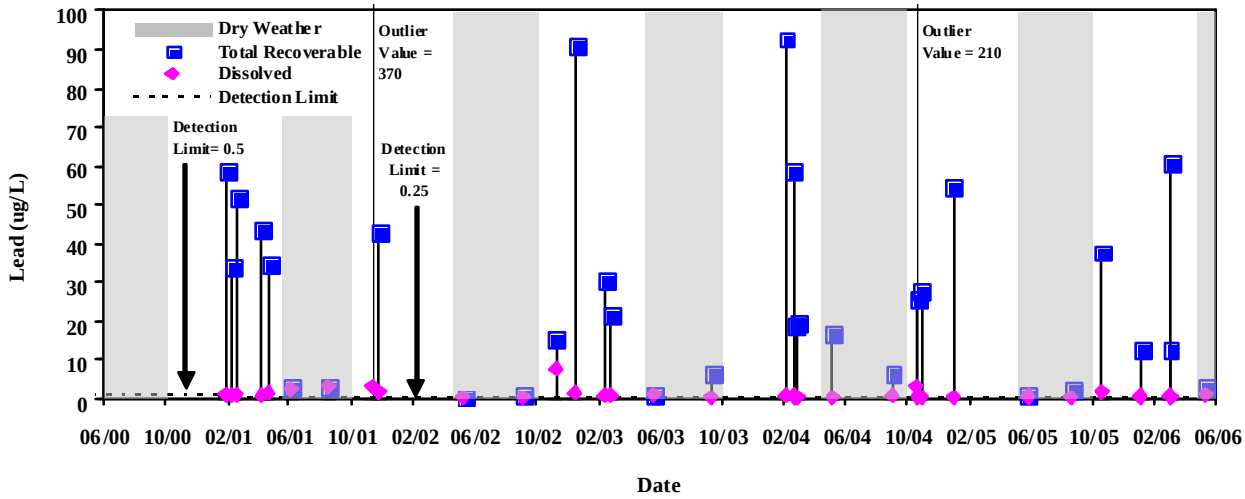


Figure 9.7 Los Cerritos Channel Chemistry Results: a) Cadmium; b) Copper; c) Nickel.

a)



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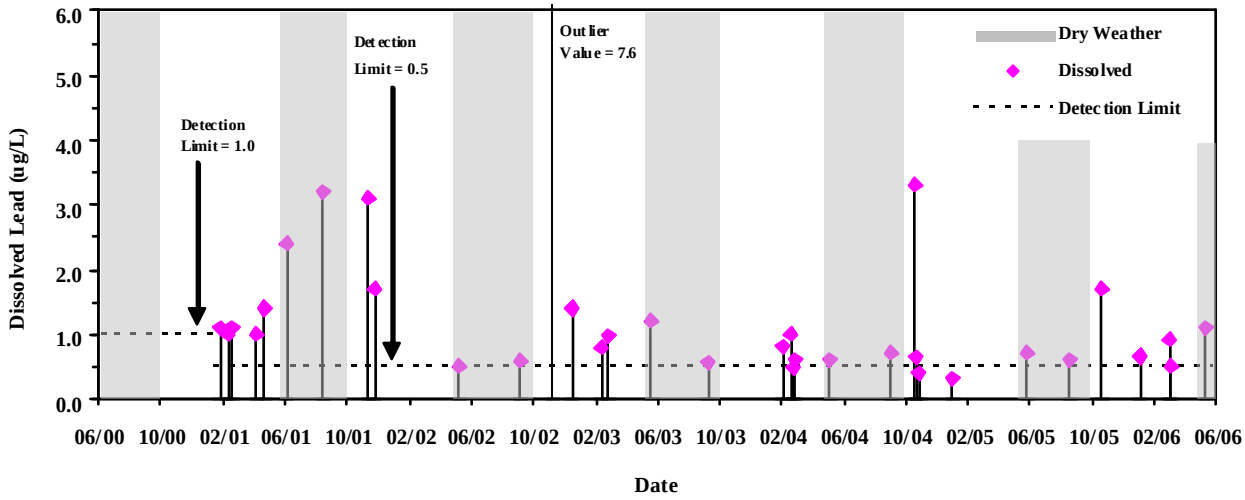

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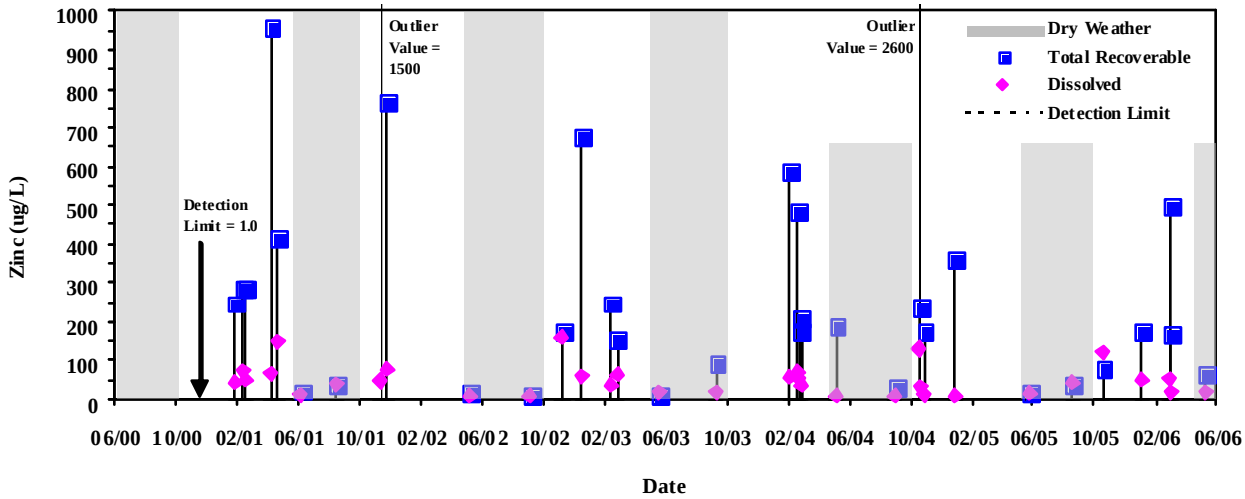
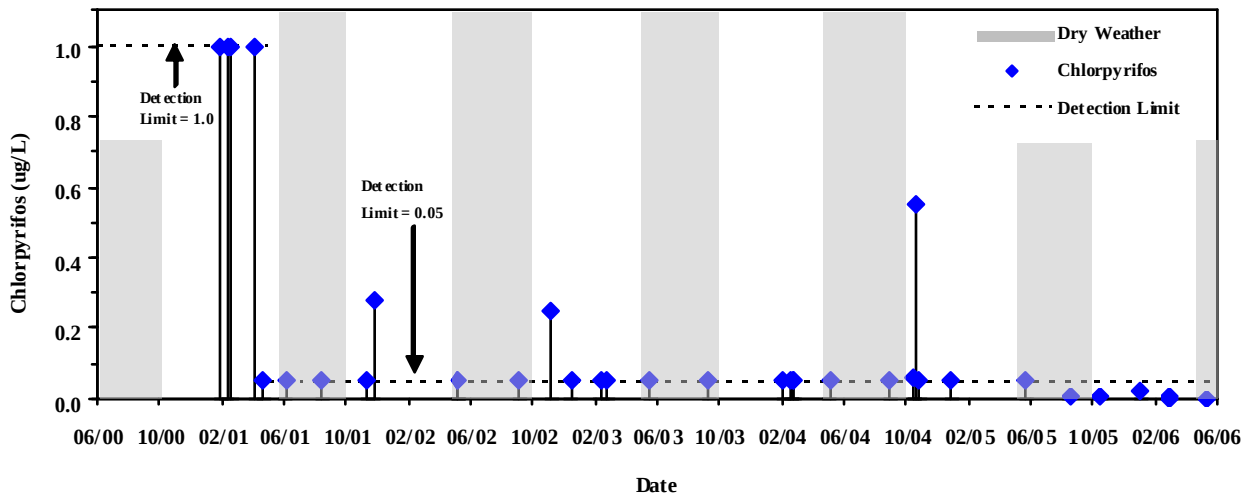
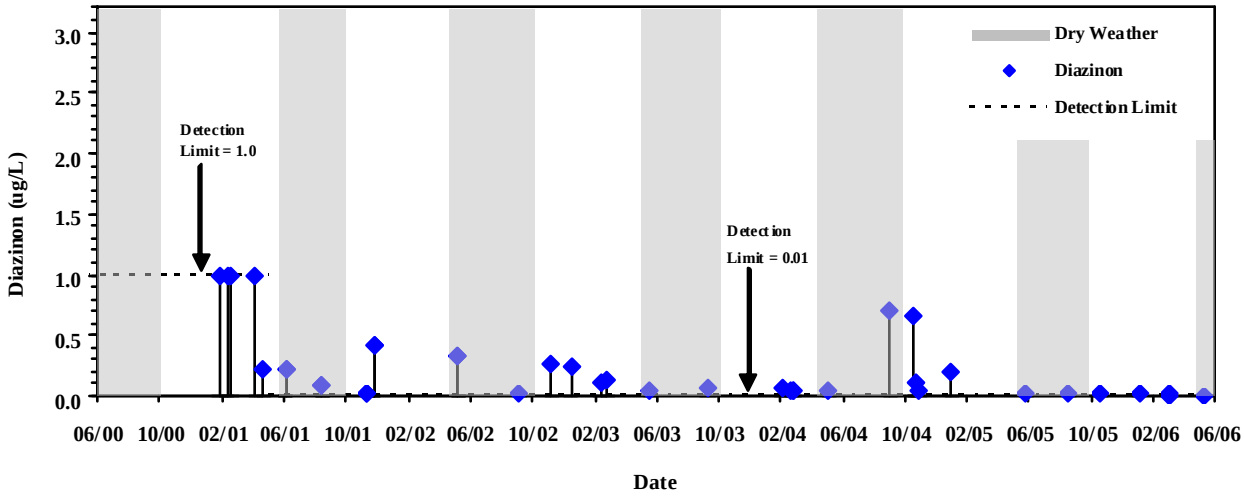


Figure 9.8 Los Cerritos Channel Chemistry Results: a) Lead (total and dissolved); b) Lead (dissolved only); c) Zinc.

a)



b)



c)

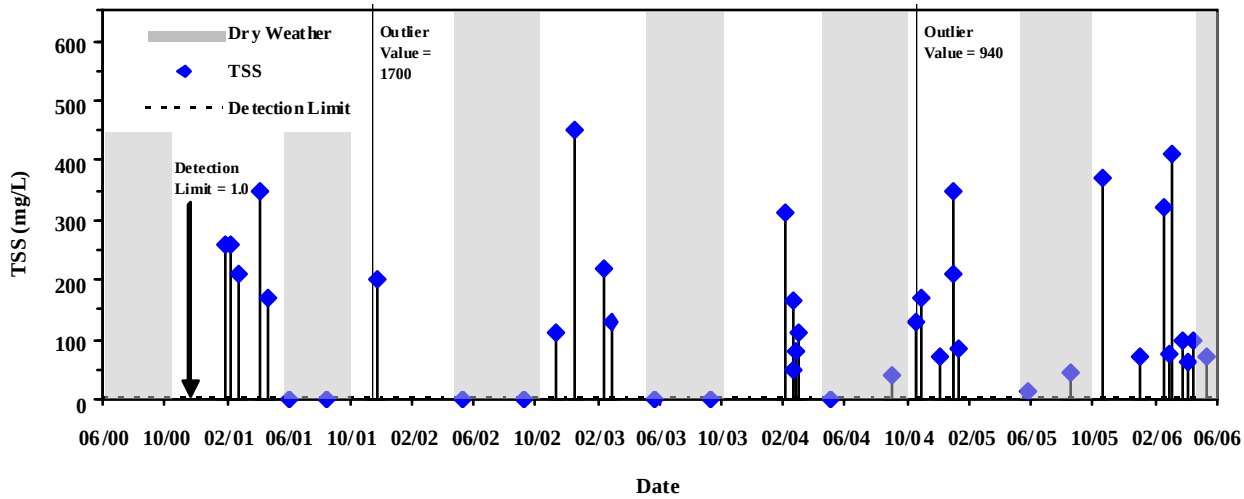
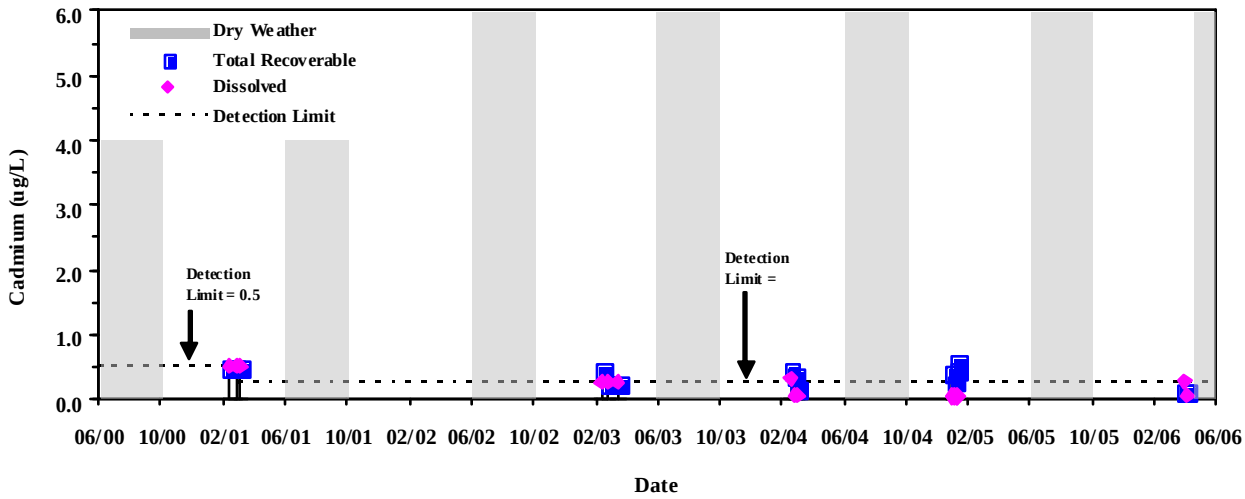


Figure 9.9 Los Cerritos Channel Chemistry Results: a) Chlorpyrifos; b) Diazinon; c) TSS.

a)



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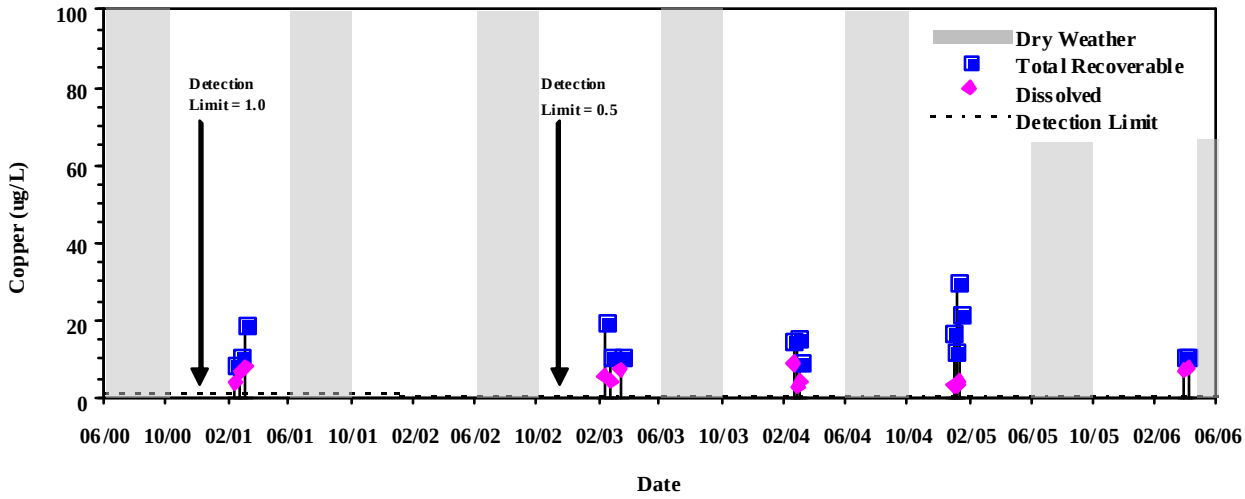


c)

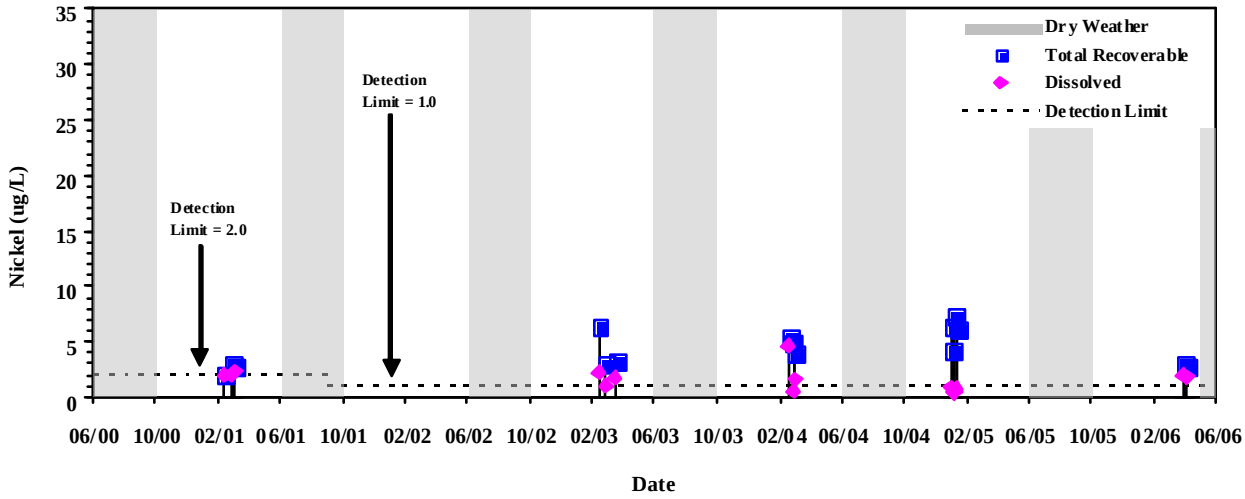
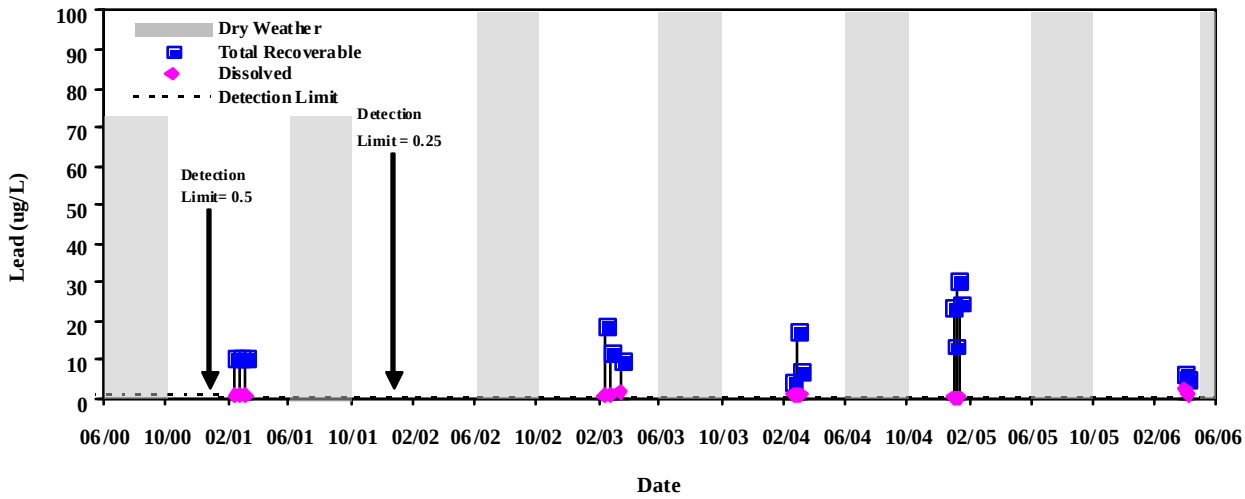
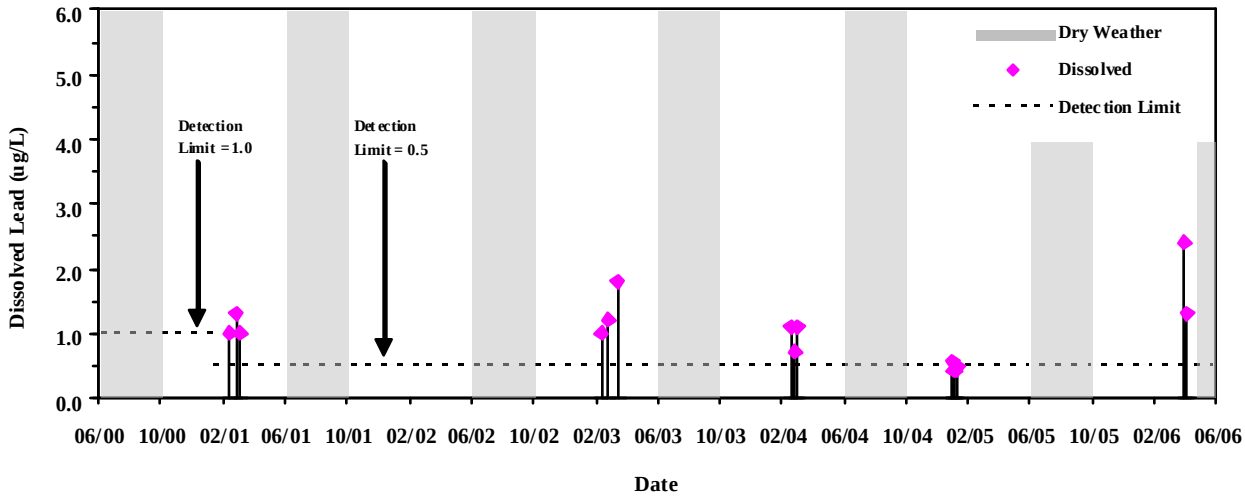


Figure 9.10 Dominquez Gap Chemistry Results: a) Cadmium; b) Copper; c) Nickel.

a)



b)



c)

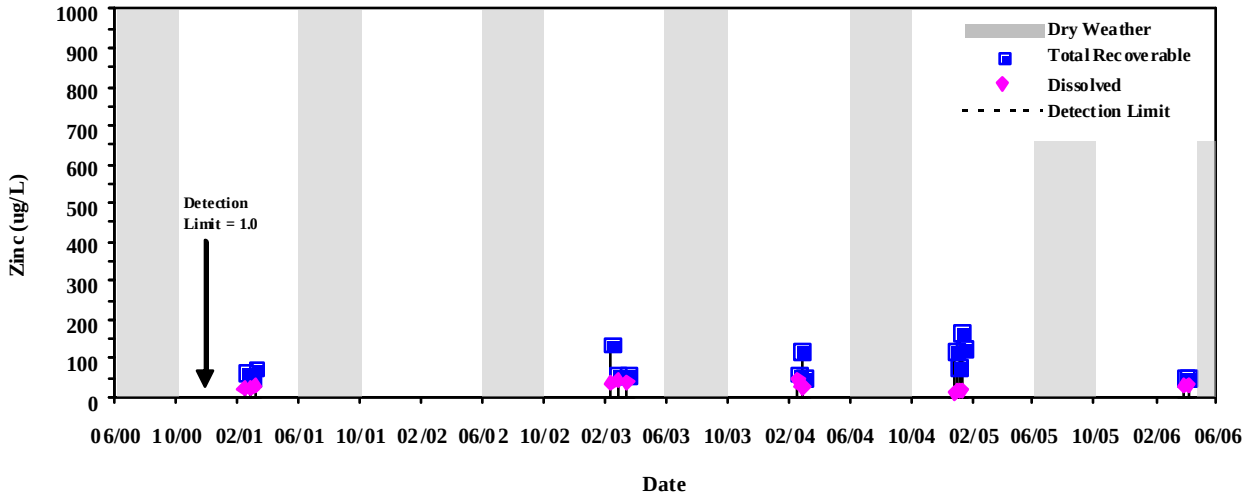
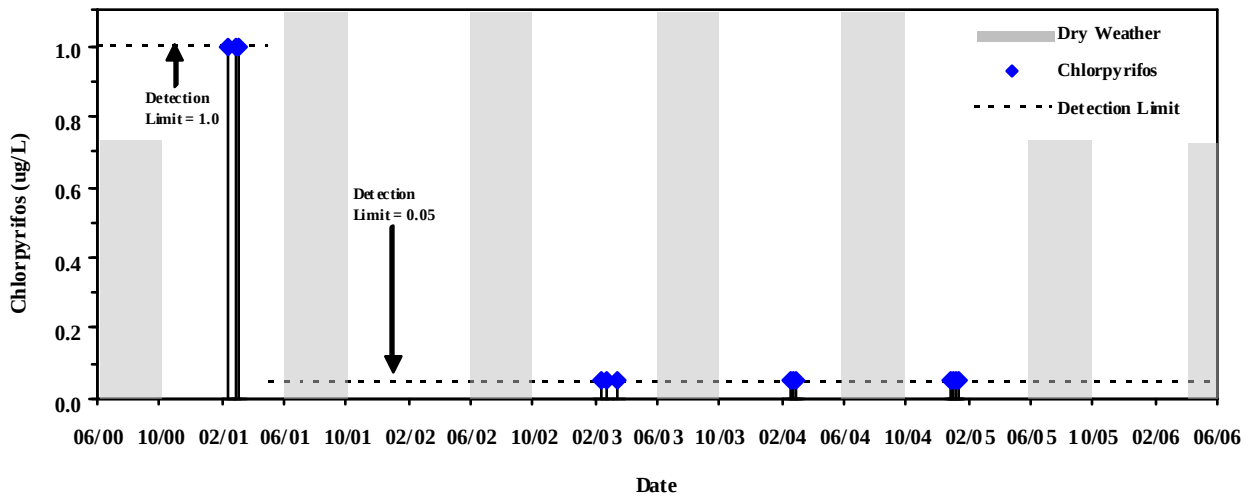
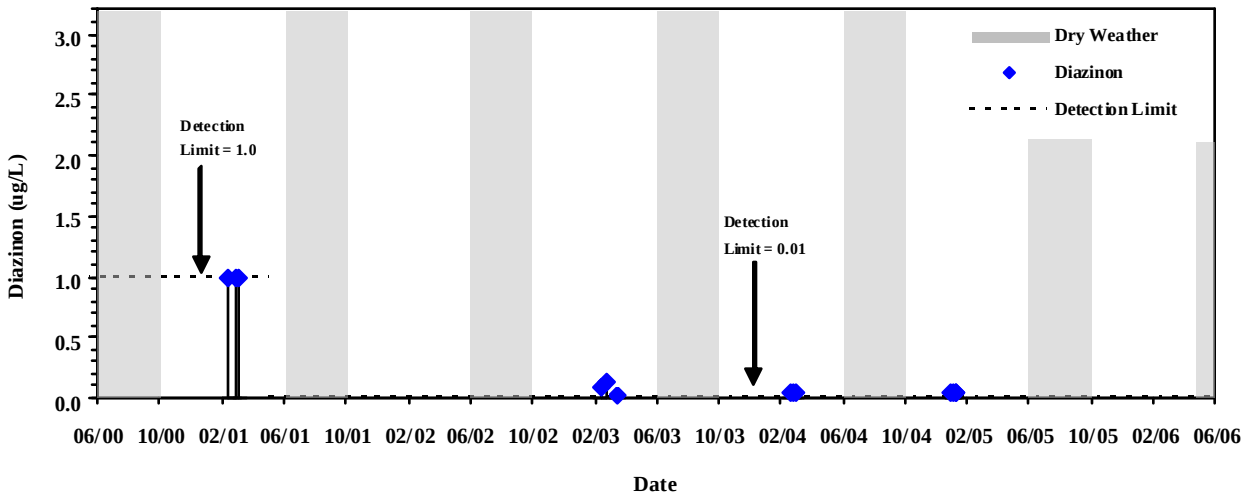


Figure 9.11 Dominquez Gap Chemistry Results: a) Lead (total and dissolved); b) Lead (dissolved only); c) Zinc.

a)



b)



c)

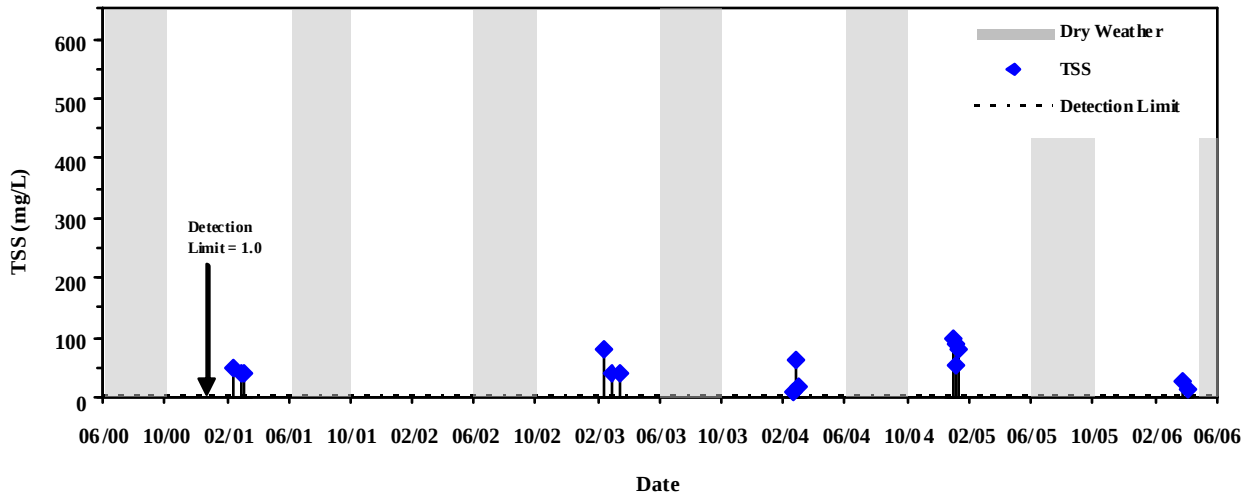


Figure 9.12 Dominquez Gap Chemistry Results: a) Chlorpyrifos; b) Diazinon; c) TSS.

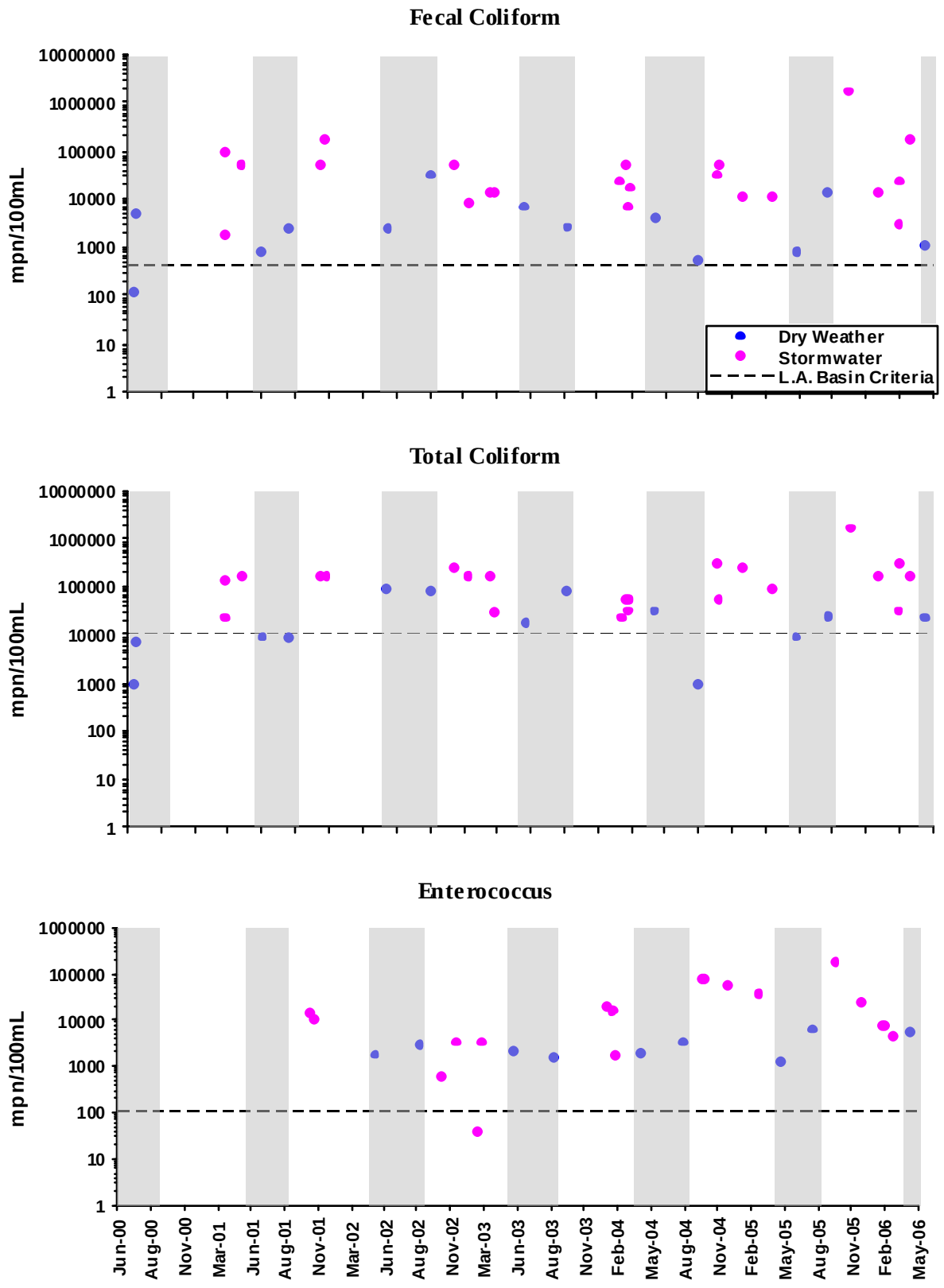


Figure 9.13 Belmont Pump Station bacteria concentrations for 2000 through 2006. Dashed lines indicate the species-specific, single sample criteria based on the L.A. Basin Plan.

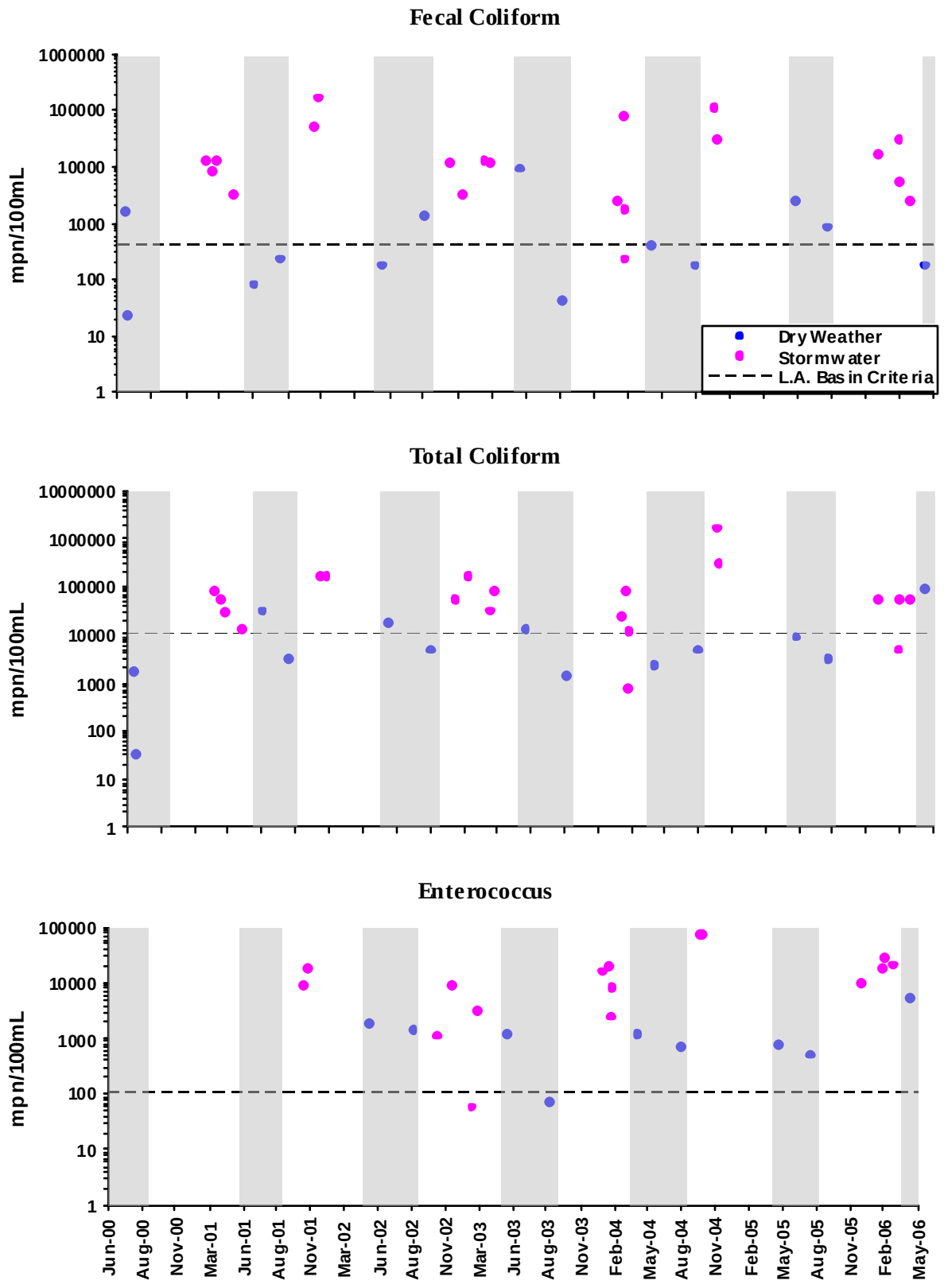


Figure 9.14 Bouton Creek bacteria concentrations for 2000 through 2006. Dashed lines indicate the species-specific, single sample criteria based on the L.A. Basin Plan.

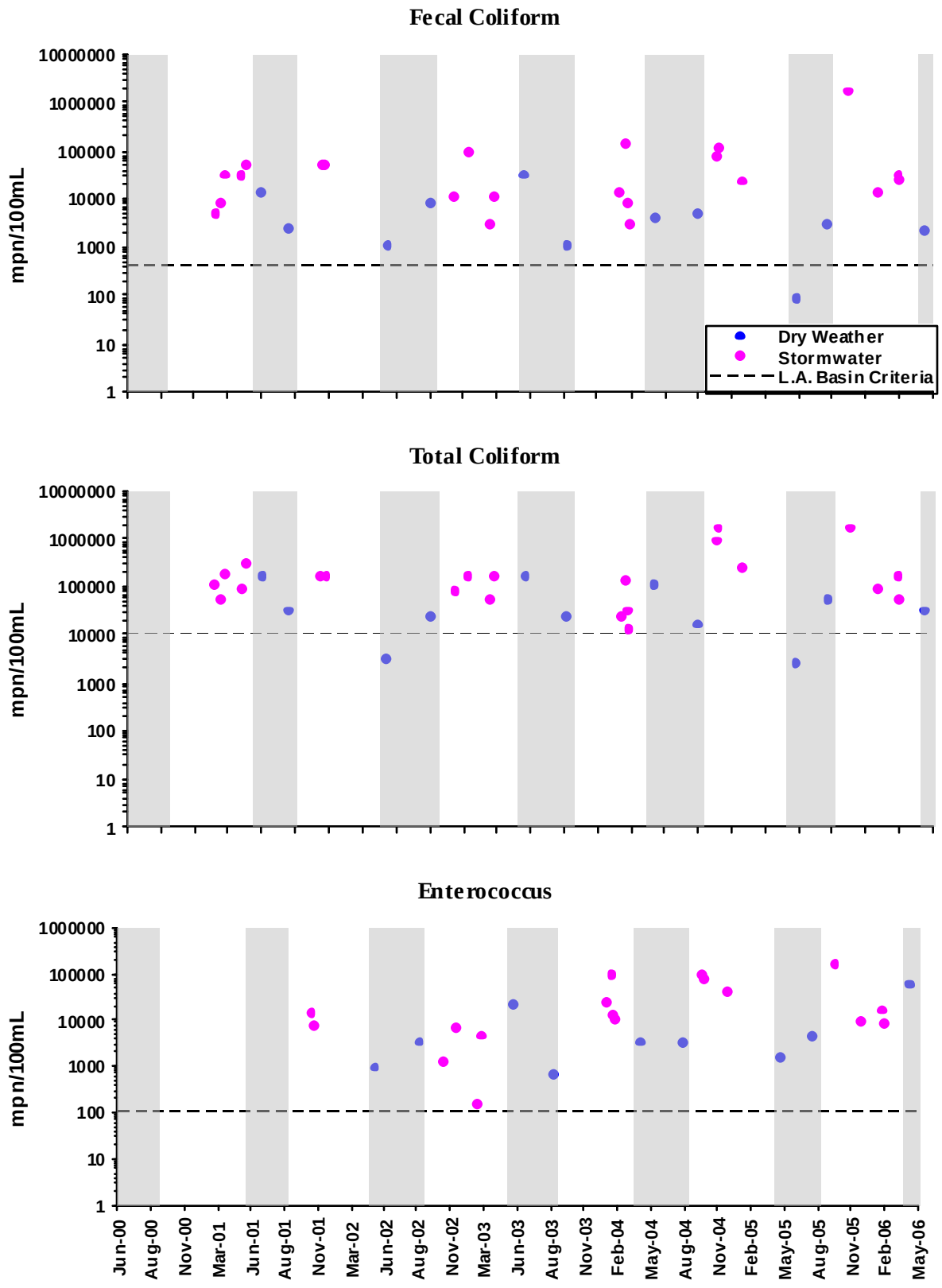


Figure 9.15 Los Cerritos Channel bacteria concentrations for 2000 through 2006. Dashed lines indicate the species-specific, single sample criteria based on the L.A. Basin Plan.

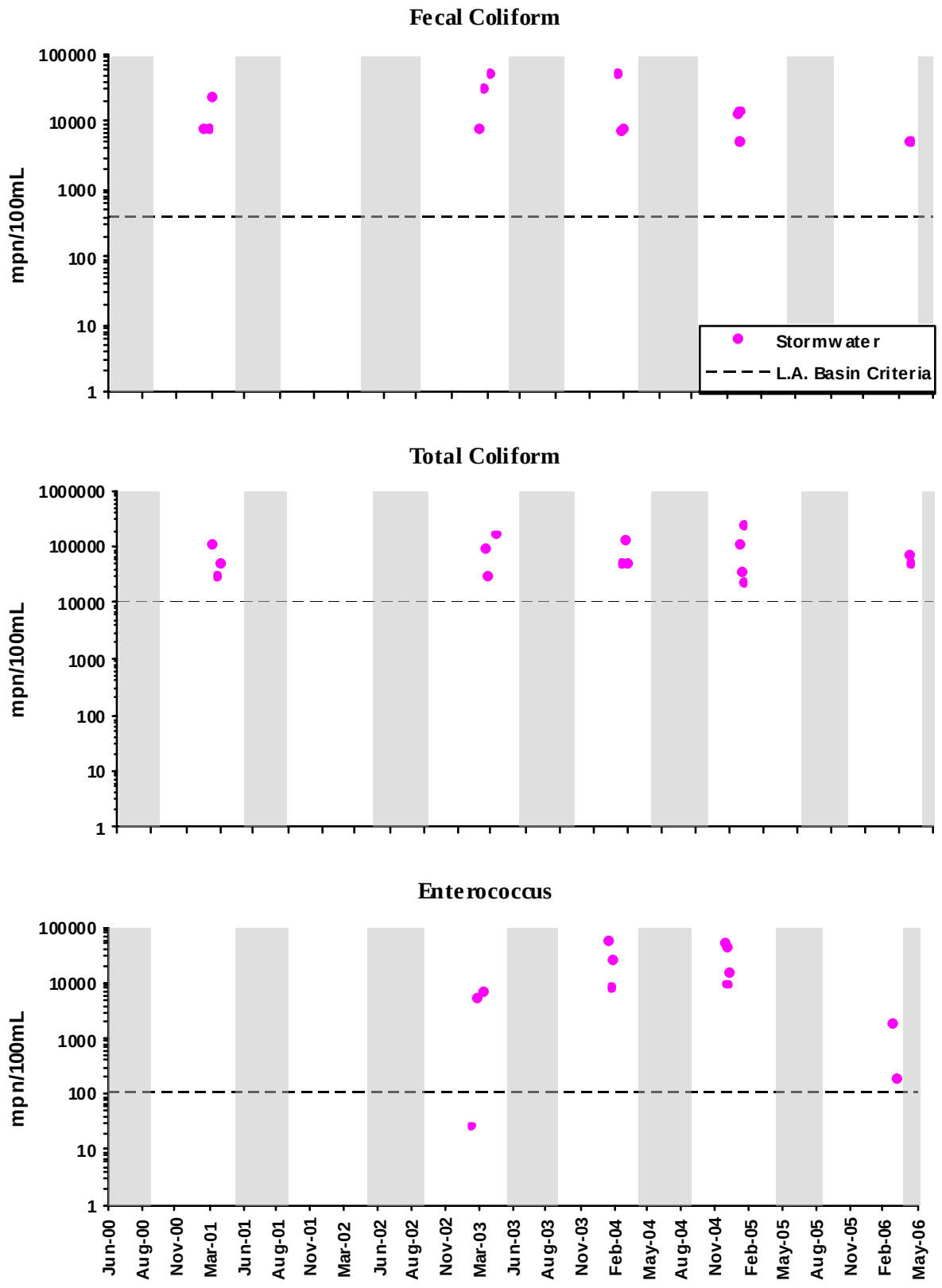


Figure 9.16 Dominguez Gap bacteria concentrations for 2000 through 2006. Dashed lines indicate the species-specific, single sample criteria based on the L.A. Basin Plan.

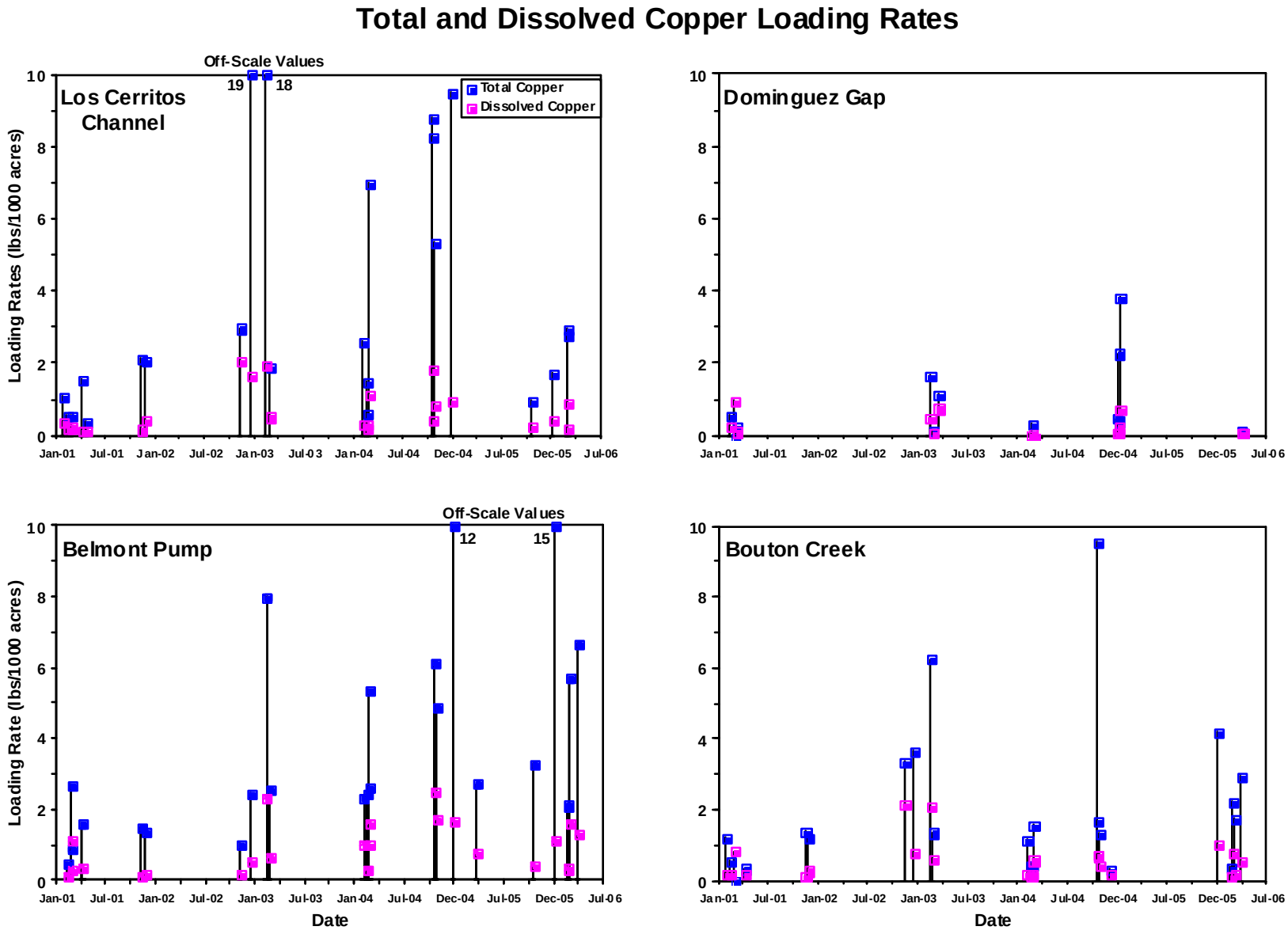


Figure 9.17 Total and Dissolved Copper Loading Rates Calculated for all Monitored Storm Events, 2001-2006.

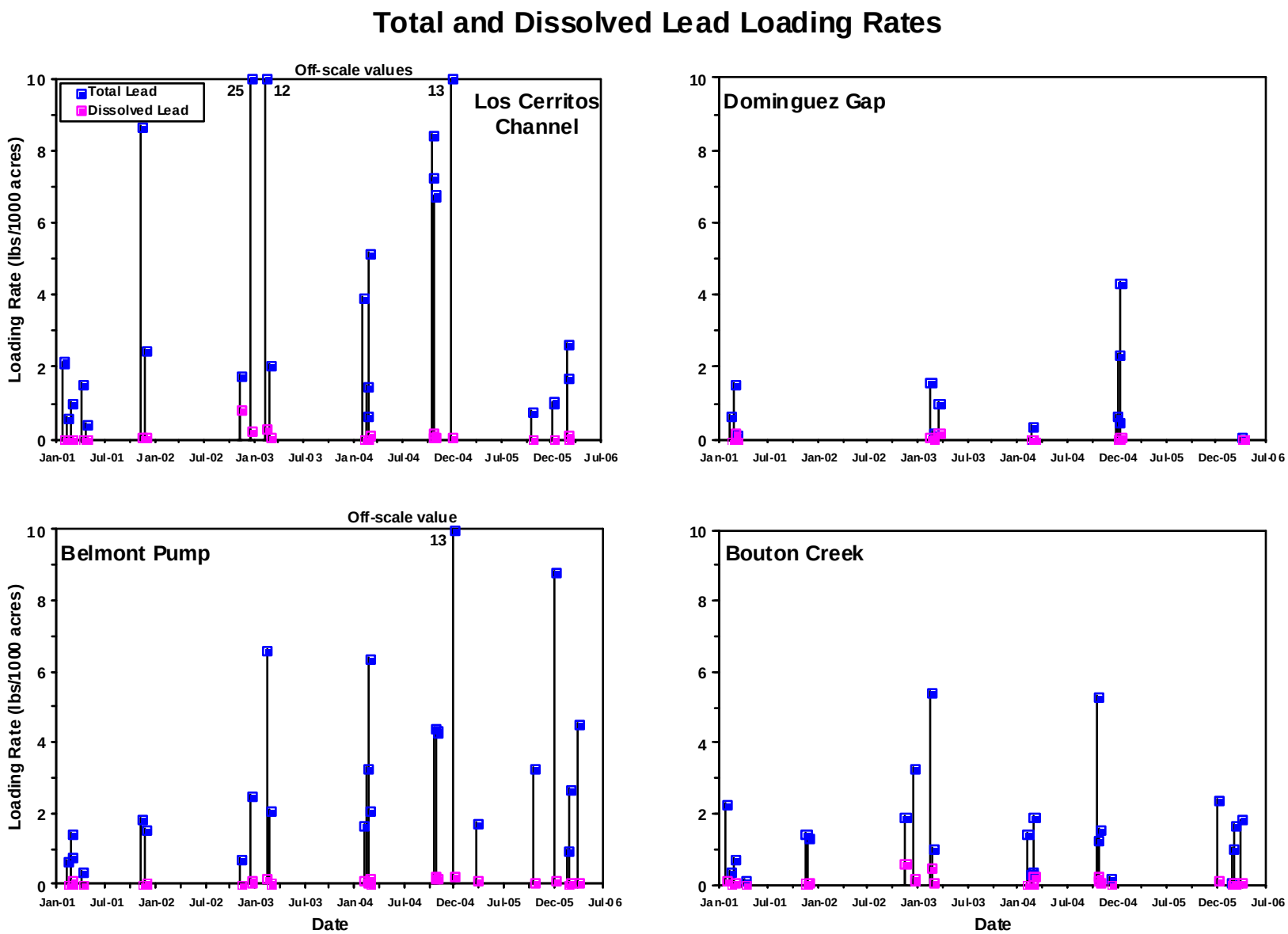


Figure 9.18 Total and Dissolved Lead Loading Rates Calculated for all Monitored Storm Events, 2001-2006.

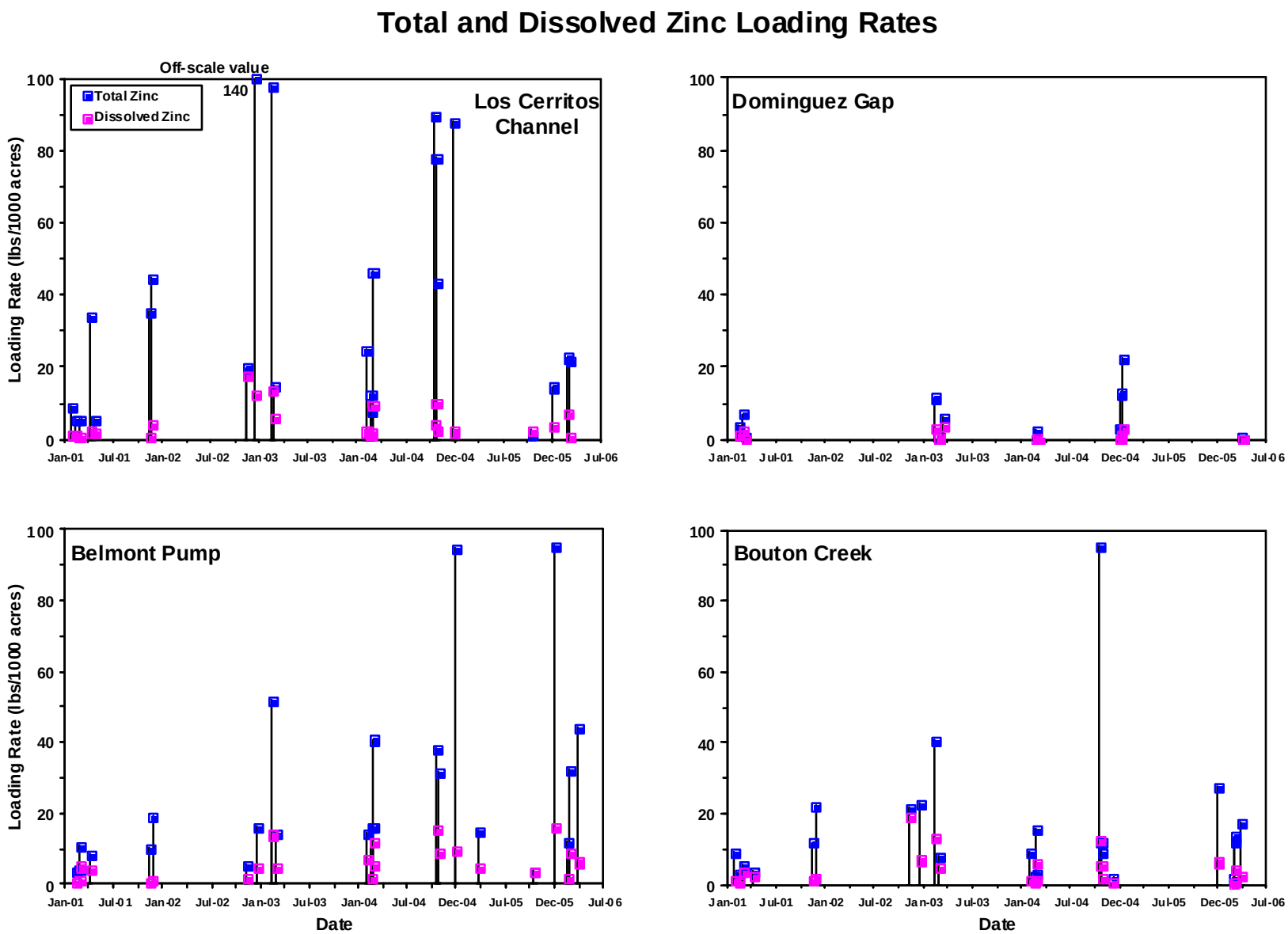


Figure 9.19 Total and Dissolved Zinc Loading Rates Calculated for all Monitored Storm Events, 2001-2006.

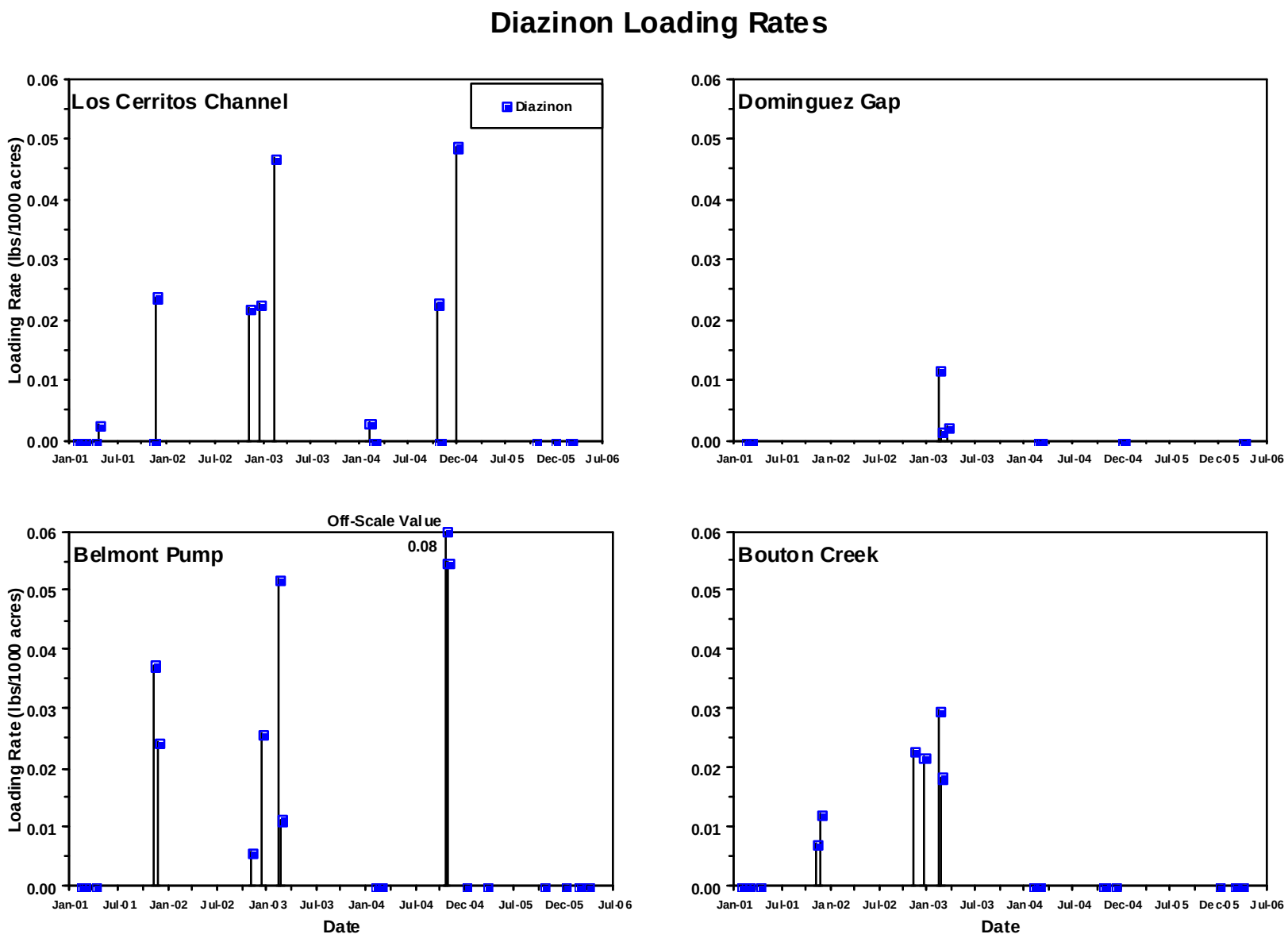


Figure 9.20 Diazinon Loading Rates Calculated for all Monitored Storm Events, 2001-2006.

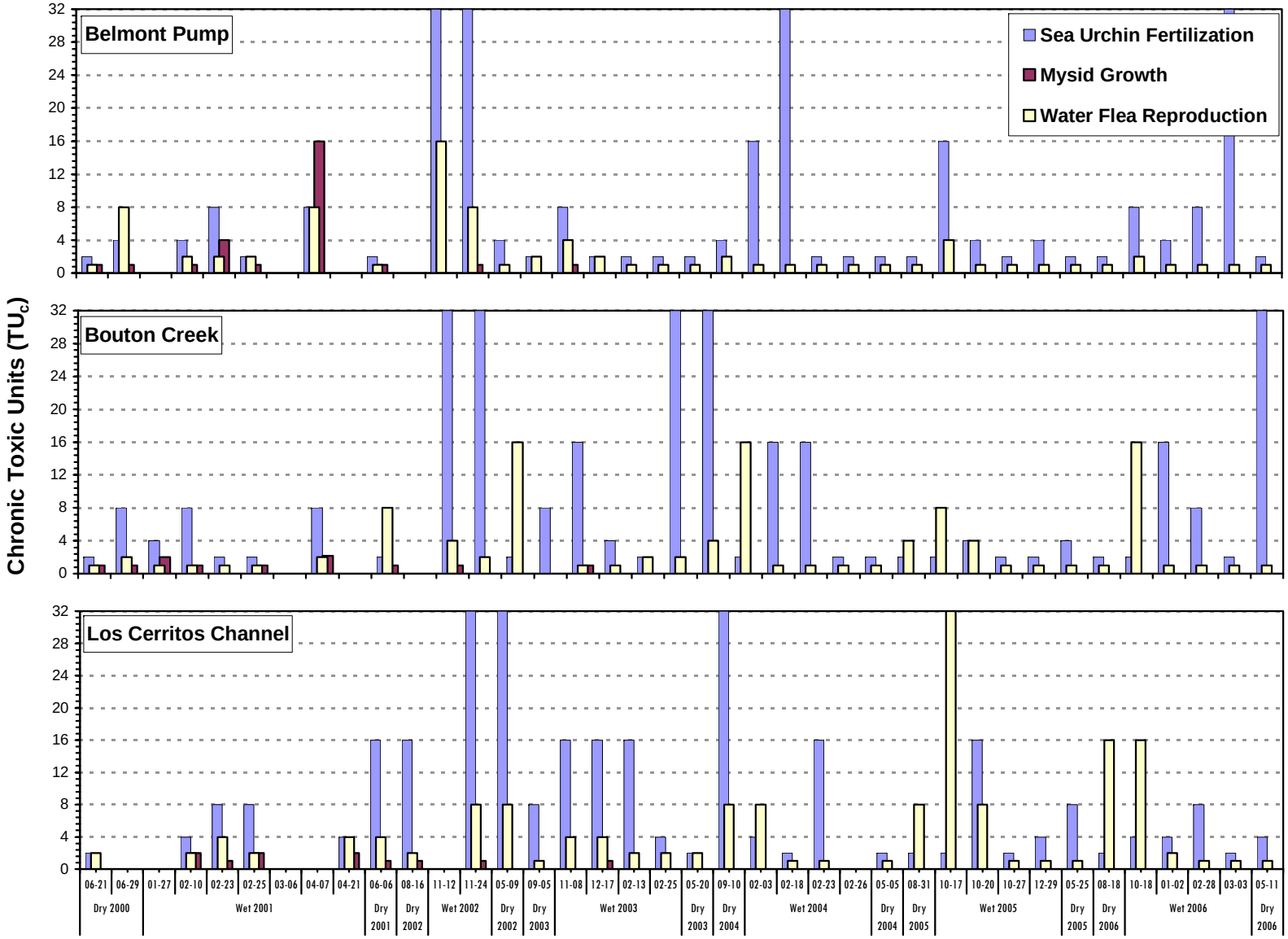


Figure 9.21 Summary of Wet and Dry Weather Toxicity Results for all Long Beach Samples.

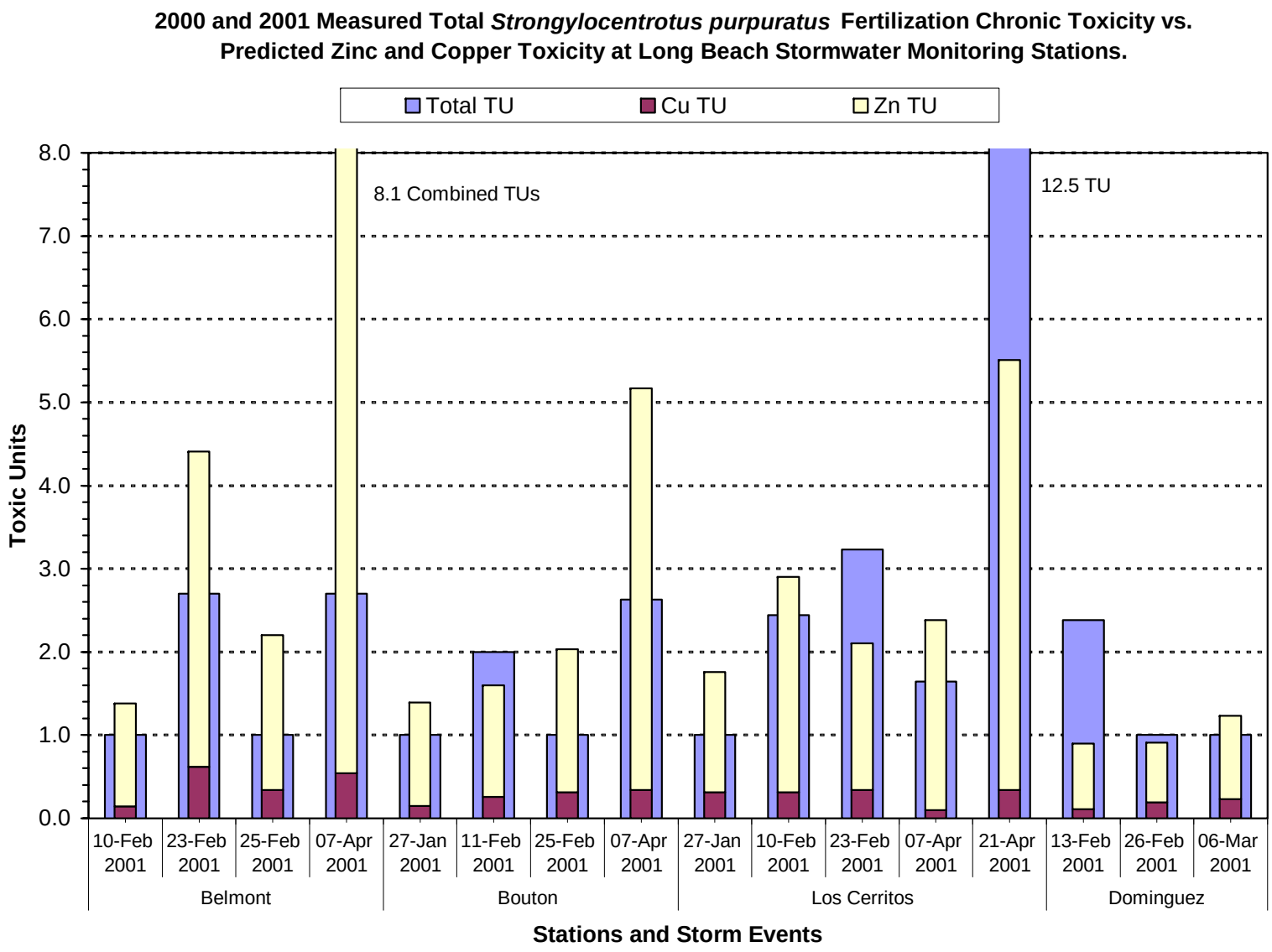


Figure 9.22a **Comparison of Measured (Total) Toxic Units for the Sea Urchin Fertilization Test and Toxic Units Predicted from the Dissolved Concentrations of Copper and Zinc in the Test Samples.** Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%

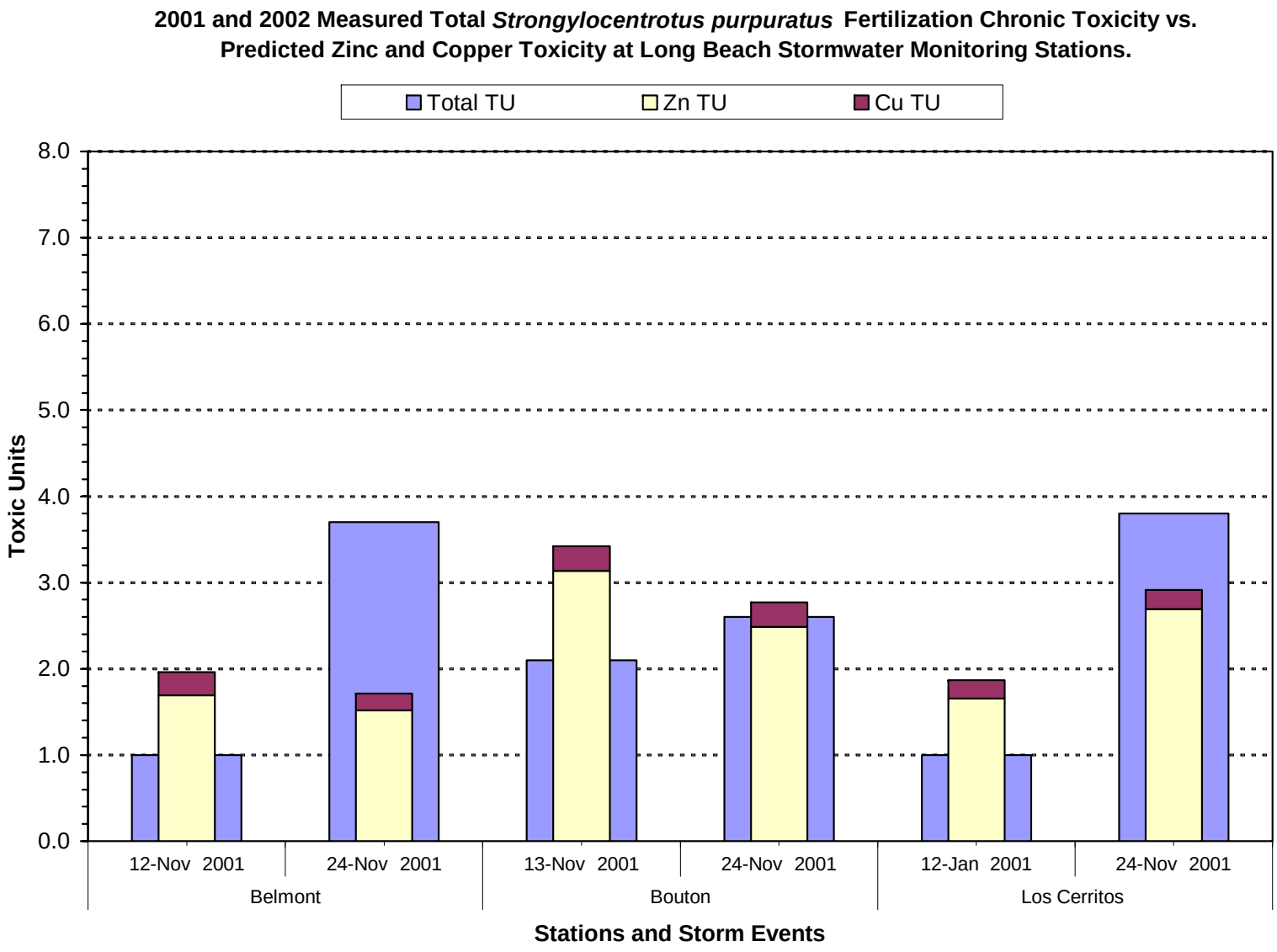


Figure 9.22b Comparison of Measured (Total) Toxic Units for the Sea Urchin Fertilization Test and Toxic Units Predicted from the Dissolved Concentrations of Copper and Zinc in the Test Samples. Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%

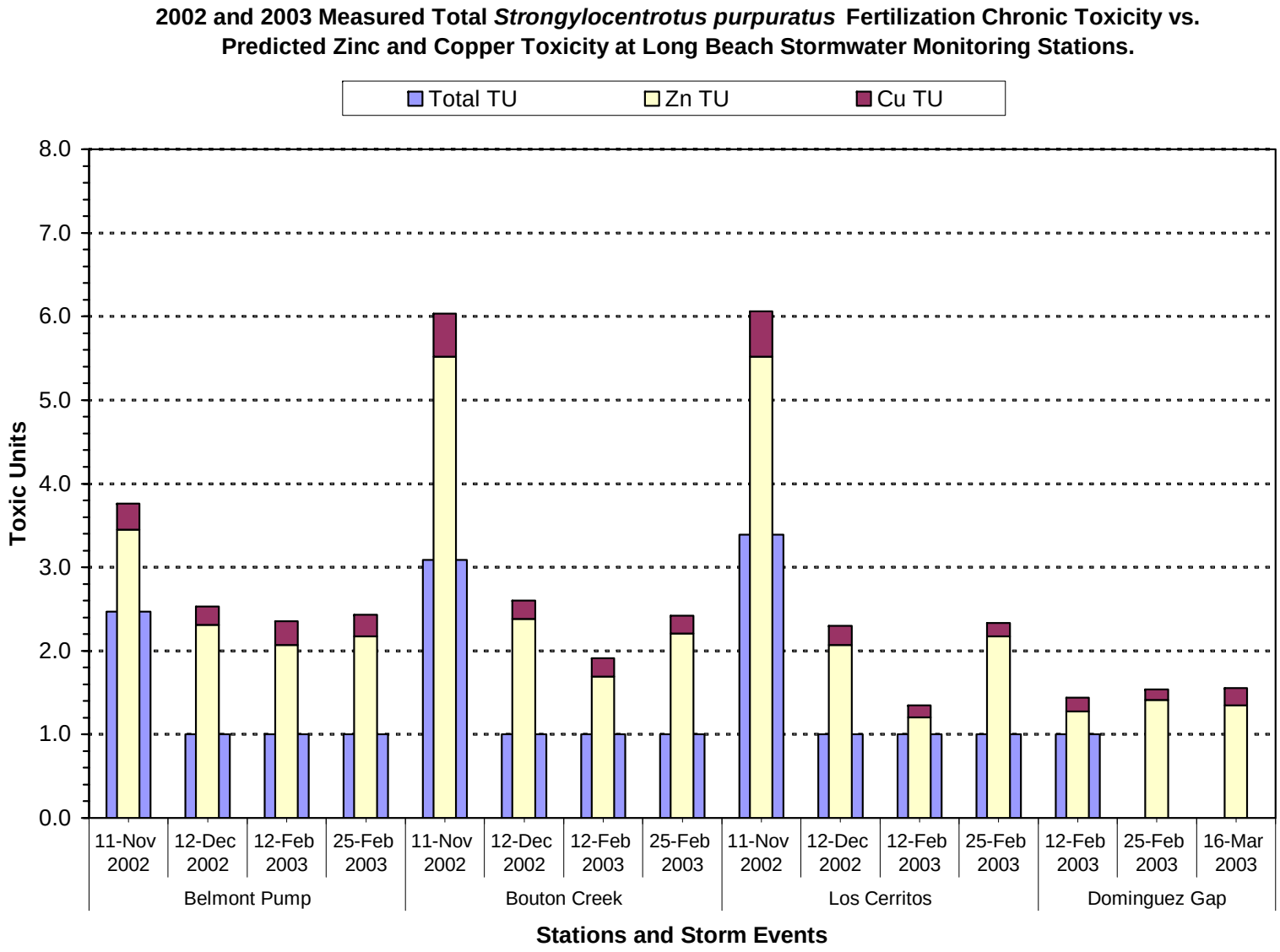


Figure 9.22c **Comparison of Measured (Total) Toxic Units for the Sea Urchin Fertilization Test and Toxic Units Predicted from the Dissolved Concentrations of Copper and Zinc in the Test Samples.** Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%

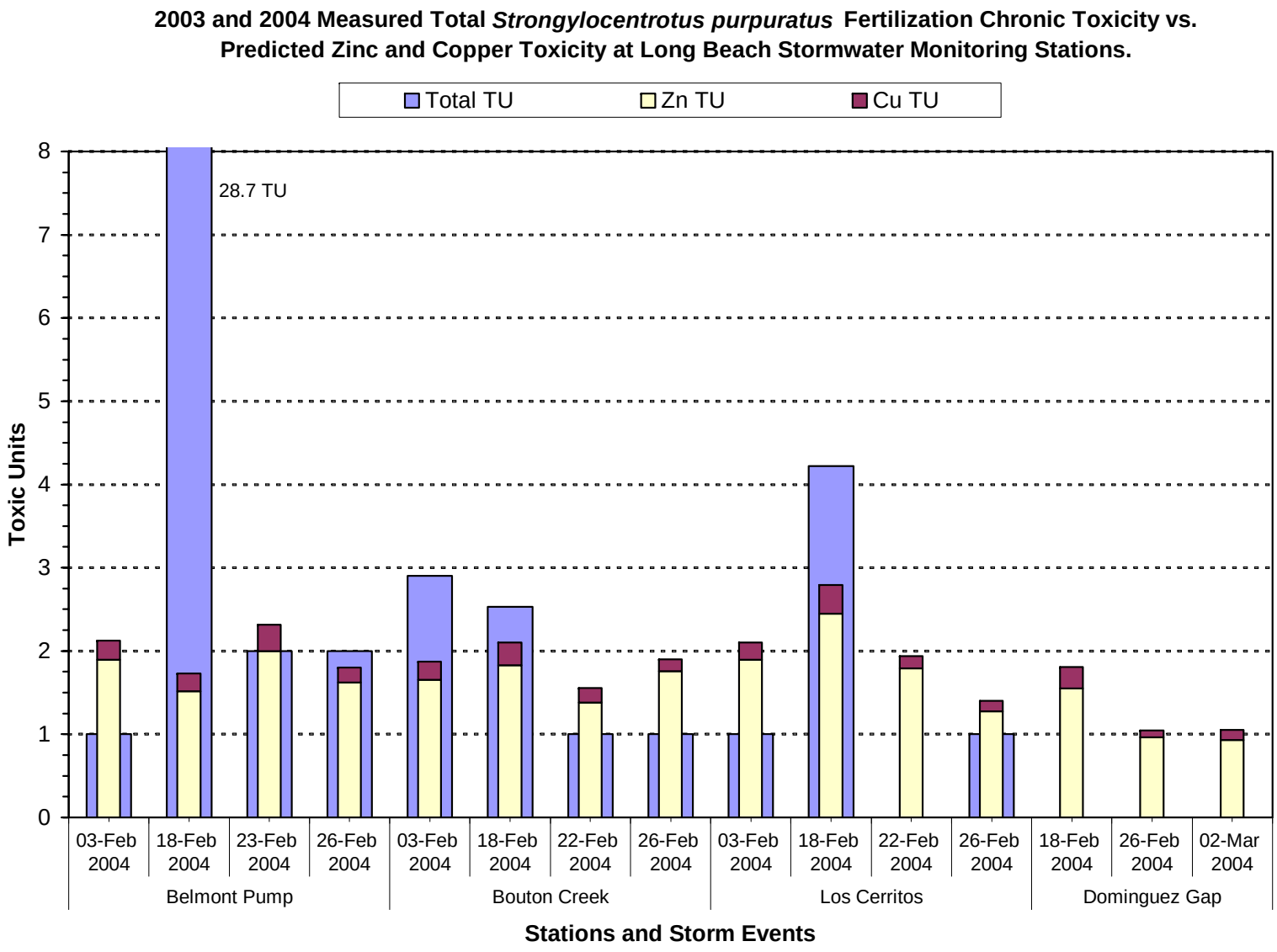


Figure 9.22d **Comparison of Measured (Total) Toxic Units for the Sea Urchin Fertilization Test and Toxic Units Predicted from the Dissolved Concentrations of Copper and Zinc in the Test Samples.** Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%

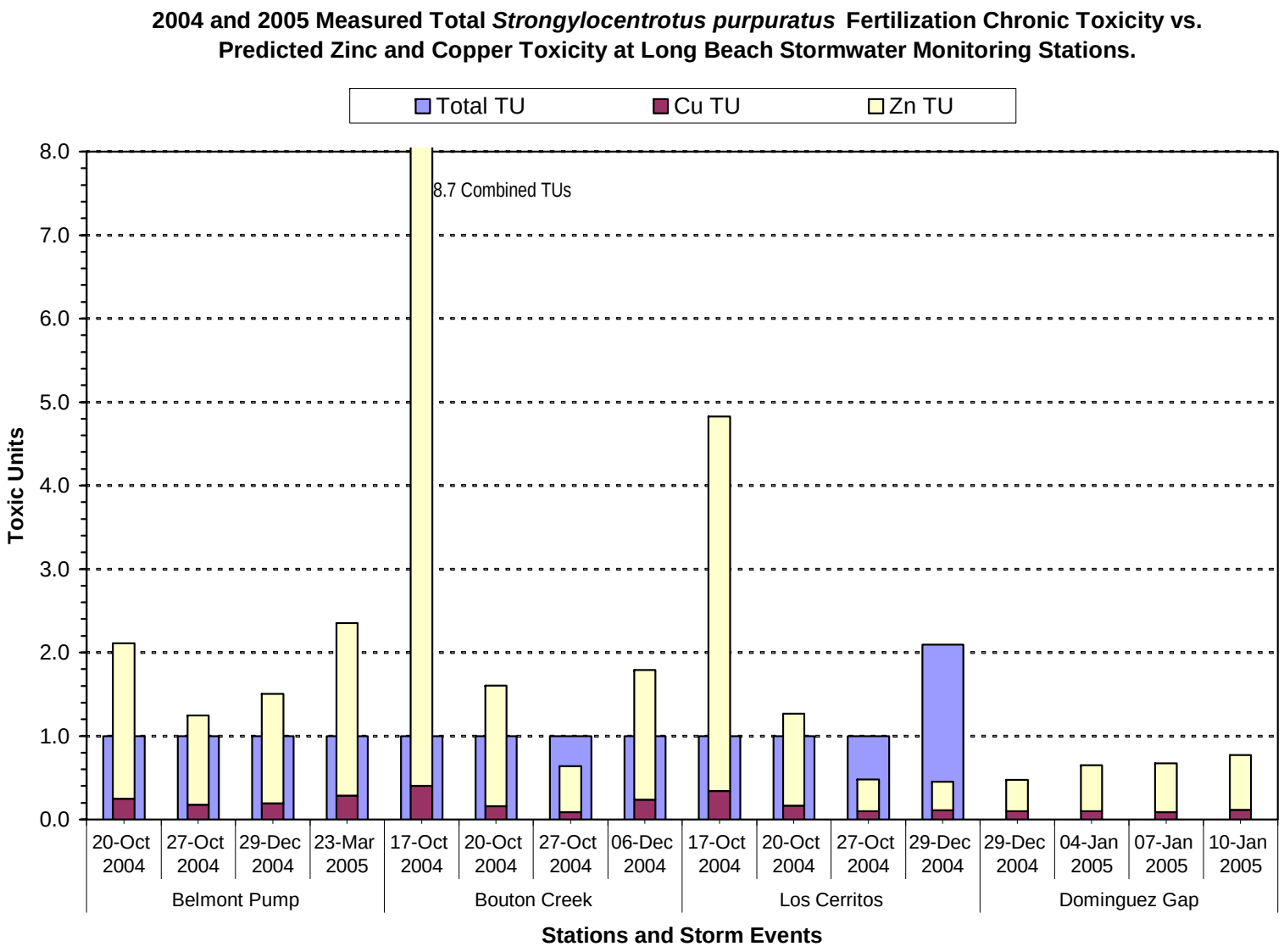


Figure 9.22e Comparison of Measured (Total) Toxic Units for the Sea Urchin Fertilization Test and Toxic Units Predicted from the Dissolved Concentrations of Copper and Zinc in the Test Samples. Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%

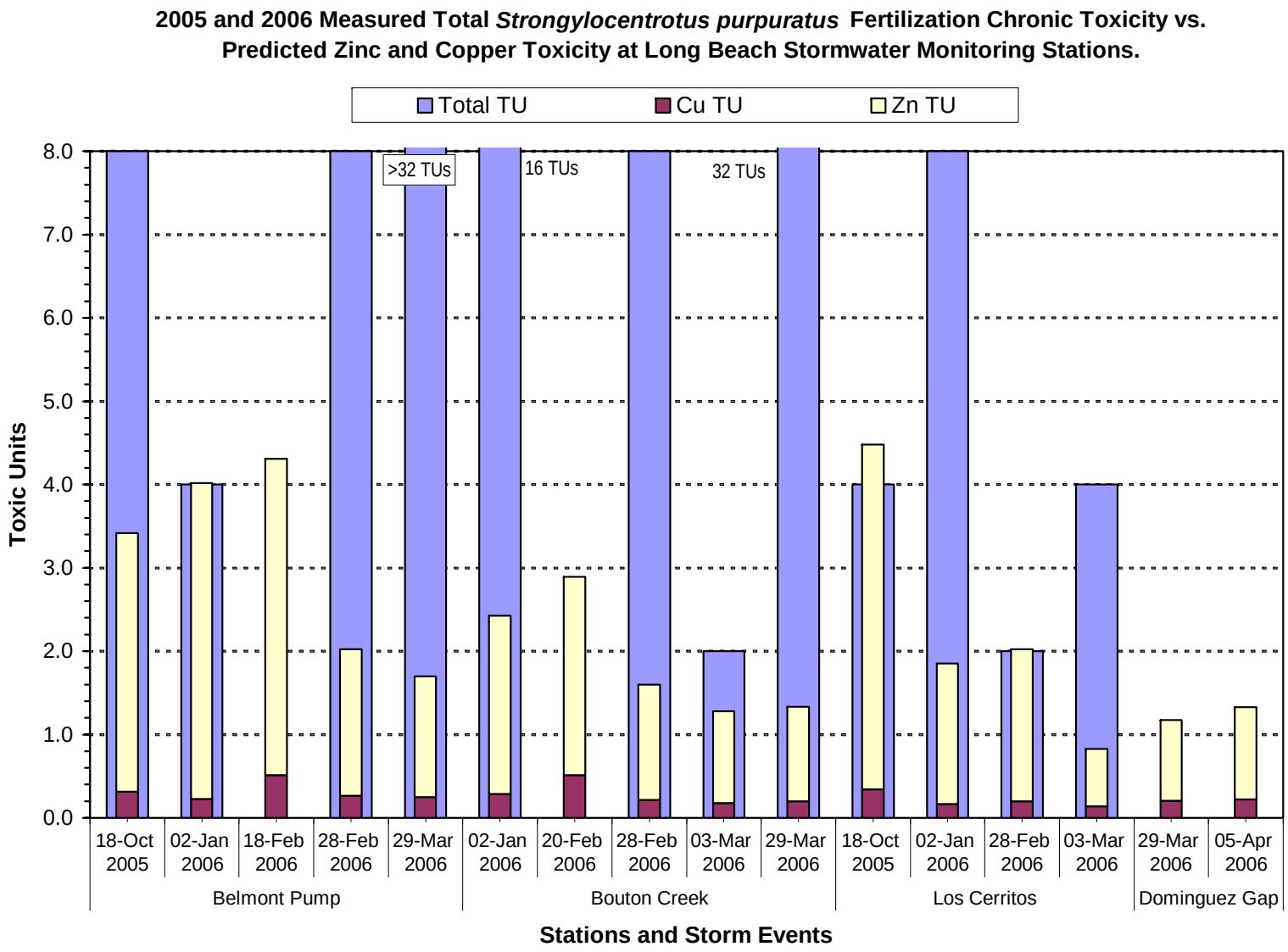


Figure 9.22f **Comparison of Measured (Total) Toxic Units for the Sea Urchin Fertilization Test and Toxic Units Predicted from the Dissolved Concentrations of Copper and Zinc in the Test Samples.** Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%

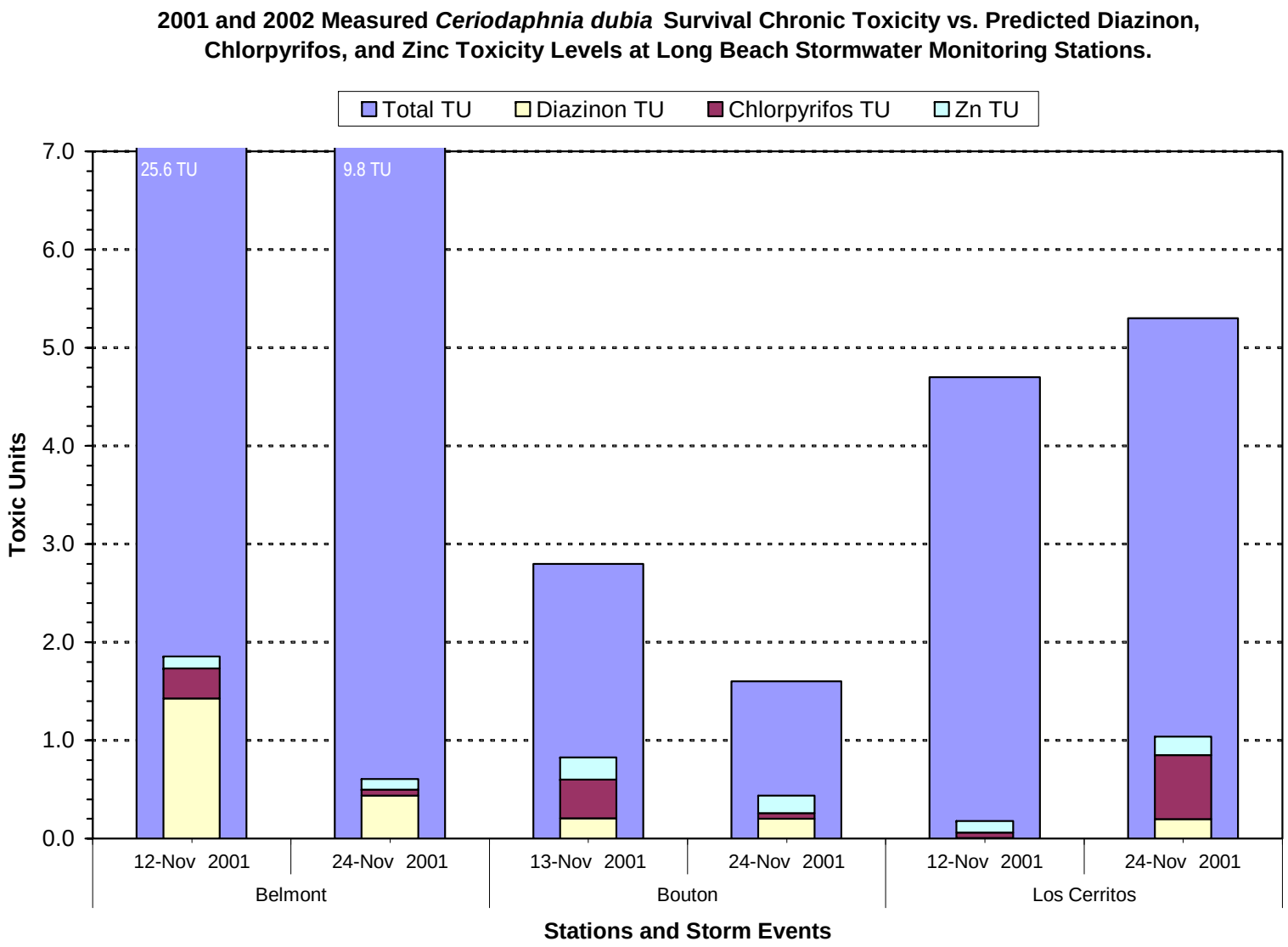


Figure 9.23a Comparison of Measured (Total) Toxic Units for the Water Flea Survival Test and Toxic Units Predicted from the Concentrations of Chlorpyrifos, Diazinon, and Dissolved Zinc in the Test Samples. Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%.

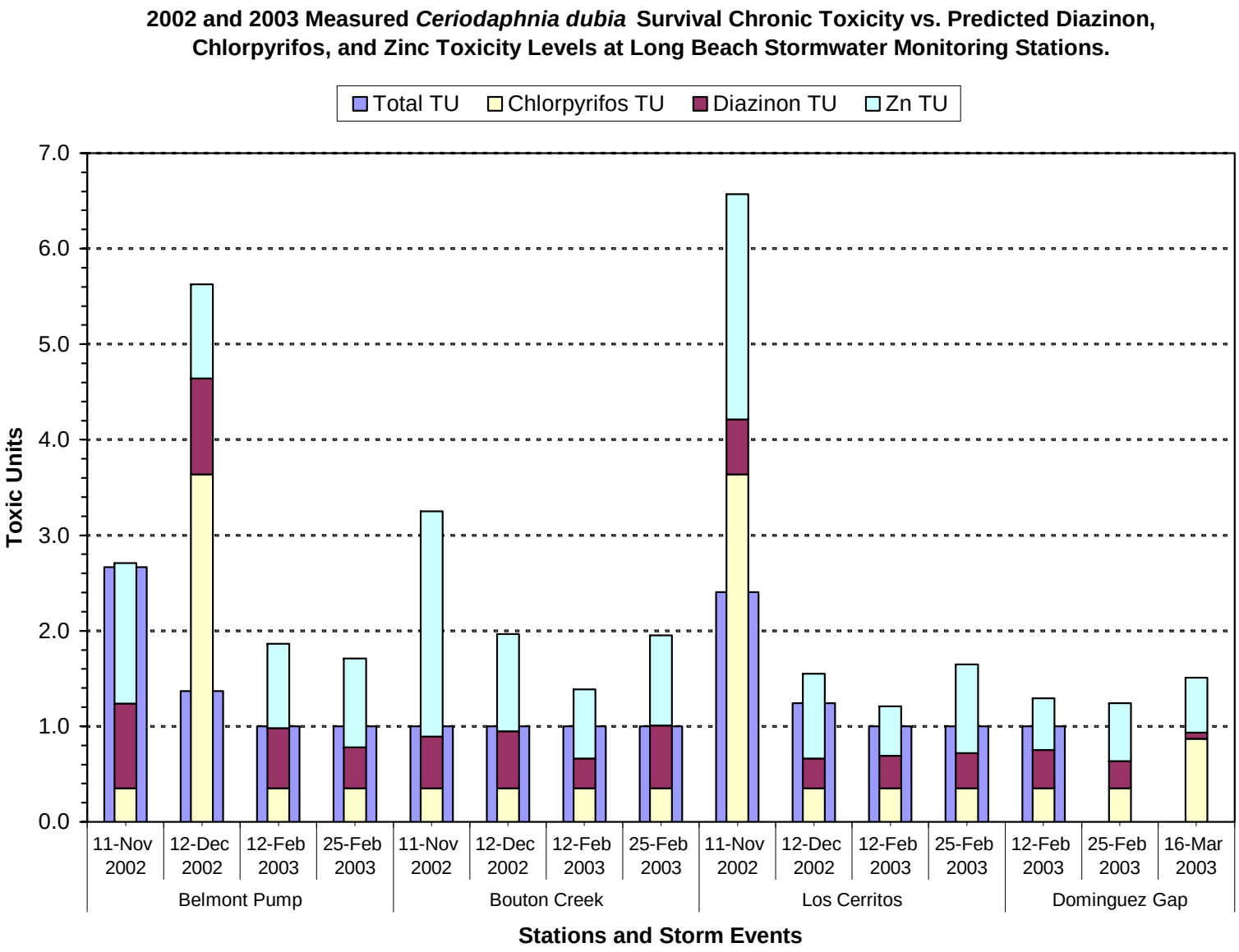


Figure 9.23b Comparison of Measured (Total) Toxic Units for the Water Flea Survival Test and Toxic Units Predicted from the Concentrations of Chlorpyrifos, Diazinon, and Dissolved Zinc in the Test Samples. Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%.

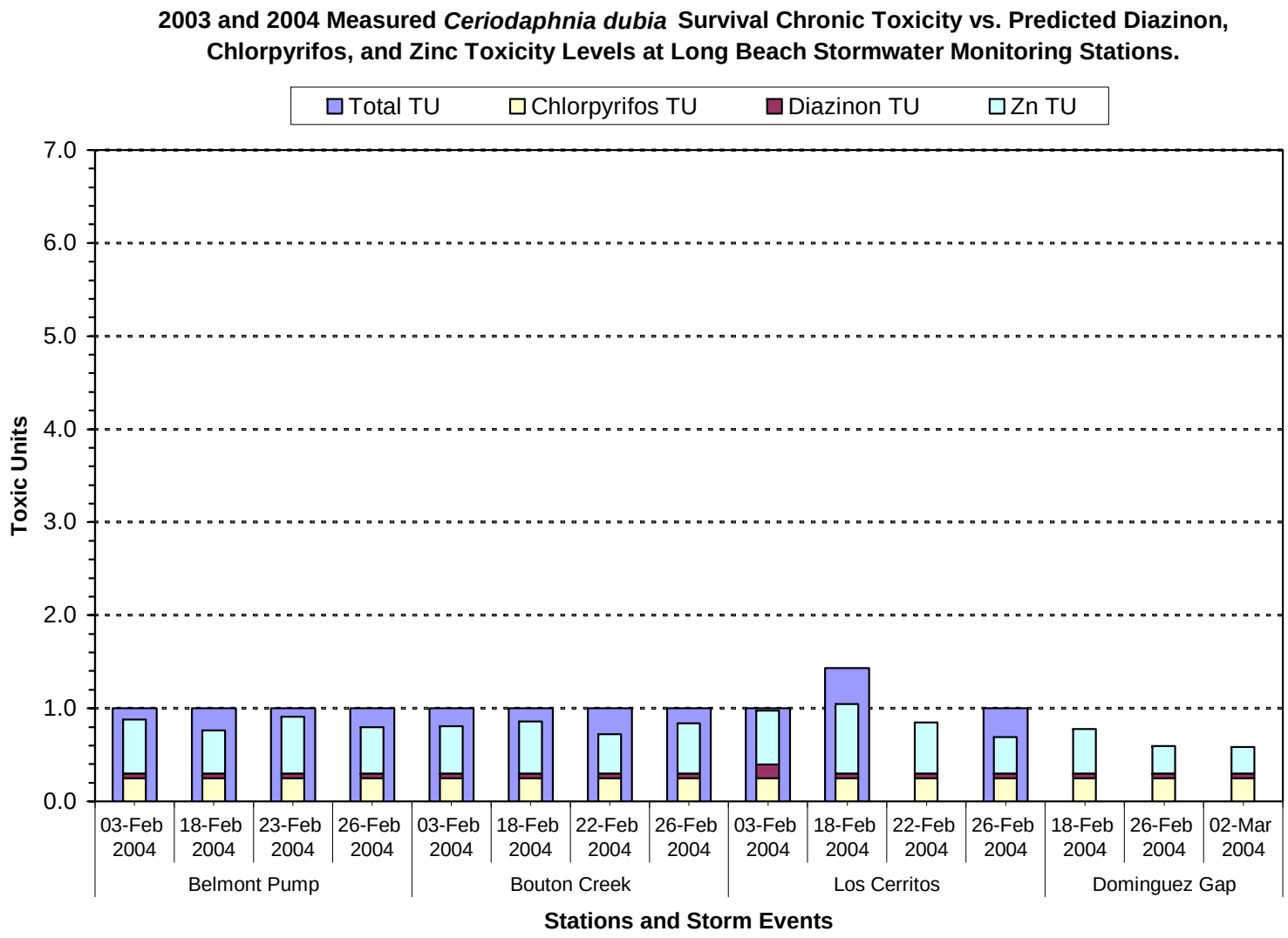


Figure 9.23c Comparison of Measured (Total) Toxic Units for the Water Flea Survival Test and Toxic Units Predicted from the Concentrations of Chlorpyrifos, Diazinon, and Dissolved Zinc in the Test Samples. Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%.

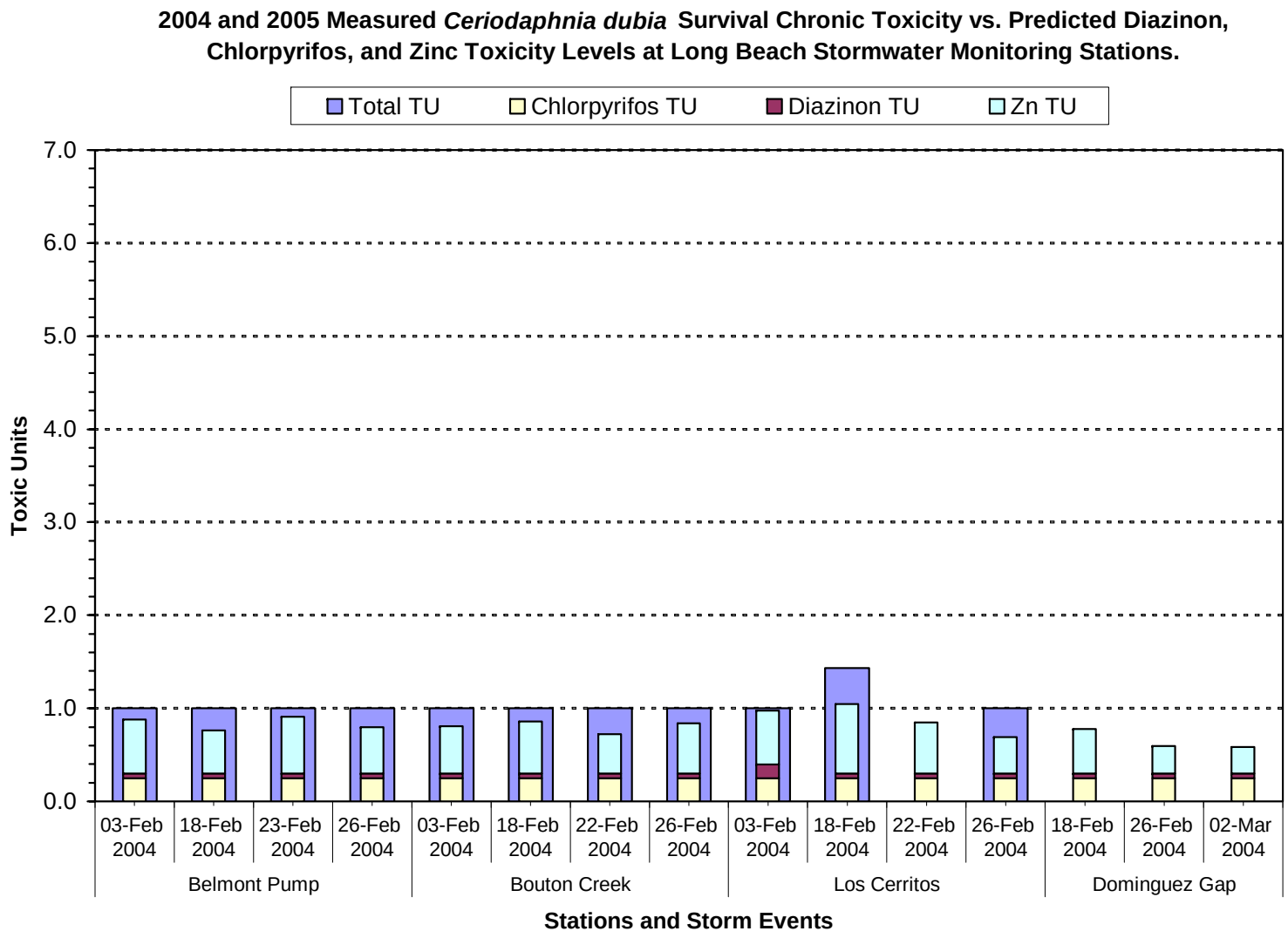


Figure 9.23d Comparison of Measured (Total) Toxic Units for the Water Flea Survival Test and Toxic Units Predicted from the Concentrations of Chlorpyrifos, Diazinon, and Dissolved Zinc in the Test Samples. Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%.

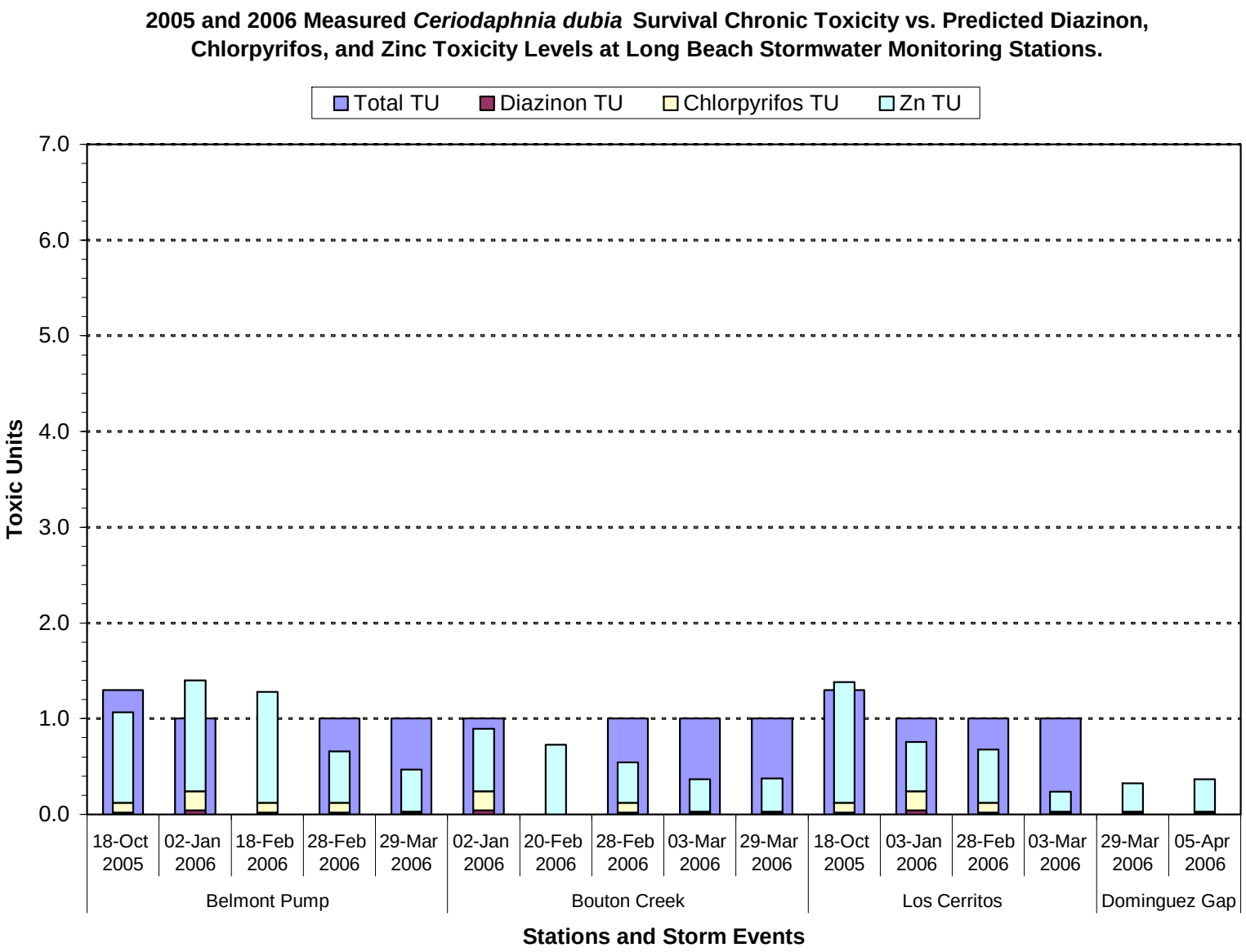


Figure 9.23e **Comparison of Measured (Total) Toxic Units for the Water Flea Survival Test and Toxic Units Predicted from the Concentrations of Chlorpyrifos, Diazinon, and Dissolved Zinc in the Test Samples.** Measured toxic units are based on the EC_{50} ($100/EC_{50}$). A value of 1 toxic unit was assigned to low/non-toxic samples have an estimated EC_{50}>100%.

Table 9.1 Summary of Beneficial Uses for Receiving Waterbodies Associated with each Monitoring Location[1].

DISCHARGE LOCATION	HYDRO. UNIT	COMM	EST	GWR	IND	MAR	MUN	NAV	RARE	REC1	REC2	SHELL	WARM	WET	WILD
Bouton Creek	**405.15**						**P**			**P**	**I**		**I**		**E**
Los Cerritos Channel	**405.15**						**P**			**P**	**I**		**I**		**E**
Dominguez Gap Pump Sta.	**405. 15**			**E**	**P**		**P**			**E**	**E**		**E**		**P**
Belmont Pump Sta./Alamitos Bay	**405.12**	**E**	**E**		**E**	**E**		**E**	**E**	**E**	**E**	**E**		**E**	**E**

1. Source: California Regional Water Quality Control Board, Los Angeles Region. 1994. Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties. P=Potential, E=Existing, and I=Intermittent

Commercial and Sport Fishing (COMM): Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

Estuarine Habitat (EST): Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Ground Water Recharge (GWR): Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Industrial Service Supply (IND): Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

Marine Habitat (MAR): Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation, such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Municipal and Domestic Supply (MUN): Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water.

Navigation (NAV): Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Rare, Threatened, or Endangered Species (RARE): Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

Water Contact Recreation (REC-1): Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Non-contact Water Recreation (REC-2): Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sun bathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Shellfish Harvesting (SHELL): Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sports purposes.

Warm Freshwater Habitat (WARM): Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Wetland Habitat (WET): Uses if water that support wetland ecosystems including, but not limited to, preservation or enhancement of wetland habitats, vegetation, fish, shellfish, or wildlife, and other unique wetland functions which enhance water quality, such as providing flood and erosion control, stream bank stabilization, and filtration and purification of naturally occurring contaminants.

Wildlife Habitat (WILD): Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., Mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Table 9.2 Available Benchmarks and Guidelines used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites.

Analyte Name	Long Beach 2005-2006 ML	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Bacteria (MPN/100 ml)									
Enterococcus	10	104	104						
Fecal Coliform	20	400	400						
Total Coliform	20	10000	10000						
Ratio of Fecal to Total Coliform	-	FC/TC>0.1 & TC>1000	FC/TC>0.1 & TC>1000						
Conventionals (mg/L unless noted)									
pH (pH Units)	0.1		<[6.5-8.5]<						
Conductivity (µmhos/cm)	1								
Alkalinity as CaCO3	1								
Hardness as CaCO3	2								
Biochemical Oxygen Demand	2								
Chemical Oxygen Demand	4								
Total Organic Carbon	1								
Chloride	1								
Fluoride	0.1								
MBAS	0.025		0.5						
Oil and Grease	5								
Total Ammonia (as N)	0.1		2.4						
Total Kjeldahl Nitrogen	0.1								
Nitrate (as N)	0.1		10						
Nitrite (as N)	0.1		1						
Total Orthophosphate (as P)	0.01								
Total Phosphorus	0.01								
Total Recoverable Phenolics	0.1								
Total Dissolved Solids	10								
Total Suspended Solids	5								
Total Volatile Solids	2								
Turbidity (NTU)	0.1								

Table 9.2 Available Benchmarks and Guidelines used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites (continued)

Analyte Name	Long Beach 2005-2006 ML	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Dissolved Metals (µg/L)									
Aluminum	25								
Arsenic	0.5					150	36		
Cadmium	0.2					1.3	9.3		
Chromium	0.01								
Copper	0.5					5	3.1		
Iron	25								
Lead	0.2					1.2	8.1		
Nickel	0.5					29	8.2		
Selenium	1						71		
Silver	0.2					1.1	1.9		
Zinc	1					66	81		
Total Metals (µg/L)									
Aluminum	25		1000					87	
Arsenic	0.5	32	50						
Cadmium	0.2	4	5						
Chromium	0.01		50						
Copper	0.5	12							
Iron	25							1000	
Lead	0.2	8							
Nickel	0.5	20	100						
Selenium	0.1	60	50			5			
Silver	0.2	2.8							
Zinc	1	80							
Aroclors (µg/L)									
Aroclor 1016	0.02		0.5						
Aroclor 1221	0.02		0.5						
Aroclor 1232	0.02		0.5						
Aroclor 1242	0.02		0.5						
Aroclor 1248	0.02		0.5						
Aroclor 1254	0.02		0.5						
Aroclor 1260	0.02		0.5						

Table 9.2 Available Benchmarks and Guidelines used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites (continued)

Analyte Name	Long Beach 2005-2006 ML	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Chlorinated Pesticides (µg/L)									
2,4'-DDD	0.005								
2,4'-DDE	0.005								
2,4'-DDT	0.005								
4,4'-DDD	0.005								
4,4'-DDE	0.005								
4,4'-DDT	0.005					0.001	0.001		
Total DDT	0.005								
Aldrin	0.005	0.000022				3	1.3		
Dieldrin	0.005	0.00004				0.056	0.0019		
Endrin	0.005	0.004	2			0.036	0.023		
Endrin aldehyde	0.005								
Endrin ketone	0.005								
alpha-BHC	0.005								
beta-BHC	0.005								
delta-BHC	0.005								
gamma-BHC (Lindane)	0.005		0.2			0.95	0.16		
Endosulfan I	0.005					0.056	0.0087		
Endosulfan II	0.005					0.056	0.0087		
Endosulfan sulfate	0.005								
alpha-Chlordane	0.005								
gamma-Chlordane	0.005								
Heptachlor	0.005	0.00005	0.01			0.0038	0.0036		
Heptachlor epoxide	0.005	0.00002	0.01			0.0038	0.0036		
Oxychlordane	0.005								
cis-Nonachlor	0.005								
trans-Nonachlor	0.005								
Total Chlordane	0.005		0.1						
Methoxychlor	0.005		40					0.03	0.03
Mirex	0.005							0.001	0.001
Toxaphene	0.05	0.00021	2			0.0002	0.0002		

Table 9.2 Available Benchmarks and Guidelines used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites (continued)

Analyte Name	Long Beach 2005-2006 ML	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Organophosphates (µg/L)									
Bolstar (Sulprofos)	0.004								
Chlorpyrifos	0.002			0.02	0.02			0.041	0.0056
Demeton	0.002							0.1	0.1
Diazinon	0.004			0.08				0.17	0.82
Dichlorvos	0.006								
Dimethoate	0.006								
Disulfoton	0.002								
Ethoprop	0.002								
Fensulfothion	0.002								
Fenthion	0.004								
Malathion	0.006							0.1	0.1
Merphos	0.002								
Methyl Parathion	0.002								
Mevinphos	0.016								
Phorate	0.012								
Ronnel	0.004								
Tetrachlorvinphos (Stirophos)	0.004								
Tokuthion (Prothiofos)	0.006								
Trichloronate	0.002								
Triazines (µg/L)									
Ametryn	0.01								
Atraton	0.01								
Atrazine	0.01		3						
Cyanazine	0.01								
Prometon	0.01								
Prometryn	0.01								
Propazine	0.01								
Secbumeton	0.01								
Simazine	0.01		4						
Simetryn	0.01								
Terbutryn	0.01								
Terbutylazine	0.01								

Notes to Table 9.2:

General

- Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific method. analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.
- Criteria continuous concentration (CCC) equals the highest concentration of pollutant to which aquatic life can be exposed for an extended period of time without deleterious effects.
- Criteria maximum concentration (CMC) equals the highest concentration of pollutant to which aquatic life can be exposed for a short period of time with deleterious effects.

California Toxics Rule

- CTR freshwater dissolved metals are hardness dependant. The values listed here are computed for a hardness of 50 mg/L.
- CTR freshwater dissolved cadmium and lead conversion coefficients for total to dissolved are also hardness dependent.
- CTR freshwater and saltwater dissolved metal criteria are "CCC" except for Silver which are "CMC".
- CTR freshwater and saltwater organics are "CCC" except for aldrin and gamma-BHC which are "CMC".

Ocean Plan and LA Basin Plan

- Bacteria are instantaneous or single sample criteria.
- LA Basin Plan contains Title 22 Drinking Water standards

California Fish and Game

- All values are "CMC" criteria. CMCs are considered acute criteria.

National Recommended Water Quality Criteria

- All values CCCs

Table 9.3 Belmont Pump: Comparison of Stormwater Chemistry with Benchmarks and Guidelines.

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Bacteria										
Enterococcus	4	4	4	4						
Fecal Coliform	4	4	4	4						
Total Coliform	4	4	4	4						
Ratio of Fecal to Total Coliform	4	4	2	2						
Conventionals										
pH	5	5		2						
Conductivity	5	5								
Alkalinity as CaCO3	5	5								
Hardness as CaCO3	5	4								
Biochemical Oxygen Demand	5	5								
Chemical Oxygen Demand	5	5								
Total Organic Carbon	5	5								
Chloride	5	4								
Fluoride	5	2								
MBAS	5	3		0						
Oil and Grease	4	1								
Total Ammonia (as N)	5	5	0							
Total Kjeldahl Nitrogen	5	5								
Nitrate (as N)	5	5		0						
Nitrite (as N)	5	0		0						
Total Orthophosphate (as P)	5	5								
Total Phosphorus	5	5								
Total Recoverable Phenolics	5	0								
Total Dissolved Solids	5	5								
Total Suspended Solids	5	5								
Total Volatile Solids	5	5								
Turbidity	5	5								

Table 9.3 Belmont Pump: Comparison of Stormwater Chemistry with Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Dissolved Metals										
Aluminum	5	2								
Arsenic	5	5					0	0		
Cadmium	5	0					0	0		
Chromium	5	4								
Copper	5	5					5	5		
Iron	5	3								
Lead	5	4					4	0		
Nickel	5	5					0	0		
Selenium	5	0						0		
Silver	5	2					0	0		
Zinc	5	5					5	3		
Total Metals										
Aluminum	5	5		5					5	
Arsenic	5	5	0	0						
Cadmium	5	5	0	0						
Chromium	5	5		0						
Copper	5	5	5							
Iron	5	5							5	
Lead	5	5	5							
Nickel	5	5	0	0						
Selenium	5	2	0	0			0			
Silver	5	1	0							
Zinc	4	4	4							
Aroclors										
Aroclor 1016	5	0		0						
Aroclor 1221	5	0		0						
Aroclor 1232	5	0		0						
Aroclor 1242	5	0		0						
Aroclor 1248	5	0		0						
Aroclor 1254	5	0		0						
Aroclor 1260	5	0		0						

Table 9.3 Belmont Pump: Comparison of Stormwater Chemistry with Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Chlorinated Pesticides										
2,4'-DDD	5	0								
2,4'-DDE	5	0								
2,4'-DDT	5	0								
4,4'-DDD	5	0								
4,4'-DDE	5	1								
4,4'-DDT	5	0					0	0		
Total DDT	5	1								
Aldrin	5	0	0				0	0		
Dieldrin	5	0	0				0	0		
Endrin	5	0	0	0			0	0		
Endrin aldehyde	5	0								
Endrin ketone	5	0								
alpha-BHC	5	0								
beta-BHC	5	0								
delta-BHC	5	0								
gamma-BHC (Lindane)	5	0		0			0	0		
Endosulfan I	5	0					0	0		
Endosulfan II	5	0					0	0		
Endosulfan sulfate	5	0								
alpha-Chlordane	5	3								
gamma-Chlordane	5	3								
Heptachlor	5	0	0	0			0	0		
Heptachlor epoxide	5	0	0	0			0	0		
Oxychlordane	5	0								
cis-Nonachlor	5	2								
trans-Nonachlor	5	4								
Total Chlordane	5	4		0						
Methoxychlor	5	0		0						
Mirex	5	0							0	0
Toxaphene	5	0	0	0			0	0		

Table 9.3 Belmont Pump: Comparison of Stormwater Chemistry with Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Organophosphates										
Bolstar (Sulprofos)	5	0								
Chlorpyrifos	5	0	0	0		0			0	0
Demeton	5	0							0	0
Diazinon	5	0	0			0			0	0
Dichlorvos	5	1								
Dimethoate	5	0								
Disulfoton	5	0								
Ethoprop	5	0								
Fensulfothion	5	0								
Fenthion	5	0								
Malathion	5	5							3	3
Merphos	5	0								
Methyl Parathion	5	0								
Mevinphos	5	0								
Phorate	5	0								
Ronnel	5	0								
Tetrachlorvinphos (Stirophos)	5	0								
Tokuthion (Prothiofos)	5	0								
Trichloronate	5	0								
Triazines	5	0								
Ametryn	5	0								
Atraton	5	0		0						
Atrazine	5	0								
Cyanazine	5	0								
Prometon	5	2								
Prometryn	5	0								
Propazine	5	0								
Secbumeton	5	0		0						
Simazine	5	0								
Simetryn	5	0								
Terbutryn	5	0								
Terbutylazine	5	0								

Table 9.4 Bouton Creek: Comparison of Stormwater Chemistry with Benchmarks and Guidelines.

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Bacteria										
Enterococcus	4	4	4	4						
Fecal Coliform	4	4	4	4						
Total Coliform	4	4	4	4						
Ratio of Fecal to Total Coliform	4	4	2	2						
Conventionals										
pH	5	5		2						
Conductivity	5	5								
Alkalinity as CaCO3	5	5								
Hardness as CaCO3	5	4								
Biochemical Oxygen Demand	5	4								
Chemical Oxygen Demand	5	5								
Total Organic Carbon	5	5								
Chloride	5	4								
Fluoride	5	2								
MBAS	5	1		0						
Oil and Grease	4	0								
Total Ammonia (as N)	5	4	0							
Total Kjeldahl Nitrogen	5	5								
Nitrate (as N)	5	5		0						
Nitrite (as N)	5	0		0						
Total Orthophosphate (as P)	5	5								
Total Phosphorus	5	5								
Total Recoverable Phenolics	5	0								
Total Dissolved Solids	5	5								
Total Suspended Solids	5	5								
Total Volatile Solids	5	5								
Turbidity	5	5								

Table 9.4 Bouton Creek: Comparison of Stormwater Chemistry with Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Dissolved Metals										
Aluminum	5	3								
Arsenic	5	5					0	0		
Cadmium	5	0					0	0		
Chromium	5	5								
Copper	5	5					5	5		
Iron	5	3								
Lead	5	5					3	0		
Nickel	5	5					0	1		
Selenium	5	0								
Silver	5	0					0	0		
Zinc	5	5					1	0		
Total Metals										
Aluminum	5	5		5					5	
Arsenic	5	5	0	0						
Cadmium	5	5	0	0						
Chromium	5	4		0						
Copper	5	5	5							
Iron	5	5							5	
Lead	5	5	5							
Nickel	5	5	0	0						
Selenium	5	2	0	0			0			
Silver	5	0	0							
Zinc	5	5	5							
Aroclors										
Aroclor 1016	4	0		0						
Aroclor 1221	4	0		0						
Aroclor 1232	4	0		0						
Aroclor 1242	4	0		0						
Aroclor 1248	4	0		0						
Aroclor 1254	4	0		0						
Aroclor 1260	4	0		0						

Table 9.4 Bouton Creek: Comparison of Stormwater Chemistry with Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Chlorinated Pesticides										
2,4'-DDD	4	0								
2,4'-DDE	4	0								
2,4'-DDT	4	0								
4,4'-DDD	4	0								
4,4'-DDE	4	0								
4,4'-DDT	4	0					0	0		
Total DDT	4	0								
Aldrin	4	0	0				0	0		
Dieldrin	4	0	0				0	0		
Endrin	4	0	0	0			0	0		
Endrin aldehyde	4	0								
Endrin ketone	4	0								
alpha-BHC	4	0								
beta-BHC	4	0								
delta-BHC	4	0								
gamma-BHC (Lindane)	4	0		0			0	0		
Endosulfan I	4	0					0	0		
Endosulfan II	4	0					0	0		
Endosulfan sulfate	4	0								
alpha-Chlordane	4	1								
gamma-Chlordane	4	1								
Heptachlor	4	0	0	0			0	0		
Heptachlor epoxide	4	0	0	0			0	0		
Oxychlordane	4	0								
cis-Nonachlor	4	0								
trans-Nonachlor	4	1								
Total Chlordane	4	1		0						
Methoxychlor	4	0		0						
Mirex	4	0							0	0
Toxaphene	4	0	0	0			0	0		

Table 9.4 Bouton Creek: Comparison of Stormwater Chemistry with Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Organophosphates										
Bolstar (Sulprofos)	4	0								
Chlorpyrifos	4	0			0	0			0	0
Demeton	4	0							0	0
Diazinon	4	0			0				0	0
Dichlorvos	4	0								
Dimethoate	4	0								
Disulfoton	4	0								
Ethoprop	4	0								
Fensulfothion	4	0								
Fenthion	4	0								
Malathion	4	2							0	0
Merphos	4	0								
Methyl Parathion	4	0								
Mevinphos	4	0								
Phorate	4	0								
Ronnel	4	0								
Tetrachlorvinphos (Stirophos)	4	0								
Tokuthion (Prothiofos)	4	0								
Trichloronate	4	0								
Triazines										
Ametryn	4	0								
Atraton	4	0								
Atrazine	4	0		0						
Cyanazine	4	0								
Prometon	4	2								
Prometryn	4	0								
Propazine	4	0								
Secbumeton	4	0								
Simazine	4	0		0						
Simetryn	4	0								
Terbutryn	4	0								
Terbutylazine	4	0								

Table 9.5 Los Cerritos Channel: Comparison of Stormwater Chemistry with Available Benchmarks and Guidelines.

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Bacteria										
Enterococcus	4	4	4	4						
Fecal Coliform	4	4	4	4						
Total Coliform	4	4	4	4						
Ratio of Fecal to Total Coliform	4	4	4	4						
Conventionals										
pH	4	4		0						
Conductivity	4	4								
Alkalinity as CaCO3	4	4								
Hardness as CaCO3	4	3								
Biochemical Oxygen Demand	4	4								
Chemical Oxygen Demand	4	4								
Total Organic Carbon	4	4								
Chloride	4	4								
Fluoride	4	1								
MBAS	4	1		0						
Oil and Grease	4	0								
Total Ammonia (as N)	4	4	0							
Total Kjeldahl Nitrogen	4	4								
Nitrate (as N)	4	4		0						
Nitrite (as N)	4	0		0						
Total Orthophosphate (as P)	4	4								
Total Phosphorus	4	4								
Total Recoverable Phenolics	4	0								
Total Dissolved Solids	4	4								
Total Suspended Solids	4	4								
Total Volatile Solids	4	4								
Turbidity	4	4								

Table 9.5 Los Cerritos Channel: Comparison of Stormwater Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Dissolved Metals										
Aluminum	4	3								
Arsenic	4	4					0	0		
Cadmium	4	1					0	0		
Chromium	4	4								
Copper	4	4					4	4		
Iron	4	4								
Lead	4	4					3	0		
Nickel	4	4					0	0		
Selenium	4	0						0		
Silver	4	0					0	0		
Zinc	4	4					3	1		
Total Metals										
Aluminum	4	4		4					4	
Arsenic	4	4	0	0						
Cadmium	4	4	0	0						
Chromium	4	4		0						
Copper	4	4	4							
Iron	4	4							4	
Lead	4	4	4							
Nickel	4	4	1	0						
Selenium	4	2	0	0			0			
Silver	4	1	0							
Zinc	3	3	3							
Aroclors										
Aroclor 1016	4	0		0						
Aroclor 1221	4	0		0						
Aroclor 1232	4	0		0						
Aroclor 1242	4	0		0						
Aroclor 1248	4	0		0						
Aroclor 1254	4	0		0						
Aroclor 1260	4	0		0						

Table 9.5 Los Cerritos Channel: Comparison of Stormwater Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Chlorinated Pesticides										
2,4'-DDD	4	0								
2,4'-DDE	4	0								
2,4'-DDT	4	0								
4,4'-DDD	4	0								
4,4'-DDE	4	0								
4,4'-DDT	4	0					0	0		
Total DDT	4	0								
Aldrin	4	0	0				0	0		
Dieldrin	4	0	0				0	0		
Endrin	4	0	0	0			0	0		
Endrin aldehyde	4	0								
Endrin ketone	4	0								
alpha-BHC	4	0								
beta-BHC	4	0								
delta-BHC	4	0								
gamma-BHC (Lindane)	4	0		0			0	0		
Endosulfan I	4	0					0	0		
Endosulfan II	4	0					0	0		
Endosulfan sulfate	4	0								
alpha-Chlordane	4	1								
gamma-Chlordane	4	1								
Heptachlor	4	0	0	0			0	0		
Heptachlor epoxide	4	0	0	0			0	0		
Oxychlordane	4	0								
cis-Nonachlor	4	0								
trans-Nonachlor	4	1								
Total Chlordane	4	1		0						
Methoxychlor	4	0		0						
Mirex	4	0							0	0
Toxaphene	4	0	0	0			0	0		

Table 9.5 Los Cerritos Channel: Comparison of Stormwater Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Organophosphates										
Bolstar (Sulprofos)	4	0								
Chlorpyrifos	4	0	0	0	0	0			0	0
Demeton	4	0							0	0
Diazinon	4	0	0		0				0	0
Dichlorvos	4	0								
Dimethoate	4	0								
Disulfoton	4	0								
Ethoprop	4	0								
Fensulfothion	4	0								
Fenthion	4	0								
Malathion	4	3							2	2
Merphos	4	0								
Methyl Parathion	4	0								
Mevinphos	4	0								
Phorate	4	0								
Ronnel	4	0								
Tetrachlorvinphos (Stirophos)	4	0								
Tokuthion (Prothiofos)	4	0								
Trichloronate	4	0								
Triazines										
Ametryn	4	0								
Atraton	4	0								
Atrazine	4	0		0						
Cyanazine	4	0								
Prometon	4	1								
Prometryn	4	0								
Propazine	4	0								
Secbumeton	4	0								
Simazine	4	0		0						
Simetryn	4	0								
Terbutryn	4	0								
Terbutylazine	4	0								

Table 9.6 Dominguez Gap Pump Station: Comparison of Stormwater Chemistry with Available Benchmarks and Guidelines.

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Bacteria										
Enterococcus	2	2	2	2						
Fecal Coliform	2	2	2	2						
Total Coliform	2	2	2	2						
Ratio of Fecal to Total Coliform	2	2	0	0						
Conventionals										
pH	2	2		1						
Conductivity	2	2								
Alkalinity as CaCO3	2	2								
Hardness as CaCO3	2	2								
Biochemical Oxygen Demand	2	2								
Chemical Oxygen Demand	2	2								
Total Organic Carbon	2	2								
Chloride	2	2								
Fluoride	2	0								
MBAS	2	1		0						
Oil and Grease	2	0								
Total Ammonia (as N)	2	2	0							
Total Kjeldahl Nitrogen	2	2								
Nitrate (as N)	2	2		0						
Nitrite (as N)	2	0		0						
Total Orthophosphate (as P)	2	2								
Total Phosphorus	2	2								
Total Recoverable Phenolics	2	0								
Total Dissolved Solids	2	2								
Total Suspended Solids	2	2								
Total Volatile Solids	2	2								
Turbidity	2	2								

Table 9.6 Dominguez Gap Pump Station: Comparison of Stormwater Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Dissolved Metals										
Aluminum	2	2								
Arsenic	2	2					0	0		
Cadmium	2	1					0	0		
Chromium	2	2								
Copper	2	2					2	2		
Iron	2	2								
Lead	2	2					2	0		
Nickel	2	2					0	0		
Selenium	2	0						0		
Silver	2	0					0	0		
Zinc	2	2					1	0		
Total Metals										
Aluminum	2	2		0					2	
Arsenic	2	2	0	0						
Cadmium	2	0	0	0						
Chromium	2	2		0						
Copper	2	2	0							
Iron	2	2							1	
Lead	2	2	0							
Nickel	2	2	0	0						
Selenium	2	0	0	0			0			
Silver	2	0	0							
Zinc	2	2	0							
Aroclors										
Aroclor 1016	2	0		0						
Aroclor 1221	2	0		0						
Aroclor 1232	2	0		0						
Aroclor 1242	2	0		0						
Aroclor 1248	2	0		0						
Aroclor 1254	2	0		0						
Aroclor 1260	2	0		0						

Table 9.6 Dominguez Gap Pump Station: Comparison of Stormwater Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Chlorinated Pesticides										
2,4'-DDD	2	0								
2,4'-DDE	2	0								
2,4'-DDT	2	0								
4,4'-DDD	2	0								
4,4'-DDE	2	0								
4,4'-DDT	2	0					0	0		
Total DDT	2	0								
Aldrin	2	0	0				0	0		
Dieldrin	2	0	0				0	0		
Endrin	2	0	0	0			0	0		
Endrin aldehyde	2	0								
Endrin ketone	2	0								
alpha-BHC	2	0								
beta-BHC	2	0								
delta-BHC	2	0								
gamma-BHC (Lindane)	2	0		0			0	0		
Endosulfan I	2	0					0	0		
Endosulfan II	2	0					0	0		
Endosulfan sulfate	2	0								
alpha-Chlordane	2	0								
gamma-Chlordane	2	0								
Heptachlor	2	0	0	0			0	0		
Heptachlor epoxide	2	0	0	0			0	0		
Oxychlordane	2	0								
cis-Nonachlor	2	0								
trans-Nonachlor	2	0								
Total Chlordane	2	0		0						
Methoxychlor	2	0		0						
Mirex	2	0							0	0
Toxaphene	2	0	0	0			0	0		

Table 9.6 Dominguez Gap Pump Station: Comparison of Stormwater Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Organophosphates										
Bolstar (Sulprofos)	2	0								
Chlorpyrifos	2	0			0	0			0	0
Demeton	2	0							0	0
Diazinon	2	0			0				0	0
Dichlorvos	2	0								
Dimethoate	2	0								
Disulfoton	2	0								
Ethoprop	2	0								
Fensulfothion	2	0								
Fenthion	2	0								
Malathion	2	2							1	1
Merphos	2	0								
Methyl Parathion	2	0								
Mevinphos	2	0								
Phorate	2	0								
Ronnel	2	0								
Tetrachlorvinphos (Stirophos)	2	0								
Tokuthion (Prothiofos)	2	0								
Trichloronate	2	0								
Triazines										
Ametryn	2	0								
Atraton	2	0								
Atrazine	2	0		0						
Cyanazine	2	0								
Prometon	2	1								
Prometryn	2	0								
Propazine	2	0								
Secbumeton	2	0								
Simazine	2	1		0						
Simetryn	2	0								
Terbutryn	2	0								
Terbutylazine	2	0								

Table 9.7 Belmont Pump Station: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines.

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Bacteria										
Enterococcus	2	2	2	2						
Fecal Coliform	2	2	2	2						
Total Coliform	2	2	2	2						
Ratio of Fecal to Total Coliform	2	2	1	1						
Conventionals										
pH	2	2		0						
Conductivity	2	2								
Alkalinity as CaCO3	2	2								
Hardness as CaCO3	2	2								
Biochemical Oxygen Demand	2	2								
Chemical Oxygen Demand	2	2								
Total Organic Carbon	2	2								
Chloride	2	2								
Fluoride	2	2								
MBAS	2	1		1						
Oil and Grease	2	0								
Total Ammonia (as N)	2	1	0							
Total Kjeldahl Nitrogen	2	2								
Nitrate (as N)	2	2		0						
Nitrite (as N)	2	0		0						
Total Orthophosphate (as P)	2	2								
Total Phosphorus	2	2								
Total Recoverable Phenolics	2	0								
Total Dissolved Solids	2	2								
Total Suspended Solids	2	2								
Total Volatile Solids	1	0								
Turbidity	2	2								

Table 9.7 Belmont Pump : Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Dissolved Metals										
Aluminum	2	0								
Arsenic	2	2					0	0		
Cadmium	2	0					0	0		
Chromium	2	1								
Copper	2	2					0	1		
Iron	2	1								
Lead	2	0					0	0		
Nickel	2	1					0	0		
Selenium	2	0						0		
Silver	2	0					0	0		
Zinc	2	2					0	0		
Total Metals										
Aluminum	2	2		0					0	0
Arsenic	2	2	0	0						
Cadmium	2	0	0	0						
Chromium	2	2		0						
Copper	2	2	0							
Iron	2	2								
Lead	2	2	0							
Nickel	2	1	0	0						
Selenium	2	1	0	0			0			
Silver	2	0	0							
Zinc	2	2	0							
Aroclors										
Aroclor 1016	2	0		0						
Aroclor 1221	2	0		0						
Aroclor 1232	2	0		0						
Aroclor 1242	2	0		0						
Aroclor 1248	2	0		0						
Aroclor 1254	2	0		0						
Aroclor 1260	2	0		0						

Table 9.7 Belmont Pump: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Chlorinated Pesticides										
2,4'-DDD	2	0								
2,4'-DDE	2	0								
2,4'-DDT	2	0								
4,4'-DDD	2	0								
4,4'-DDE	2	0								
4,4'-DDT	2	0					0	0		
Total DDT	2	0								
Aldrin	2	0	0				0	0		
Dieldrin	2	0	0				0	0		
Endrin	2	0	0	0			0	0		
Endrin aldehyde	2	0								
Endrin ketone	2	0								
alpha-BHC	2	0								
beta-BHC	2	0								
delta-BHC	2	0								
gamma-BHC (Lindane)	2	0		0			0	0		
Endosulfan I	2	0					0	0		
Endosulfan II	2	0					0	0		
Endosulfan sulfate	2	0								
alpha-Chlordane	2	0								
gamma-Chlordane	2	0								
Heptachlor	2	0	0	0			0	0		
Heptachlor epoxide	2	0	0	0			0	0		
Oxychlordane	2	0								
cis-Nonachlor	2	0								
trans-Nonachlor	2	0								
Total Chlordane	2	0		0						
Methoxychlor	2	0		0						
Mirex	2	0							0	0
Toxaphene	2	0	0	0			0	0		

Table 9.7 Belmont Pump: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwat er	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Organophosphates										
Bolstar (Sulprofos)	2	0								
Chlorpyrifos	2	0			0	0			0	0
Demeton	2	0							0	0
Diazinon	2	0			0				0	0
Dichlorvos	2	0								
Dimethoate	2	0								
Disulfoton	2	0								
Ethoprop	2	0								
Fensulfothion	2	0								
Fenthion	2	0								
Malathion	2	0							0	0
Merphos	2	0								
Methyl Parathion	2	0								
Mevinphos	2	0								
Phorate	2	0								
Ronnel	2	0								
Tetrachlorvinphos (Stirophos)	2	0								
Tokuthion (Prothiofos)	2	0								
Trichloronate	2	0								
Triazines										
Ametryn	2	0								
Atraton	2	0								
Atrazine	2	0		0						
Cyanazine	2	0								
Prometon	2	2								
Prometryn	2	0								
Propazine	2	0								
Secbumeton	2	0								
Simazine	2	0		0						
Simetryn	2	0								
Terbutryn	2	0								
Terbutylazine	2	0								

Table 9.8 Bouton Creek: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines.

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Bacteria										
Enterococcus	2	2	2	2						
Fecal Coliform	2	2	1	1						
Total Coliform	2	2	1	1						
Ratio of Fecal to Total Coliform	2	2	1	1						
Conventionals										
pH	2	2		0						
Conductivity	2	2								
Alkalinity as CaCO3	2	2								
Hardness as CaCO3	2	2								
Biochemical Oxygen Demand	2	2								
Chemical Oxygen Demand	2	2								
Total Organic Carbon	2	2								
Chloride	2	2								
Fluoride	2	2								
MBAS	2	1		1						
Oil and Grease	2	0								
Total Ammonia (as N)	2	0	0							
Total Kjeldahl Nitrogen	2	2								
Nitrate (as N)	2	0		0						
Nitrite (as N)	2	0		0						
Total Orthophosphate (as P)	2	2								
Total Phosphorus	2	2								
Total Recoverable Phenolics	2	0								
Total Dissolved Solids	2	2								
Total Suspended Solids	2	2								
Total Volatile Solids	1	1								
Turbidity	2	2								

Table 9.8 Bouton Creek: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Dissolved Metals										
Aluminum	2	0								
Arsenic	2	2					0	0		
Cadmium	2	0					0	0		
Chromium	2	1								
Copper	2	2					0	1		
Iron	2	0								
Lead	2	1					0	0		
Nickel	2	1					0	0		
Selenium	2	0						0		
Silver	2	0					0	0		
Zinc	2	2					0	0		
Total Metals										
Aluminum	2	1		0					0	0
Arsenic	2	2	0	0						
Cadmium	2	0	0	0						
Chromium	2	1		0						
Copper	2	2	0							
Iron	2	1								
Lead	2	2	0							
Nickel	2	1	0	0						
Selenium	2	0	0	0			0			
Silver	2	0	0							
Zinc	2	2	0							
Aroclors										
Aroclor 1016	2	0		0						
Aroclor 1221	2	0		0						
Aroclor 1232	2	0		0						
Aroclor 1242	2	0		0						
Aroclor 1248	2	0		0						
Aroclor 1254	2	0		0						
Aroclor 1260	2	0		0						

Table 9.8 Bouton Creek: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Chlorinated Pesticides										
2,4'-DDD	2	0								
2,4'-DDE	2	0								
2,4'-DDT	2	0								
4,4'-DDD	2	0								
4,4'-DDE	2	0								
4,4'-DDT	2	0					0	0		
Total DDT	2	0								
Aldrin	2	0	0				0	0		
Dieldrin	2	0	0				0	0		
Endrin	2	0	0	0			0	0		
Endrin aldehyde	2	0								
Endrin ketone	2	0								
alpha-BHC	2	0								
beta-BHC	2	0								
delta-BHC	2	0								
gamma-BHC (Lindane)	2	0		0			0	0		
Endosulfan I	2	0					0	0		
Endosulfan II	2	0					0	0		
Endosulfan sulfate	2	0								
alpha-Chlordane	2	0								
gamma-Chlordane	2	0								
Heptachlor	2	0	0	0			0	0		
Heptachlor epoxide	2	0	0	0			0	0		
Oxychlordane	2	0								
cis-Nonachlor	2	0								
trans-Nonachlor	2	0								
Total Chlordane	2	0		0						
Methoxychlor	2	0		0						
Mirex	2	0							0	0
Toxaphene	2	0	0	0			0	0		

Table 9.8 Bouton Creek: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Organophosphates										
Bolstar (Sulprofos)	2	0								
Chlorpyrifos	2	0			0	0			0	0
Demeton	2	0							0	0
Diazinon	2	0			0				0	0
Dichlorvos	2	0								
Dimethoate	2	0								
Disulfoton	2	0								
Ethoprop	2	0								
Fensulfothion	2	0								
Fenthion	2	0								
Malathion	2	0							0	0
Merphos	2	0								
Methyl Parathion	2	0								
Mevinphos	2	0								
Phorate	2	0								
Ronnel	2	0								
Tetrachlorvinphos (Stirophos)	2	0								
Tokuthion (Prothiofos)	2	0								
Trichloronate	2	0								
Triazines										
Ametryn	2	0								
Atraton	2	0								
Atrazine	2	0		0						
Cyanazine	2	0								
Prometon	2	0								
Prometryn	2	0								
Propazine	2	0								
Secbumeton	2	0								
Simazine	2	0		0						
Simetryn	2	0								
Terbutryn	2	0								
Terbutylazine	2	0								

Table 9.9 Los Cerritos Channel: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines.

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Bacteria										
Enterococcus	2	2	2	2						
Fecal Coliform	2	2	2	2						
Total Coliform	2	2	2	2						
Ratio of Fecal to Total Coliform	2	2	0	0						
Conventionals										
pH	2	2		1						
Conductivity	2	2								
Alkalinity as CaCO3	2	2								
Hardness as CaCO3	2	2								
Biochemical Oxygen Demand	2	2								
Chemical Oxygen Demand	2	2								
Total Organic Carbon	2	2								
Chloride	2	2								
Fluoride	2	2								
MBAS	2	1		1						
Oil and Grease	2	0								
Total Ammonia (as N)	2	0	0							
Total Kjeldahl Nitrogen	2	2								
Nitrate (as N)	2	0		0						
Nitrite (as N)	2	0		0						
Total Orthophosphate (as P)	2	1								
Total Phosphorus	2	2								
Total Recoverable Phenolics	2	0								
Total Dissolved Solids	2	2								
Total Suspended Solids	2	2								
Total Volatile Solids	1	1								
Turbidity	2	2								

Table 9.9 Los Cerritos Channel: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Dissolved Metals										
Aluminum	2	0								
Arsenic	2	2					0	0		
Cadmium	2	1					0	0		
Chromium	2	2								
Copper	2	2					1	2		
Iron	2	1								
Lead	2	2					0	0		
Nickel	2	1					0	0		
Selenium	2	1						0		
Silver	2	0					0	0		
Zinc	2	2					0	0		
Total Metals										
Aluminum	2	2		0					0	0
Arsenic	2	2	0	0						
Cadmium	2	2	0	0						
Chromium	2	2		0						
Copper	2	2	2							
Iron	2	2								
Lead	2	2	0							
Nickel	2	1	0	0						
Selenium	2	2	0	0			0			
Silver	2	0	0							
Zinc	2	2	0							
Aroclors										
Aroclor 1016	2	0		0						
Aroclor 1221	2	0		0						
Aroclor 1232	2	0		0						
Aroclor 1242	2	0		0						
Aroclor 1248	2	0		0						
Aroclor 1254	2	0		0						
Aroclor 1260	2	0		0						

Table 9.9 Los Cerritos Channel: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Chlorinated Pesticides										
2,4'-DDD	2	0								
2,4'-DDE	2	0								
2,4'-DDT	2	0								
4,4'-DDD	2	0								
4,4'-DDE	2	0								
4,4'-DDT	2	0					0	0		
Total DDT	2	0								
Aldrin	2	0	0				0	0		
Dieldrin	2	0	0				0	0		
Endrin	2	0	0	0			0	0		
Endrin aldehyde	2	0								
Endrin ketone	2	0								
alpha-BHC	2	0								
beta-BHC	2	0								
delta-BHC	2	0								
gamma-BHC (Lindane)	2	0		0			0	0		
Endosulfan I	2	0					0	0		
Endosulfan II	2	0					0	0		
Endosulfan sulfate	2	0								
alpha-Chlordane	2	0								
gamma-Chlordane	2	0								
Heptachlor	2	0	0	0			0	0		
Heptachlor epoxide	2	0	0	0			0	0		
Oxychlordane	2	0								
cis-Nonachlor	2	0								
trans-Nonachlor	2	0								
Total Chlordane	2	0		0						
Methoxychlor	2	0		0						
Mirex	2	0							0	0
Toxaphene	2	0	0	0			0	0		

Table 9.9 Los Cerritos Channel: Comparison of Dry Weather Water Chemistry with Available Benchmarks and Guidelines. (continued)

Analyte Name	N	Detects	Ocean Plan	LA Basin Plan	California Fish and Game Freshwater	California Fish and Game Saltwater	California Toxics Rule Freshwater	California Toxics Rule Saltwater	National Non Priority Pollutant Freshwater	National Non Priority Pollutant Saltwater
Organophosphates										
Bolstar (Sulprofos)	2	0								
Chlorpyrifos	2	0			0	0			0	0
Demeton	2	0							0	0
Diazinon	2	0			0				0	0
Dichlorvos	2	0								
Dimethoate	2	0								
Disulfoton	2	0								
Ethoprop	2	0								
Fensulfothion	2	0								
Fenthion	2	0								
Malathion	2	0							0	0
Merphos	2	0								
Methyl Parathion	2	0								
Mevinphos	2	0								
Phorate	2	0								
Ronnel	2	0								
Tetrachlorvinphos (Stirophos)	2	0								
Tokuthion (Prothiofos)	2	0								
Trichloronate	2	0								
Triazines										
Ametryn	2	0								
Atraton	2	0								
Atrazine	2	0		0						
Cyanazine	2	0								
Prometon	2	0								
Prometryn	2	0								
Propazine	2	0								
Secbumeton	2	0								
Simazine	2	0		0						
Simetryn	2	0								
Terbutryn	2	0								
Terbutylazine	2	0								

Table 9.10 Summary of Toxicity Characteristics of Stormwater from Various Southern California Watersheds. Test Types: SF = sea urchin fertilization, MS = mysid survival/growth, DS = daphnid survival/reproduction.

Location	Date	Test Type	Number of Samples	%Toxic	TU_c
Long Beach	2005-2006	SF	12	83	2->32
	2005-2006	DS	2	17	1-2
Long Beach	2004-2005	SF	12	58	2-16
	2004-2005	DS	12	25	1-8
Long Beach	2003-2004	SF	11	45	<2-32
	2003-2004	DS	11	9	1-2
Long Beach	2002-2003	SF	13	46	≤2-32
	2002-2003	DS	13	31	1-4
Long Beach	2000-2002	SF	22	86	≤2-32
	2000-2002	MS	20	55	1-16
	2000-2002	DS	22	77	1->16
Los Angeles River	1997-1999	SF	4	100	4-8
San Gabriel River	1997-1999	SF	4	50	≤2-4
Ballona Creek	1996-1997	SF	13	85	≤4-32
Chollas Creek	2000-2001	DS	40	35[1]	Not reported
	1999-2000	SF	5	100	8-32
	1999	MS	3	0	1
	1999	DS	3	67	1-2
	1994-1998	DS	11	100	2-8

1. Percent toxic based only on daphnid survival LC_{50}.

Table 9.11 Summary of TIE Results for Each Sample. The primary toxicant category indicates the chemical class most strongly indicated by the results. The secondary category indicates the chemical class indicated from partially effective TIE treatments.

Date	Station	Water Flea	
		Primary Category[1]	Secondary Category[1]
Dry Weather Events:			
8/19/05	Bouton Creek	NPO	P?
8/19/05	Los Cerritos	NPO	P?

[1] OP = organophosphate pesticide, METAL = divalent cationic trace metal, NPO = unspecified nonpolar organic; P=pyrethroid

Table 9.12 Spearman Rank Correlation Coefficients (r_s) for Toxicity and Chemical Data from Six Wet Weather Seasons from 2001 to 2006. The nonparametric tests show the relationship between paired chemical concentrations and toxic units (TU) for either acute or chronic bioassay toxicity tests. Toxic units are based on either the median response (EC_{50} or LC_{50}, acute TUa) or the NOEC (chronic TUc) concentration. Values of r_s in bold text are significant at $p \leq 0.05$ and indicate that each significant ranked pair series approach the same positive or negative order and are statistically different from an order that is random. For all constituents except diazinon n=68 (diazinon n=52).

	Sea Urchin Fertilization	Water Flea Survival	Water Flea Reproduction
Constituent	**TU_a**	**TU_a**	**TU_c**
Conventionals			
Hardness	0.205	**0.468**	**0.472**
TSS	0.059	**0.433**	**0.531**
TDS	0.177	**0.409**	**0.453**
TOC	0.229	**0.530**	**0.620**
Dissolved Metals			
Cadmium	0.167	0.185	0.142
Chromium	0.182	-0.177	-0.201
Copper	**0.336**	0.174	0.198
Lead	**0.254**	0.194	**0.255**
Nickel	**0.322**	**0.279**	**0.338**
Zinc	**0.396**	0.203	**0.262**
Organophosphate Pesticides			
Diazinon	0.047	**0.448**	**0.400**

In bold, significant values at the level of significance alpha=0.050 (two-tailed test).

10.0 CONCLUSIONS

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10.0 CONCLUSIONS

The City of Long Beach's water quality monitoring program for stormwater and dry weather discharges through the City's municipal separate storm sewer system (MS4) began in the 1999/2000 wet weather season under terms of Order No. 99-060 National Pollutant Discharge Elimination Systems Municipal Permit No. CAS004003 (CI 8052). Since that time, 81 wet weather monitoring events have been conducted at the four Long Beach mass emission stations for the full set of analytes, along with 54 dry weather inspections/monitoring events. In addition 37 wet weather events have been monitored to develop Event Mean Concentrations (EMCs) for total suspended solids only. For the past four years, annual studies have been conducted in Alamitos Bay to characterize the vertical and horizontal extent of the stormwater plume and document potential toxicity effects in the receiving waters in the Bay.

The Long Beach stormwater monitoring program has emphasized an approach of paired chemical analysis and toxicity testing of discharges of municipal stormwater. The purpose of this approach was to first identify the constituents in the City of Long Beaches stormwater discharges that exhibited potential water quality impacts. Also, since numerical stormwater quality standards do not exist, it was desired to measure the impacts of these discharges in the Long Beach receiving waters.

A number of conclusions can be made based upon both the results of the 2005/2006 monitoring effort and the cumulative results of the first seven years of the City of Long Beach Stormwater Monitoring Program. Many of these conclusions have been stated previously in each annual report. The body of evidence to support these basic conclusions has continued to build over the course of the past seven years. These include:

- Exceedances of available benchmark values based upon receiving water, ocean water, drinking water or other available comparisons are common for three metals (copper, lead and zinc).

- During the previous six years, measurable concentrations of diazinon and chlorpyrifos (organophosphate pesticides) have often been detected in stormwater discharges but occurrences have not followed any consistent seasonal or spatial patterns. During the 2005/2006 monitoring period neither compound was detected. The absence of these compounds corresponds with removal of these pesticides from retail outlets. Both pesticides are no longer approved for residential use

- With the exception of a few measurements taken since the start of monitoring in 2000, indicator bacterial counts tend to exceed Basin Plan single sample criteria during storm events. During dry weather investigations, indicator bacteria were typically comparable to levels reported in association with wet weather events. Total and fecal coliform concentrations in Bouton Creek continue to be an exception. Concentrations of total and fecal coliform are often below Basin Plan single sample criteria during dry weather discharges. Approximately 50% of the dry weather samples taken at Bouton Creek over the past seven years have met the single sample criteria for total and fecal coliform.

- Concentrations of dissolved cadmium, copper, nickel and lead are relatively comparable during both wet and dry weather periods compared to concentrations of the total recoverable forms. Although the concentrations of many dissolved metals remain relatively consistent between storm events and dry weather flows, higher levels of hardness during dry weather conditions tend to prevent frequent exceedances of freshwater CTR water quality criteria.

- Unlike these four metals, dissolved zinc concentrations are consistently higher during storm events.

- Concentrations of total copper, lead and zinc are distinctly higher in association with storm flows. Regressions developed in the five-year summary report (Kinnetic Laboratories, Inc., 2004) provided evidence of strong relationships to the concentration of total suspended solids at each site.

- Stormwater discharges from the Dominguez Gap Pump Station are typically of a higher quality than the other mass emission sites. In addition, stormwater discharges are less frequent at Dominguez Gap because of the storage capacity and infiltration that occurs in the basin associated with this pump station. Exceptions to this occur in situations when unusually high volume storm events occur repeatedly over a relatively short time interval. During the 2005/2006 season dissolved copper was the primary constituent of concern at this site.

- Stormwater discharges have consistently shown measured toxicity to freshwater and marine test species, but lesser or no toxicity after a series of storms or very large runoff events. For the 2005/2006 monitoring program *Ceriodaphnia* and urchin test data follow this trend, with toxicity measured in the first-of-the-year storm. Sea urchin toxicity also showed high values at the end of the storm season, when approximately one month had elapsed between the third and fourth storms

- Toxicity Identification Evaluations (TIEs) conducted over the past seven years have typically implicated organophosphate pesticides (diazinon and chlorpyrifos) in causing toxicity to the freshwater water flea (freshwater test). Over the past three years, fewer TIEs were conducted with water fleas due to lower incidence of toxicity but results have implicated possible added toxicity due to pyrethoid pesticides as well as cationic metals.

- Stormwater plumes that develop in Alamitos Bay have consistently shown little evidence of toxicity. The largest storm events show the least evidence of toxicity and result in a plume throughout Alamitos Bay and out into San Pedro Bay. The smaller events produce a plume that is most evident around the mouth of the Los Cerritos Channel where it enters Alamitos Bay at the bottom of Marine Stadium. The low or lack of toxicity in the stormwater plume contrasts with similar studies of stormwater plumes from in Santa Monica Bay from Ballona Creek and in San Diego Bay from Chollas Creek. In the latter studies, toxicity was measured in receiving waters when the plume consisted of as little as 10 to 25 percent stormwater. Minimal toxicity was evident in the stormwater plume in Alamitos Bay where the plume consisted of up to 70% stormwater.

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APPENDICES

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Appendix A

Quality Assurance/Quality Control Assessment

APPENDIX A: ANALYTICAL CHEMISTRY QUALITY ASSURANCE/QUALITY CONTROL 2005/2006 LONG BEACH STORMWATER MONITORING PROJECT

Kinnetic Laboratories conducts all activities in accordance with formal QA/QC procedures. Quality Assurance and Quality Control (QA/QC) consists of evaluating the field duplicates and laboratory quality control samples for compliance associated with the field sampling and laboratory. Field QA/QC samples are used to evaluate potential contamination and sampling error introduced prior to submittal to the analytical laboratories. Laboratory QA/QC activities provide information needed to assess potential laboratory contamination, analytical precision and representativeness.

The overall QA objective is to ensure that data of known and acceptable quality are provided. The primary indicators used to evaluate the quality of the data are precision, accuracy, representativeness, comparability and completeness. The following sections define each of these indicators and how they are used to asses and validate data from the 2005/2006 Long Beach Stormwater Monitoring Project.

1.0 QUALITY ASSURANCE/QUALITY CONTROL METHODS

The 2005/2006 Long Beach Stormwater Monitoring Project Quality Assurance/Quality Control (QA/AC) chemistry records were inspected using the EPA documents for organic and inorganic review for guidance and compared to the Sampling and Analysis Plan.

The dataset accumulated this project year contains nearly than 10,000 records that break down to more than 3,900 individual sample chemistry and toxicity records, and more than 4,500 laboratory QC records. Each record was examined individually and also in related groups such as sampling event or QC batch to determine the overall quality of the dataset.

The overall quality of the dataset is determined to a large degree by the thoroughness, accuracy and precision of the laboratory QC records which explains why the majority of this section is devoted to examining them in detail. The QC is tabulated by category and each is discussed individually. Generally the results were well within the appropriate ranges and limits and any significant exceptions and any resulting data qualifications are presented in detail in this section and reflected in the summary tables found in the main body of the document.

1.1 Precision

Precision provides an assessment of mutual agreement between repeated measurements. These measures may apply to blind field duplicates (FD), laboratory duplicates (DUP), matrix spike duplicates (MSD) and laboratory control sample duplicates (LCSD). Monitoring of precision through the process allows for the evaluation of the consistency of field sampling and laboratory analysis.

The Relative Percent Difference (RPD) is used to evaluate duplicate samples. The RPD is the difference between the two samples divided by their average expressed as percent and is calculated as:

$$RPD = 200 * \left(\frac{|x_1 - x_2|}{(x_1 + x_2)} \right)$$

where:
x_1 = Concentration of sample 1 of the pair
x_2 = Concentration of sample 2 of the pair

1.2 Accuracy

An assessment of the accuracy of measurements is based on determining the difference between measured values and the known or "true" value and is applied to Matrix Spikes (MS), Laboratory Control Samples (LCS) and Standard Reference Material (SRM).

In general, Percent Recovery is calculated as:

$$\%R = 100 * \left(\frac{Measured_Value}{True_Value} \right)$$

Matrix Spike recoveries take into account the concentration of the source sample.

$$\%R_{MS} = 100 * \left(\frac{Measured_Value - Sample_Value}{True_Value} \right)$$

1.3 Representativeness, Comparability and Completeness

Representativeness is the degree to which data accurately and precisely represents the natural environment.

Comparability is the measure of confidence with which one dataset can be compared to another. The use of standardized methods of chemical analysis and field sampling and processing are ways of insuring comparability. The implementation of thorough QA/QC methods such as field duplicates and laboratory QC is essential.

Completeness is a measure of the percentage of the data judged valid after comparison with specific validation criteria. This includes data lost through accidental breakage of sample containers or other activities that result in irreparable loss of samples. Implementation of standardized Chain-of-Custody procedures which track samples as they are transferred between custodians is one method of maintaining a high level of completeness.

A high level of completeness is essential to all phases of this study due to the limited number of samples. Of course, the overall goal is to obtain completeness of one hundred percent however a realistic data quality objective of 95% will insure an adequate level of data return.

Close adherence to 'Standard Operating Procedures' (SOP's) assures that the resulting data is representative, complete and comparable. The results are further assessed with a thorough validation process.

2.0 DATA QUALITY ASSESSMENT PROCESS

2.1 Verification

Data verification was the first step in the data quality assessment process. The verification process generally included checks to verify compliance with the sampling plan and with the QA/QC practices. Information contained in the laboratory reports was verified to be complete, correct and free of inconsistencies.

2.2 Validation

Data validation was performed in accordance with the National Functional Guidelines for Organic Review (EPA 540-R-99-008, October 1999), Low Concentration Organic Review (EPA 540-R-00-006, June 2001) and Inorganic Data Review (EPA.540-R-01-008, July 2002). All laboratory and field data generated under the program were reviewed for accuracy, precision and completeness. The review included:

- Data package completeness
- Chain-of-Custody
- Use of specified analytical methods
- Holding times for extraction and analysis
- Blanking results (equipment, bottle, filter, and method blanks) relative to the reporting limits and sample concentrations
- Field duplicate frequency and precision
- Laboratory duplicates, frequency and precision
- Laboratory Control Sample frequency, compounds and recoveries
- Surrogate standard frequency, compounds and recoveries
- Matrix spike frequency, compounds and recoveries
- Matrix spike duplicate frequency and relative percent differences
- Reporting limits and dilution factors

2.3 Data Qualifiers

Where appropriate, data qualifiers were associated with the results using the following standard notations from the EPA guidance documents

Data Review Qualifiers

U	The compound was analyzed for but was not detected. The associated value is the sample reporting limit
UJ	The compound was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise
J-	The associated value is a low estimate
J	The associate value is an estimated quantity
J+	The associated value is a high estimate
R	The data are unusable. The analyte may or may not be present

The EPA guidance documents are clear that data review and qualification rules are to be tempered using professional judgment and the specifics are discussed in the following section of this report.

3.0 PROJECT SPECIFIC DATA REVIEW

3.1 Holding Times

Holding times were generally met during the project year. The exceptions are as follows:

Dry Weather Event-01 - 18-Aug-2005

The holding time for Total Organic Carbon is 28 days. It was run on the 30th day, or within 26 hours of being within hold time. Total Suspended Solids has a holding time of 7 days and was run on the 9th day or within 33 hours of being within hold time.

Global Storm Event-01 - 18-Oct-2005

Total Phosphorus has a holding time of 28 days but was run on the 30th day or within 26 hours of hold time.

Global Storm Event-02 - 02-Jan-2006

Total Orthophosphate (as P) has a holding time of 48 hours. The samples were run an hour out of hold time.

Global Storm Event-03 - 19-Feb-2006

Biochemical Oxygen Demand , MBAS, Nitrate (as N), Nitrite (as N), Total Orthophosphate (as P) and Turbidity have 48 hour holding times. They were all run within 17 hours of hold time.

None of these holding time excursions were significant enough to require any additional qualification of the sample results.

3.2 Equipment Blanks

The results of field-related blanking activities are summarized in Table A-1. Blanks were analyzed to assess potential contamination from monitoring site intake hoses, the sub-sampling process, and composite bottles. Equipment was tested for Total Metals (Al, As, Cd, Cr. Cu, Pb, Ni, Ag, Zn) and four conventional contaminates (COD, TOC, Nitrate as N, and Total Phosphorus).

An intake hose is installed at each station and leads from the sample basin to the sampler. One blank analysis was performed on the set of hoses and no contaminates were detected. The peristaltic hose was washed in conjunction with the intake hoses. The blank for the intake hoses serves as the blank for the peristaltic hose.

In general, if a contaminate is found in an equipment blanking study, all associated samples that have a concentration less than five times the blank hit are qualified with a 'J+' flag. Samples with relatively high concentrations are unaffected. In the blanking studies associated with the Long Beach 2005/2006 storm season no samples were qualified as a result of an equipment blanking hit.

3.3 Field Duplicates

A summary of field duplicate stations and dates are summarized in Table A-2. Sample volumes were sufficient for at least partial field duplication for six of the events monitored during the project year including both dry weather events and five storm events. Sample volume was limited for some of the storms and the scope of the duplicates were limited to either just grab samples only without organic analyses. The field duplicate results are summarized in Table A-3.

Strict criteria are not established for the evaluation of field duplicates. Rather samples are evaluated based upon best professional judgment. Relative percent differences where highlighted when greater than 50% and were given closer scrutiny. As a general rule, values are considered to be of concern if above 50% provided both values are greater than five times the reporting limit. In cases where one or both values are less than five times the reporting limit those values are considered to be of potential concern if the difference between the two values is greater than twice the reporting limit. The excursions from these guidelines are as follows:

3.3.1 Grabs

Oil and grease and bacteria samples were collected manually as grab samples. True field duplicates were collected for these constituents. Sampling was preformed sequentially maintaining a minimum period of time between each sample.

High RPD's encountered for bacteria are typical of repeated measurements of microbial constituents in receiving waters. Out of the 21 bacteria duplicates 14 have RPD's 50% or less. Of the seven remaining samples one is over 150%, one is between 100 and 150% and five are between 50 and 100%.

Storm-02 02-Jan-2006:

> The Fecal Coliform field duplicate was reported at 1100 MPN/100 ml and its duplicate at 13000 with an RPD of 169%. Total Coliform was reported as 50000 and160000 MPN/100 with a RPD of 105%.

3.3.2 Composites-Sub-sampling Splits

Sub-sampling splits of the composite samples, while not true field duplicates, are assessed as field duplicates. They indicate that the sub-sampling process was, in most cases, able to effectively obtain representative samples from the composite during the project. High variability as observed for only a small number of constituents during the project year and they are shown in bold in Table A-3.

The only serious issue with the field duplicates occurred during first Dry Weather event (18-Aug-2005). The dissolved zinc field duplicate was reported at 8.4 µg/L and its replicate at 43 µg/L with an RPD of 135%. This was considered an egregious excursion and the associated sample values were subjected to further evaluation. Los Cerritos was the field duplicate site and the associated dissolved zinc sample value was rejected based on professional judgment that the other sites were not affected.

The field duplicate for total zinc was reported at 22 µg/L and its replicate at 40 µg/L. This computes to an RPD of 58%. The associated sample values were not additionally qualified

4.0 ANALYTICAL CHEMISTRY QA/QC

This section address procedures and errors associated with laboratory handling and analysis. In most cases, the QA/QC results have been summarized for each type of assessment.

4.1 Reporting Limits

We aim for the lowest reasonable, reliable and repeatable detection limits for our projects which have been steadily improving for many categories of analytes. We compare the results from the laboratory and examine cases where the minimum level was not met when the analyte was not detected. We are specifically looking for elevated levels for non-detects.

The minimum levels were generally met for the project. Hoewever, in some cases the limited water volumes made it impossible to meet the lowest possible limits but they were still in an acceptable range.

4.2 Method and Filter Blanks

The laboratory method and filter blank results are shown in Table A-4. Estimated values between the MDL and RL are included in the table and indicated with a (J) qualifier. Overall the analyses for the project year were free of blank contamination.

The general rule is: Samples whose values are more than 10 times the blank hit are not affected. Those samples whose values are less than 10 times the blank hit are qualified as J+ to indicate a high bias. Non-detects are not affected.

Storm-01 - 18-Oct-05:

Total Chromium was detected at 2.18 µg/L; ten times the blank hit is 21.8 µg/L. The associated sample values are 11 and 13 µg/L and both are qualified with a J+ to indicate them as high estimates.

Total Silver was detected at 0.235 µg/L; ten times the blank hit is 2.35 µg/L. The associated sample values were at or below the detection limit of 0.2 µg/L. The sample value was additionally qualified with J+ to indicate it as having a high bias.

Total Zinc was detected at 3.13 µg/L; Values less than ten times the blank hit of 31.3 µg/L would have been qualified but all were ultimately rejected as unsuitable because of more serious QC issues.

Storm-03 - 19-Feb-06:

Total Kjeldahl Nitrogen was reported at 0.18 mg/L; ten times the blank hit is 1.8 mg/L. Both sample values (2.4 and 4.1 mg/L) are above this limit and no additional qualification was required.

Storm-04 - 28-Feb-06:

Total Kjeldahl Nitrogen was reported at 0.12 mg/L; ten times the blank hit is 1.2 mg/L. Both sample values (1.1 and 0.85 mg/L) are below this limit and are qualified with J+ to indicate them as high estimates.

4.3 Laboratory Duplicates

To evaluate precision of laboratory analysis, replicate samples were analyzed and reported in Table A-5. Those duplicates with an RPD greater than 20% were examined more closely and those results that professional judgment determines to be affected are qualified

Laboratory Duplicates where both values are less than the reporting limit and their difference is less than the reporting limit are not qualified. There were a number of such cases because the laboratories estimated the concentrations down to their MDL.

Dry-01 - 18-Aug-2005

Total Copper was reported as 14.1 µg/L for one sample but non-detect (1U) for the replicate. The laboratory duplicate was taken from a different project, not necessarily stormwater. Taking this into account and evaluating the other QC run with this batch the associated samples were qualified with a J to indicate that they are estimated values.

Storm-01 - 18-Oct-2005:

Total Zinc was reported at 2.71 µg/L for one sample, 4.2 µg/L for the duplicate and an RPD of 43%. The associated samples were ultimately rejected because of the additional QC issues.

4.4 Matrix Spikes

Matrix Spike and Matrix Spike Duplicate (MS/MSD) percent recoveries were evaluated to determine acceptable accuracy based on method-specific percent recoveries. Precision was evaluated by calculating the RPD of the MS/MSD recovery results.

The General rule is that when spikes are reported below the accepted range they indicate a low bias to the results and when reported above the accepted range they indicate a high bias.

QA/QC guidelines indicate that no action need be taken on MS/MSD data alone. The data reviewer may use the MS/MSD results in conjunction with other QC criteria when determining the need for further qualification. The MS/MSD results are summarized in table A-6.

The Matrix Spike and their duplicates were recovered within range during the Long Beach 2005/2006 project. The exceptions are as follows:

Dry-01 - 18-Aug-2005

Total selinium was reported with low recoveries for both MS (59%) and MSD (61%) with RPD of 4.2%. The associated values were qualified as J- or UJ to indicate them as low estimates.

Storm-02 - 02-Jan-2006

Both the MS and MSD for dissolved silver were recovered below acceptable limits with an MS of 54% and MSD of 55% and an RPD of 1.8%. The associated sample values were qualified as J- or UJ to indicate them as low estimates.

Total Lead was reported with an MS of 71%, a slightly low MSD of 65% and an RPD of 9%. No additional qualification of the samples was indicated because other QC records (lab duplicate and LCS) were all well within range.

Storm-05 - 03-Mar-2006

Methoxyclor was not recovered in either MS or MSD. The associated sample values were reported as R to indicate that the analyte was not recovered in the samples and estimates of the concentrations is not possible.

4.5 Laboratory Control Samples

Laboratory Control Spikes and their duplicates (LCS/LCSD) are solutions of known compounds and selected concentrations. Precision and accuracy are evaluated in a similar fashion as MS/MSDs with the

exception that there is no source sample to subtract and no matrix interference issues. The LCS/LCSD results are presented in table A-7.

All Laboratory Control Spikes for the 2005/2006 project year were recovered within the proper range.

4.6 Standard Reference Material

Standard Reference Material (SRM) is analyzed to evaluate accuracy. The results are presented in Table A-8 and show that the data quality objectives were met in all cases for the Long Beach 2005/2006 year.

4.7 Surrogate Recoveries

Surrogate analytes behave similarly to the target analytes. Surrogate spikes are introduced into the samples at specific concentrations and are used to provide a measure of instrument and method performance and to indicate sample-specific matrix effects. In logic similar to that offered for matrix spikes no action is required based on surrogate recoveries alone but should be taken in context with other QC records. Surrogate recovery results are summarized in Table A-9.

The surrogate recoveries were all within range for the 2005/2006 project year.

4.8 Total and Dissolved Metals

A comparison of nearly 320 total-dissolved metal pairs revealed 13 where the dissolved fraction was larger than the total. As we have seen in previous studies this typically occurs during dry weather sampling for reasons that are not yet entirely understood. Sample pairs whose values were greater than the reporting limit, where the dissolved fraction was larger than the total by more than 2 ug/L and where the RPD was greater than 30% were flagged with J to identify them as estimated values.

Only the zinc pair from Los Cerritos Channel for the first storm event (18-Oct-2005) revealed an issue. The dissolved zinc was reported at 120 µg/L and the total at 79 µg/L. Looking at the run as a whole it was determined that the total zinc value was determined to be well below what would be expected and the value was qualified with an R to indicated it as a rejected value.

5.0 TOXICITY QA/Q

The majority of toxicity tests met critical test acceptability criteria (TAC) and the results were judged to be valid. Four of the *Cerodaphnia* wet weather tests and one dry weather water flea test did not meet all of the TACs but these were nevertheless judged to have produced valid toxicity results. A single sea urchin test did not meet TAC and those results should be critically evaluated by the reader. A few additional tests experienced minor procedural deviations that had no significant effect on the results. All deviations are described in the following paragraphs and summarized in Table A-10.

5.1 Water Flea Tests

The water flea toxicity tests were conducted according to USEPA protocol guidelines, and there were no procedural problems with tests conducted on most storm samples or most dry weather collections.

The bioassays conducted on the Belmont Pump, Bouton Creek and Cerritos Channel samples collected during the January 2 wet weather event, however, did not meet the minimum control performance standard for survival and reproduction. Despite this poor control performance, however, the stormwater samples showed no apparent toxicity, with high survival and abundant neonate production in all test concentrations. The concurrent reference toxicant test also showed poor survival in the controls, while yielding LC50 and EC50 values that were within control chart limits. In our best professional judgement, these test results strongly suggested that toxicity was absent in the sample, and the test was not repeated.

In the wet weather sample collected from Cerritos Channel during the March 3 storm, control reproduction was below TAC. All stormwater samples showed high neonate production and reference toxicant results were within control chart ranges, so our judgment is that there was no toxicity in the sample. Similar low reproduction was seen in the controls for the May 2006 dry weather sample from Cerritos Channel, but again excellent reproduction in the highest concentrations of test water suggests the absence of sample toxicity,

In all water flea bioassays, dissolved oxygen and pH measurements remained within acceptable limits, while there were very small (< 0.5C) temperature excursions outside protocol recommendations which were corrected by adjusting room temperature controls. Samples were renewed each day with aliquots within the recommended pH range. All reference toxicant tests produced LC50s and EC50s that were within laboratory control chart limits.

5.2 Sea Urchin Tests

Sea urchin fertilization tests were conducted according to protocol guidelines. There was one sample that failed to meet TAC:

The brine control associated with the Bouton Creek wet weather sample collected on March 3 failed minimum (70%) fertilization requirements. The dilution water control met all TAC and the test water showed no significant decrease in fertilization in any concentration. The low fertilization in the brine controls, combined with somewhat elevated % mean square deviation (%MSD) suggests that these test results should be interpreted with caution.

With the exception detailed above, all sea urchin tests met TACs, all environmental monitoring values were within recommended ranges and all reference toxicant tests produced EC50s that were within laboratory control chart limits.

5.3 Sample Holding Times

The holding time for each sample and test is presented in Table A-11. The objective of <36 hours holding before test initiation was met for 58% of the samples; and tests for 100% of the samples were started within the allowable extended holding time window of 72 hours. In general, failure to meet the 36 hour holding time was due to laboratory loading problems.

The effect of extended cold storage on stormwater toxicity is unpredictable. The 36 hr storage objective used in this program was adapted from guidance for wastewater effluent testing developed by USEPA. The same guidance allows an extension of holding time to 72 hours when required by sample shipping or other logistic considerations. Extended storage times may have resulted in toxicity loss due to contaminant degradation or sorption to the storage container. The impact of such potential losses in this program cannot be assessed, since toxicity was not present in samples that experienced the most extended storage.

Table A-1 Summary of Blanking Results Associated with Field Activities.

Analyte	Reporting Limit	Installed Intake Hose		Subsampling Hose		Composite Bottles	
		Number of Detections	Number of Analyses	Number of Detections	Number of Analyses	Number of Detections	Number of Analyses
CONVENTIONALS (mg/L)							
Chemical Oxygen Demand (COD)	4.0	0	1	0	1	0	4
Total Organic Carbon (TOC)	0.5-1.0	0	1	0	1	0	4
Nitrate-N	0.10	0	1	0	1	0	4
Total P	0.01-0.002	0	1	0	1	0	4
TOTAL METALS (µg/L)							
Aluminum	100	0	1	0	1	0	4
Arsenic	1.0	0	1	0	1	0	4
Cadmium	0.25	0	1	0	1	0	4
Chromium	0.50	0	1	0	1	0	4
Copper	0.50	0	1	0	1	0	4
Lead	0.50	0	1	0	1	0	4
Nickel	1.0	0	1	0	1	0	4
Silver	0.25	0	1	0	1	0	4
Zinc	1.0	0	1	0	1	0	4

Table A-2 Field Duplicate Stations for Each Event.

Event Category	Global Event ID	Sample Date	Composite or Grab	Duplicated Station
Dry Weather	Event-01	18-Aug-2005	Comp	Los Cerritos Channel
Dry Weather	Event-01	18-Aug-2005	Grab	Los Cerritos Channel
Storm	Event-01	18-Oct-2005	Grab	Belmont Pump
Storm	Event-02	02-Jan-2006	Grab	Belmont Pump
Storm	Event-04	28-Feb-2006	Comp	Bouton Creek
Storm	Event-04	28-Feb-2006	Grab	Belmont Pump
Storm	Event-05	03-Mar-2006	Comp	Belmont Pump
Storm	Event-05	03-Mar-3006	Grab	Bouton Creek
Storm	Event-06	29-Mar-2006	Comp	Bouton Creek
Storm	Event-06	29-Mar-2006	Grab	Bouton Creek
Dry Weather	Event-02	11-May-2006	Comp	Los Cerritos Channel
Dry Weather	Event-02	11-May-2006	Grab	Belmont Pump

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Conventionals(mg/L unless noted)						
Conductivity (umhos/cm)	2200	2200	0	-	-	-
Alkalinity as CaCO3	140	130	7	-	-	-
Hardness as CaCO3	270	270	0	-	-	-
Biochemical Oxygen Demand	22	20	10	-	-	-
Chemical Oxygen Demand	210	210	0	-	-	-
Total Organic Carbon	35	34	3	-	-	-
Chloride	580	590	2	-	-	-
Fluoride	0.7	0.7	0	-	-	-
MBAS	ND	ND	N/A	-	-	-
Oil and Grease	ND	ND	N/A	ND	4.2	N/A
Total Ammonia (as N)	ND	ND	N/A	-	-	-
Total Kjeldahl Nitrogen	3.4	3.7	8	-	-	-
Nitrate (as N)	ND	ND	N/A	-	-	-
Nitrite (as N)	ND	ND	N/A	-	-	-
Total Orthophosphate (as P)	0.016	0.015	6	-	-	-
Total Phosphorus	0.26	0.26	0	-	-	-
Total Recoverable Phenolics	ND	ND	N/A	-	-	-
Total Dissolved Solids	1300	1300	0	-	-	-
Total Suspended Solids	44	44	0	-	-	-
Total Volatile Solids	-	-		-	-	-
Turbidity (NTU)	22	18	20	-	-	-
Dissolved Metals (µg/L)						
Aluminum	ND	ND	N/A	-	-	-
Arsenic	5.8	5.7	2	-	-	-
Cadmium	ND	ND	N/A	-	-	-
Chromium	0.22	0.23	4	-	-	-
Copper	9.3	12	25	-	-	-
Iron	ND	ND	N/A	-	-	-
Lead	ND	0.6	N/A	-	-	-
Nickel	ND	ND	N/A	-	-	-
Selenium	ND	ND	N/A	-	-	-
Silver	ND	ND	N/A	-	-	-
Zinc	**8.4**	**43**	**135**	-	-	-
Total Metals (µg/L)						
Aluminum	ND	170	N/A	-	-	-
Arsenic	5.4	5.1	6	-	-	-
Cadmium	0.22	0.26	17	-	-	-
Chromium	0.63	0.62	2	-	-	-
Copper	12	17	34	-	-	-
Iron	160	120	29	-	-	-
Lead	1.4	2.8	67	-	-	-
Nickel	ND	ND	N/A	-	-	-
Selenium	0.42	0.39	7	-	-	-
Silver	ND	ND	N/A	-	-	-
Zinc	**22**	**40**	**58**	-	-	-

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Bacteria (MPN/100 ml)						
Enterococcus	3000	4200	33	**79000**	**174000**	**75**
Fecal Coliform	**1700**	**3000**	**55**	1600000	1600000	0
Total Coliform	30000	50000	50	1600000	1600000	0
Aroclors (µg/L)						
Aroclor 1016	ND	ND	N/A	-	-	-
Aroclor 1221	ND	ND	N/A	-	-	-
Aroclor 1232	ND	ND	N/A	-	-	-
Aroclor 1242	ND	ND	N/A	-	-	-
Aroclor 1248	ND	ND	N/A	-	-	-
Aroclor 1254	ND	ND	N/A	-	-	-
Aroclor 1260	ND	ND	N/A	-	-	-
Chlorinated Pesticides (µg/L)						
2,4'-DDD	ND	ND	N/A	-	-	-
2,4'-DDE	ND	ND	N/A	-	-	-
2,4'-DDT	ND	ND	N/A	-	-	-
4,4'-DDD	ND	ND	N/A	-	-	-
4,4'-DDE	ND	ND	N/A	-	-	-
4,4'-DDT	ND	ND	N/A	-	-	-
Total DDT	ND	ND	N/A	-	-	-
Aldrin	ND	ND	N/A	-	-	-
Dieldrin	ND	ND	N/A	-	-	-
Endrin	ND	ND	N/A	-	-	-
Endrin aldehyde	ND	ND	N/A	-	-	-
Endrin ketone	ND	ND	N/A	-	-	-
alpha-BHC	ND	ND	N/A	-	-	-
beta-BHC	ND	ND	N/A	-	-	-
delta-BHC	ND	ND	N/A	-	-	-
gamma-BHC (Lindane)	ND	ND	N/A	-	-	-
Endosulfan I	ND	ND	N/A	-	-	-
Endosulfan II	ND	ND	N/A	-	-	-
Endosulfan sulfate	ND	ND	N/A	-	-	-
alpha-Chlordane	ND	ND	N/A	-	-	-
gamma-Chlordane	ND	ND	N/A	-	-	-
Heptachlor	ND	ND	N/A	-	-	-
Heptachlor epoxide	ND	ND	N/A	-	-	-
Oxychlordane	ND	ND	N/A	-	-	-
cis-Nonachlor	ND	ND	N/A	-	-	-
trans-Nonachlor	ND	ND	N/A	-	-	-
Total Chlordane	ND	ND	N/A	-	-	-
Methoxychlor	ND	ND	N/A	-	-	-
Mirex	ND	ND	N/A	-	-	-
Toxaphene	ND	ND	N/A	-	-	-

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**DUP**	**Result**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	ND	ND	N/A
Chlorpyrifos	ND	ND	N/A
Demeton	ND	ND	N/A
Diazinon	ND	ND	N/A
Dichlorvos	ND	ND	N/A
Dimethoate	ND	ND	N/A
Disulfoton	ND	ND	N/A
Ethoprop	ND	ND	N/A
Fensulfothion	ND	ND	N/A
Fenthion	ND	ND	N/A
Malathion	ND	ND	N/A
Merphos	ND	ND	N/A
Methyl Parathion	ND	ND	N/A
Mevinphos	ND	ND	N/A
Phorate	ND	ND	N/A
Ronnel	ND	ND	N/A
Tetrachlorvinphos (Stirophos)	ND	ND	N/A
Tokuthion (Prothiofos)	ND	ND	N/A
Trichloronate	ND	ND	N/A
Triazines (µg/L)			
Ametryn	ND	ND	N/A
Atraton	ND	ND	N/A
Atrazine	ND	ND	N/A
Cyanazine	ND	ND	N/A
Prometon	ND	ND	N/A
Prometryn	ND	ND	N/A
Propazine	ND	ND	N/A
Secbumeton	ND	ND	N/A
Simazine	ND	ND	N/A
Simetryn	ND	ND	N/A
Terbutryn	ND	ND	N/A
Terbutylazine	ND	ND	N/A

ND – Analyte was no detected

N/A – RPD could not be calculated because one or both of the values was not-detected
- indicates field DUPlicate not available due to low water volume

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-02 02-Jan-2006			Storm-04 28-Feb-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	-	-	-	140	140	0
Alkalinity as CaCO3	-	-	-	20	20	0
Hardness as CaCO3	-	-	-	25	25	0
Biochemical Oxygen Demand	-	-	-	8.9	8.4	6
Chemical Oxygen Demand	-	-	-	53	51	4
Total Organic Carbon	-	-	-	9.4	9.2	2
Chloride	-	-	-	26	25	4
Fluoride	-	-	-	ND	0.083	N/A
MBAS	-	-	-	ND	ND	N/A
Oil and Grease	ND	4.5	N/A	ND	2.4	N/A
Total Ammonia (as N)	-	-	-	0.4	0.55	32
Total Kjeldahl Nitrogen	-	-	-	1.4	1.2	15
Nitrate (as N)	-	-	-	0.52	0.52	0
Nitrite (as N)	-	-	-	ND	ND	N/A
Total Orthophosphate (as P)	-	-	-	0.17	0.17	0
Total Phosphorus	-	-	-	0.53	0.54	2
Total Recoverable Phenolics	-	-	-	ND	ND	N/A
Total Dissolved Solids	-	-	-	89	91	2
Total Suspended Solids	-	-	-	56	55	2
Total Volatile Solids	-	-	-	20	17	16
Turbidity (NTU)	-	-	-	40	41	2
Dissolved Metals (µg/L)						
Aluminum	-	-	-	58	63	8
Arsenic	-	-	-	1.1	1.2	9
Cadmium	-	-	-	ND	0.03	N/A
Chromium	-	-	-	0.96	1	4
Copper	-	-	-	7.3	7.6	4
Iron	-	-	-	58	58	0
Lead	-	-	-	1	0.98	2
Nickel	-	-	-	1.6	1.7	6
Selenium	-	-	-	ND	ND	N/A
Silver	-	-	-	ND	ND	N/A
Zinc	-	-	-	40	40	0
Total Metals (µg/L)						
Aluminum	-	-	-	1700	1700	0
Arsenic	-	-	-	1.9	1.9	0
Cadmium	-	-	-	0.24	0.24	0
Chromium	-	-	-	11	11	0
Copper	-	-	-	21	21	0
Iron	-	-	-	2200	2000	10
Lead	-	-	-	13	10	26
Nickel	-	-	-	6	4.8	22
Selenium	-	-	-	ND	0.25	N/A
Silver	-	-	-	ND	0.037	N/A
Zinc	-	-	-	130	130	0

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-02 02-Jan-2006			Storm-04 28-Feb-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Bacteria (MPN/100 ml)						
Enterococcus	18900	23300	21	14200	7500	62
Fecal Coliform	**1100**	**13000**	**169**	3000	3000	0
Total Coliform	**50000**	**160000**	**105**	30000	30000	0
Aroclors (µg/L)						
Aroclor 1016	-	-	-	ND	ND	N/A
Aroclor 1221	-	-	-	ND	ND	N/A
Aroclor 1232	-	-	-	ND	ND	N/A
Aroclor 1242	-	-	-	ND	ND	N/A
Aroclor 1248	-	-	-	ND	ND	N/A
Aroclor 1254	-	-	-	ND	ND	N/A
Aroclor 1260	-	-	-	ND	ND	N/A
Chlorinated Pesticides (µg/L)						
2,4'-DDD	-	-	-	ND	ND	N/A
2,4'-DDE	-	-	-	ND	ND	N/A
2,4'-DDT	-	-	-	ND	ND	N/A
4,4'-DDD	-	-	-	ND	ND	N/A
4,4'-DDE	-	-	-	ND	ND	N/A
4,4'-DDT	-	-	-	ND	ND	N/A
Total DDT	-	-	-	ND	ND	N/A
Aldrin	-	-	-	ND	ND	N/A
Dieldrin	-	-	-	ND	ND	N/A
Endrin	-	-	-	ND	ND	N/A
Endrin aldehyde	-	-	-	ND	ND	N/A
Endrin ketone	-	-	-	ND	ND	N/A
alpha-BHC	-	-	-	ND	ND	N/A
beta-BHC	-	-	-	ND	ND	N/A
delta-BHC	-	-	-	ND	ND	N/A
gamma-BHC (Lindane)	-	-	-	ND	ND	N/A
Endosulfan I	-	-	-	ND	ND	N/A
Endosulfan II	-	-	-	ND	ND	N/A
Endosulfan sulfate	-	-	-	ND	ND	N/A
alpha-Chlordane	-	-	-	ND	ND	N/A
gamma-Chlordane	-	-	-	ND	ND	N/A
Heptachlor	-	-	-	ND	ND	N/A
Heptachlor epoxide	-	-	-	ND	ND	N/A
Oxychlordane	-	-	-	ND	ND	N/A
cis-Nonachlor	-	-	-	ND	ND	N/A
trans-Nonachlor	-	-	-	ND	ND	N/A
Total Chlordane	-	-	-	ND	ND	N/A
Methoxychlor	-	-	-	ND	ND	N/A
Mirex	-	-	-	ND	ND	N/A
Toxaphene	-	-	-	ND	ND	N/A

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-04 28-Feb-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	ND	ND	N/A
Chlorpyrifos	ND	ND	N/A
Demeton	ND	ND	N/A
Diazinon	ND	ND	N/A
Dichlorvos	ND	ND	N/A
Dimethoate	ND	ND	N/A
Disulfoton	ND	ND	N/A
Ethoprop	ND	ND	N/A
Fensulfothion	ND	ND	N/A
Fenthion	ND	ND	N/A
Malathion	0.041	0.039	5
Merphos	ND	ND	N/A
Methyl Parathion	ND	ND	N/A
Mevinphos	ND	ND	N/A
Phorate	ND	ND	N/A
Ronnel	ND	ND	N/A
Tetrachlorvinphos (Stirophos)	ND	ND	N/A
Tokuthion (Prothiofos)	ND	ND	N/A
Trichloronate	ND	ND	N/A
Triazines (µg/L)			
Ametryn	ND	ND	N/A
Atraton	ND	ND	N/A
Atrazine	ND	ND	N/A
Cyanazine	ND	ND	N/A
Prometon	0.017	0.021	19
Prometryn	ND	ND	N/A
Propazine	ND	ND	N/A
Secbumeton	ND	ND	N/A
Simazine	ND	ND	N/A
Simetryn	ND	ND	N/A
Terbutryn	ND	ND	N/A
Terbutylazine	ND	ND	N/A

ND – Analyte was no detected

N/A – RPD could not be calculated because one or both of the values was not-detected
- indicates field DUPlicate not available due to low water volume

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-05 03-Mar-2006			Storm-06 29-Mar-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	120	120	0	130	130	0
Alkalinity as CaCO3	16	16	0	15	16	6
Hardness as CaCO3	22	22	0	22	23	4
Biochemical Oxygen Demand	17	27	45	8.7	7.8	11
Chemical Oxygen Demand	120	110	9	71	68	4
Total Organic Carbon	9	10	11	9.2	9.4	2
Chloride	21	21	0	24	23	4
Fluoride	ND	ND	N/A	0.075	0.074	1
MBAS	ND	ND	N/A	0.12	0.091	27
Oil and Grease	ND	ND	N/A	1.1	1.3	17
Total Ammonia (as N)	0.31	0.32	3	0.2	0.23	14
Total Kjeldahl Nitrogen	1.7	1.7	0	0.67	0.74	10
Nitrate (as N)	0.41	0.41	0	0.36	0.35	3
Nitrite (as N)	ND	ND	N/A	ND	ND	N/A
Total Orthophosphate (as P)	0.12	0.12	0	0.12	0.11	9
Total Phosphorus	0.74	0.64	14	0.35	0.38	8
Total Recoverable Phenolics	ND	ND	N/A	ND	ND	N/A
Total Dissolved Solids	82	78	5	86	87	1
Total Suspended Solids	230	230	0	110	87	23
Total Volatile Solids	55	54	2	30	26	14
Turbidity (NTU)	95	94	1	56	55	2
Dissolved Metals (µg/L)						
Aluminum	41	38	8	55	56	2
Arsenic	0.96	1	4	1.1	1	10
Cadmium	0.048	0.058	19	0.053	0.052	2
Chromium	1.4	1.4	0	1.4	1.3	7
Copper	6.4	6.2	3	7.2	6.9	4
Iron	66	62	6	81	80	1
Lead	0.8	0.78	3	0.89	0.87	2
Nickel	1.3	1.4	7	1.8	1.6	12
Selenium	ND	ND	N/A	ND	ND	N/A
Silver	ND	ND	N/A	ND	ND	N/A
Zinc	27	32	17	34	33	3
Total Metals (µg/L)						
Aluminum	5900	6200	5	3400	3100	9
Arsenic	3	3.3	10	2.6	2.4	8
Cadmium	0.88	0.89	1	0.56	0.51	9
Chromium	13	14	7	10	8.9	12
Copper	51	55	8	38	35	8
Iron	7400	7500	1	4700	4200	11
Lead	52	53	2	25	22	13
Nickel	11	13	17	8	7.2	11
Selenium	1.2	1.2	0	1	1	0
Silver	0.1	0.13	26	0.057	0.069	19
Zinc	350	380	8	240	210	13

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-05 03-Mar-2006			Storm-06 29-Mar-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Bacteria (MPN/100 ml)						
Enterococcus	12100	7400	48	16200	20600	24
Fecal Coliform	**50000**	**22000**	**78**	1700	2400	34
Total Coliform	**160000**	**300000**	**61**	50000	50000	0
Aroclors (µg/L)						
Aroclor 1016	ND	ND	N/A	ND	ND	N/A
Aroclor 1221	ND	ND	N/A	ND	ND	N/A
Aroclor 1232	ND	ND	N/A	ND	ND	N/A
Aroclor 1242	ND	ND	N/A	ND	ND	N/A
Aroclor 1248	ND	ND	N/A	ND	ND	N/A
Aroclor 1254	ND	ND	N/A	ND	ND	N/A
Aroclor 1260	ND	ND	N/A	ND	ND	N/A
Chlorinated Pesticides (µg/L)						
2,4'-DDD	ND	ND	N/A	ND	ND	N/A
2,4'-DDE	ND	ND	N/A	ND	ND	N/A
2,4'-DDT	ND	ND	N/A	ND	ND	N/A
4,4'-DDD	ND	ND	N/A	ND	ND	N/A
4,4'-DDE	ND	ND	N/A	ND	ND	N/A
4,4'-DDT	ND	ND	N/A	ND	ND	N/A
Total DDT	ND	ND	N/A	ND	ND	N/A
Aldrin	ND	ND	N/A	ND	ND	N/A
Dieldrin	ND	ND	N/A	ND	ND	N/A
Endrin	ND	ND	N/A	ND	ND	N/A
Endrin aldehyde	ND	ND	N/A	ND	ND	N/A
Endrin ketone	ND	ND	N/A	ND	ND	N/A
alpha-BHC	ND	ND	N/A	ND	ND	N/A
beta-BHC	ND	ND	N/A	ND	ND	N/A
delta-BHC	ND	ND	N/A	ND	ND	N/A
gamma-BHC (Lindane)	ND	ND	N/A	ND	ND	N/A
Endosulfan I	ND	ND	N/A	ND	ND	N/A
Endosulfan II	ND	ND	N/A	ND	ND	N/A
Endosulfan sulfate	ND	ND	N/A	ND	ND	N/A
alpha-Chlordane	ND	ND	N/A	0.0129	0.0091	35
gamma-Chlordane	ND	ND	N/A	**0.0209**	**0.0052**	**120**
Heptachlor	ND	ND	N/A	ND	ND	N/A
Heptachlor epoxide	ND	ND	N/A	ND	ND	N/A
Oxychlordane	ND	ND	N/A	ND	ND	N/A
cis-Nonachlor	ND	ND	N/A	ND	0.0018	N/A
trans-Nonachlor	ND	ND	N/A	**0.0122**	**0.0054**	**77**
Total Chlordane	ND	ND	N/A	**0.046**	**0.0215**	**73**
Methoxychlor	ND	ND	N/A	ND	ND	N/A
Mirex	ND	ND	N/A	ND	ND	N/A
Toxaphene	ND	ND	N/A	ND	ND	N/A

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-05 03-Mar-2006			Storm-06 29-Mar-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Organophosphates (µg/L)						
Bolstar (Sulprofos)	ND	ND	N/A	ND	ND	N/A
Chlorpyrifos	ND	ND	N/A	ND	ND	N/A
Demeton	ND	ND	N/A	ND	ND	N/A
Diazinon	ND	ND	N/A	ND	ND	N/A
Dichlorvos	ND	ND	N/A	ND	ND	N/A
Dimethoate	ND	ND	N/A	ND	ND	N/A
Disulfoton	ND	ND	N/A	ND	ND	N/A
Ethoprop	ND	ND	N/A	ND	ND	N/A
Fensulfothion	ND	ND	N/A	ND	ND	N/A
Fenthion	ND	ND	N/A	ND	ND	N/A
Malathion	**0.061**	**ND**	**N/A**	**0.130**	**ND**	**N/A**
Merphos	ND	ND	N/A	ND	ND	N/A
Methyl Parathion	ND	ND	N/A	ND	ND	N/A
Mevinphos	ND	ND	N/A	ND	ND	N/A
Phorate	ND	ND	N/A	ND	ND	N/A
Ronnel	ND	ND	N/A	ND	ND	N/A
Tetrachlorvinphos (Stirophos)	ND	ND	N/A	ND	ND	N/A
Tokuthion (Prothiofos)	ND	ND	N/A	ND	ND	N/A
Trichloronate	ND	ND	N/A	ND	ND	N/A
Triazines (µg/L)						
Ametryn	ND	ND	N/A	ND	ND	N/A
Atraton	ND	ND	N/A	ND	ND	N/A
Atrazine	ND	ND	N/A	ND	ND	N/A
Cyanazine	ND	ND	N/A	ND	ND	N/A
Prometon	0.034	0.026	27	ND	ND	N/A
Prometryn	ND	ND	N/A	ND	ND	N/A
Propazine	ND	ND	N/A	ND	ND	N/A
Secbumeton	ND	ND	N/A	ND	ND	N/A
Simazine	ND	ND	N/A	ND	ND	N/A
Simetryn	ND	ND	N/A	ND	ND	N/A
Terbutryn	ND	ND	N/A	ND	ND	N/A
Terbutylazine	ND	ND	N/A	ND	ND	N/A

ND – Analyte was no detected

N/A – RPD could not be calculated because one or both of the values was not-detected
- indicates field DUPlicate not available due to low water volume

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-02 11-May-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**
Conventionals (mg/L unless noted)			
Conductivity (umhos/cm)	890	890	0
Alkalinity as CaCO3	140	140	0
Hardness as CaCO3	140	140	0
Biochemical Oxygen Demand	34	30	13
Chemical Oxygen Demand	150	140	7
Total Organic Carbon	40	39	3
Chloride	120	120	0
Fluoride	0.62	0.62	0
MBAS	0.48	0.6	22
Oil and Grease	3.8	ND	N/A
Total Ammonia (as N)	ND	ND	N/A
Total Kjeldahl Nitrogen	4.3	4.5	5
Nitrate (as N)	ND	ND	N/A
Nitrite (as N)	ND	ND	N/A
Total Orthophosphate (as P)	0.013	ND	N/A
Total Phosphorus	0.33	0.32	3
Total Recoverable Phenolics	ND	ND	N/A
Total Dissolved Solids	570	580	2
Total Suspended Solids	71	72	1
Total Volatile Solids	32	37	14
Turbidity (NTU)	26	26	0
Dissolved Metals (µg/L)			
Aluminum	2.4	3.8	45
Arsenic	4.7	4.9	4
Cadmium	0.19	0.23	19
Chromium	0.76	0.67	13
Copper	14	15	7
Iron	34	38	11
Lead	0.94	1.1	16
Nickel	3.8	4.4	15
Selenium	1.2	1.6	29
Silver	ND	0.009	N/A
Zinc	16	19	17
Total Metals (µg/L)			
Aluminum	390	400	3
Arsenic	5.7	5.8	2
Cadmium	0.32	0.32	0
Chromium	1.8	1.5	18
Copper	22	22	0
Iron	540	560	4
Lead	3.3	3.6	9
Nickel	6.5	6.5	0
Selenium	1.6	1.4	13
Silver	0.025	0.022	13
Zinc	67	68	1

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-02 11-May-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**
Bacteria (MPN/100 ml)			
Enterococcus	5800	5400	7
Fecal Coliform	1600	1100	37
Total Coliform	**50000**	**22000**	**78**
Aroclors (µg/L)			
Aroclor 1016	ND	ND	N/A
Aroclor 1221	ND	ND	N/A
Aroclor 1232	ND	ND	N/A
Aroclor 1242	ND	ND	N/A
Aroclor 1248	ND	ND	N/A
Aroclor 1254	ND	ND	N/A
Aroclor 1260	ND	ND	N/A
Chlorinated Pesticides (µg/L)			
2,4'-DDD	ND	ND	N/A
2,4'-DDE	ND	ND	N/A
2,4'-DDT	ND	ND	N/A
4,4'-DDD	ND	ND	N/A
4,4'-DDE	ND	ND	N/A
4,4'-DDT	ND	ND	N/A
Total DDT	ND	ND	N/A
Aldrin	ND	ND	N/A
Dieldrin	ND	ND	N/A
Endrin	ND	ND	N/A
Endrin aldehyde	ND	ND	N/A
Endrin ketone	ND	ND	N/A
alpha-BHC	ND	ND	N/A
beta-BHC	ND	ND	N/A
delta-BHC	ND	ND	N/A
gamma-BHC (Lindane)	ND	ND	N/A
Endosulfan I	ND	ND	N/A
Endosulfan II	ND	ND	N/A
Endosulfan sulfate	ND	ND	N/A
alpha-Chlordane	ND	ND	N/A
gamma-Chlordane	ND	ND	N/A
Heptachlor	ND	ND	N/A
Heptachlor epoxide	ND	ND	N/A
Oxychlordane	ND	ND	N/A
cis-Nonachlor	ND	ND	N/A
trans-Nonachlor	ND	ND	N/A
Total Chlordane	ND	ND	N/A
Methoxychlor	ND	ND	N/A
Mirex	ND	ND	N/A
Toxaphene	ND	ND	N/A

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-02 11-May-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	ND	ND	N/A
Chlorpyrifos	ND	ND	N/A
Demeton	ND	ND	N/A
Diazinon	ND	ND	N/A
Dichlorvos	ND	ND	N/A
Dimethoate	ND	ND	N/A
Disulfoton	ND	ND	N/A
Ethoprop	ND	ND	N/A
Fensulfothion	ND	ND	N/A
Fenthion	ND	ND	N/A
Malathion	ND	ND	N/A
Merphos	ND	ND	N/A
Methyl Parathion	ND	ND	N/A
Mevinphos	ND	ND	N/A
Phorate	ND	ND	N/A
Ronnel	ND	ND	N/A
Tetrachlorvinphos (Stirophos)	ND	ND	N/A
Tokuthion (Prothiofos)	ND	ND	N/A
Trichloronate	ND	ND	N/A
Triazines (µg/L)			
Ametryn	ND	ND	N/A
Atraton	ND	ND	N/A
Atrazine	ND	ND	N/A
Cyanazine	ND	ND	N/A
Prometon	ND	ND	N/A
Prometryn	ND	ND	N/A
Propazine	ND	ND	N/A
Secbumeton	ND	ND	N/A
Simazine	ND	ND	N/A
Simetryn	ND	ND	N/A
Terbutryn	ND	ND	N/A
Terbutylazine	ND	ND	N/A

ND – Analyte was no detected

N/A – RPD could not be calculated because one or both of the values was not-detected
- indicates field Duplicate not available due to low water volume

Table A-4 Method Blank Summary for All Sampling Events

Analytical Parameter	Dry-01 18-Aug-05	Storm-01 18-Oct-05	Storm-02 02-Jan-06	Storm-03 19-Feb-06	Storm-04 28-Feb-06
Conventionals (mg/L unless noted)					
Conductivity (umhos/cm)	1U	1U	1U	1U	1U
Alkalinity as CaCO3	1U	1U	1U	1U	1U
Hardness as CaCO3	1U	1U	1U	1U	1U
Biochemical Oxygen Demand	2U	2U	2U	2U	2U
Chemical Oxygen Demand	4U	4U	4U	4U	4U
Total Organic Carbon	1U	1U	1U	1U	1U
Chloride	1U	1U	1U	1U	1U
Fluoride	0.1U	0.1U	0.1U	0.1U	0.1U
MBAS	0.025U	0.025U	0.025U	0.025U	0.025U
Oil and Grease	5U	5U	5U	-	5U
Total Ammonia (as N)	0.1U	0.1U	0.1U	0.1U	0.1U
Total Kjeldahl Nitrogen	0.1U	0.1U	0.1U	**0.18**	**0.12**
Nitrate (as N)	0.1U	0.1U	0.1U	0.1U	0.1U
Nitrite (as N)	0.1U	0.1U	0.1U	0.1U	0.1U
Total Orthophosphate (as P)	0.001U	0.001U	0.001U	0.001U	0.001U
Total Phosphorus	0.03U	0.03U	0.03U	0.03U	0.03U
Total Recoverable Phenolics	0.1U	0.1U	0.1U	0.1U	0.1U
Total Dissolved Solids	10U	10U	10U	10U	10U
Total Suspended Solids	1U	1U	1U	1U	1U
Total Volatile Solids	-	10U	10U	10U	10U
Turbidity (NTU)	0.1U	0.1U	0.1U	0.1U	0.1U
Dissolved Metals (µg/L)					
Aluminum	50U	-	25U	25U	25U
Arsenic	1U	-	0.5U	0.5U	0.5U
Cadmium	0.2U	-	0.2U	0.2U	0.2U
Chromium	-	-	0.5U	0.5U	0.5U
Copper	1U	-	0.5U	0.5U	0.5U
Iron	25U	-	25U	25U	25U
Lead	0.5U	-	0.2U	0.2U	0.2U
Nickel	1U	-	0.5U	0.5U	0.5U
Selenium	-	-	1U	1U	1U
Silver	0.2U	-	0.5U	0.5U	0.5U
Zinc	1U	-	1U	1U	1U
Total Metals (µg/L)					
Aluminum	25U	5U	25U	25U	25U
Arsenic	1U	1U	0.5U	0.5U	0.5U
Cadmium	0.2U	0.0271J	0.2U	0.2U	0.2U
Chromium	0.01U	**2.18**	0.5U	0.5U	0.5U
Copper	1U	0.185J	0.5U	0.5U	0.5U
Iron	25U	-	25U	25U	25U
Lead	0.5U	0.0457J	0.2U	0.2U	0.2U
Nickel	1U	0.29J	0.5U	0.5U	0.5U
Selenium	1U	1U	1U	1U	1U
Silver	0.2U	**0.235**	0.5U	0.5U	0.5U
Zinc	1U	**3.13**	1U	1U	1U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Dry-01 18-Aug-05	Storm-01 18-Oct-05	Storm-02 02-Jan-06	Storm-03 19-Feb-06	Storm-04 28-Feb-06
Chlorinated Pesticides (µg/L)					
2,4'-DDD	0.005U	0.005U	0.005U	0.005U	0.005U
2,4'-DDE	0.005U	0.005U	0.005U	0.005U	0.005U
2,4'-DDT	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDD	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDE	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDT	0.005U	0.005U	0.005U	0.005U	0.005U
Aldrin	0.005U	0.005U	0.005U	0.005U	0.005U
Dieldrin	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin aldehyde	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin ketone	0.005U	0.005U	0.005U	0.005U	0.005U
alpha-BHC	0.005U	0.005U	0.005U	0.005U	0.005U
beta-BHC	0.005U	0.005U	0.005U	0.005U	0.005U
delta-BHC	0.005U	0.005U	0.005U	0.005U	0.005U
gamma-BHC (Lindane)	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan I	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan II	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan sulfate	0.005U	0.005U	0.005U	0.005U	0.005U
alpha-Chlordane	0.005U	0.005U	0.005U	0.005U	0.005U
gamma-Chlordane	0.005U	0.005U	0.005U	0.005U	0.005U
Heptachlor	0.005U	0.005U	0.005U	0.005U	0.005U
Heptachlor epoxide	0.005U	0.005U	0.005U	0.005U	0.005U
Oxychlordane	0.005U	0.005U	0.005U	0.005U	0.005U
cis-Nonachlor	0.005U	0.005U	0.005U	0.005U	0.005U
trans-Nonachlor	0.005U	0.005U	0.005U	0.005U	0.005U
Methoxychlor	0.005U	0.005U	0.005U	0.005U	0.005U
Mirex	0.005U	0.005U	0.005U	0.005U	0.005U
Toxaphene	0.05U	0.05U	0.05U	0.05U	0.05U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Dry-01 18-Aug-05	Storm-01 18-Oct-05	Storm-02 02-Jan-06	Storm-03 19-Feb-06	Storm-04 28-Feb-06
Organophosphates (µg/L)					
Bolstar (Sulprofos)	0.02U	0.02U	0.02U	0.02U	0.02U
Chlorpyrifos	0.01U	0.01U	0.01U	0.01U	0.01U
Demeton	0.02U	0.02U	0.02U	0.02U	0.02U
Diazinon	0.01U	0.01U	0.01U	0.01U	0.01U
Dichlorvos	0.02U	0.02U	0.02U	0.02U	0.02U
Dimethoate	0.01U	0.01U	0.01U	0.01U	0.01U
Disulfoton	0.02U	0.02U	0.02U	0.02U	0.02U
Ethoprop	0.02U	0.02U	0.02U	0.02U	0.02U
Fensulfothion	0.02U	0.02U	0.02U	0.02U	0.02U
Fenthion	0.02U	0.02U	0.02U	0.02U	0.02U
Malathion	0.01U	0.01U	0.01U	0.01U	0.01U
Merphos	0.02U	0.02U	0.02U	0.02U	0.02U
Methyl Parathion	0.02U	0.02U	0.02U	0.02U	0.02U
Mevinphos	0.02U	0.02U	0.02U	0.02U	0.02U
Phorate	0.02U	0.02U	0.02U	0.02U	0.02U
Ronnel	0.02U	0.02U	0.02U	0.02U	0.02U
Tetrachlorvinphos (Stirophos)	0.02U	0.02U	0.02U	0.02U	0.02U
Tokuthion (Prothiofos)	0.02U	0.02U	0.02U	0.02U	0.02U
Trichloronate	0.02U	0.02U	0.02U	0.02U	0.02U
Triazines (µg/L)					
Ametryn	0.01U	0.01U	0.01U	0.01U	0.01U
Atraton	-	0.01U	0.01U	0.01U	0.01U
Atrazine	-	0.01U	0.01U	0.01U	0.01U
Cyanazine	-	0.01U	0.01U	0.01U	0.01U
Prometon	-	0.01U	0.01U	0.01U	0.01U
Prometryn	-	0.01U	0.01U	0.01U	0.01U
Propazine	-	0.01U	0.01U	0.01U	0.01U
Secbumeton	-	0.01U	0.01U	0.01U	0.01U
Simazine	-	0.01U	0.01U	0.01U	0.01U
Simetryn	-	0.01U	0.01U	0.01U	0.01U
Terbutryn	-	0.01U	0.01U	0.01U	0.01U
Terbutylazine	-	0.01U	0.01U	0.01U	0.01U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Dry-01 18-Aug-05	Storm-01 18-Oct-05	Storm-02 02-Jan-06	Storm-03 19-Feb-06	Storm-04 28-Feb-06
PCB Congeners (µg/L)					
PCB018	0.005U	0.005U	0.005U	0.005U	0.005U
PCB028	0.005U	0.005U	0.005U	0.005U	0.005U
PCB031	0.005U	0.005U	0.005U	0.005U	0.005U
PCB033	0.005U	0.005U	0.005U	0.005U	0.005U
PCB037	0.005U	0.005U	0.005U	0.005U	0.005U
PCB044	0.005U	0.005U	0.005U	0.005U	0.005U
PCB049	0.005U	0.005U	0.005U	0.005U	0.005U
PCB052	0.005U	0.005U	0.005U	0.005U	0.005U
PCB066	0.005U	0.005U	0.005U	0.005U	0.005U
PCB070	0.005U	0.005U	0.005U	0.005U	0.005U
PCB074	0.005U	0.005U	0.005U	0.005U	0.005U
PCB077	0.005U	0.005U	0.005U	0.005U	0.005U
PCB081	0.005U	0.005U	0.005U	0.005U	0.005U
PCB087	0.005U	0.005U	0.005U	0.005U	0.005U
PCB095	0.005U	0.005U	0.005U	0.005U	0.005U
PCB097	0.005U	0.005U	0.005U	0.005U	0.005U
PCB099	0.005U	0.005U	0.005U	0.005U	0.005U
PCB101	0.005U	0.005U	0.005U	0.005U	0.005U
PCB105	0.005U	0.005U	0.005U	0.005U	0.005U
PCB110	0.005U	0.005U	0.005U	0.005U	0.005U
PCB114	0.005U	0.005U	0.005U	0.005U	0.005U
PCB118	0.005U	0.005U	0.005U	0.005U	0.005U
PCB119	0.005U	0.005U	0.005U	0.005U	0.005U
PCB123	0.005U	0.005U	0.005U	0.005U	0.005U
PCB126	0.005U	0.005U	0.005U	0.005U	0.005U
PCB128+167	0.005U	0.005U	0.005U	0.005U	0.005U
PCB138	0.005U	0.005U	0.005U	0.005U	0.005U
PCB141	0.005U	0.005U	0.005U	0.005U	0.005U
PCB149	0.005U	0.005U	0.005U	0.005U	0.005U
PCB151	0.005U	0.005U	0.005U	0.005U	0.005U
PCB153	0.005U	0.005U	0.005U	0.005U	0.005U
PCB156	0.005U	0.005U	0.005U	0.005U	0.005U
PCB157	0.005U	0.005U	0.005U	0.005U	0.005U
PCB158	0.005U	0.005U	0.005U	0.005U	0.005U
PCB168+132	0.005U	0.005U	0.005U	0.005U	0.005U
PCB169	0.005U	0.005U	0.005U	0.005U	0.005U
PCB170	0.005U	0.005U	0.005U	-	0.005U
PCB177	0.005U	0.005U	0.005U	0.005U	0.005U
PCB180	0.005U	0.005U	0.005U	0.005U	0.005U
PCB183	0.005U	0.005U	0.005U	0.005U	0.005U
PCB187	0.005U	0.005U	0.005U	0.005U	0.005U
PCB189	0.005U	0.005U	0.005U	-	0.005U
PCB194	0.005U	0.005U	0.005U	-	0.005U
PCB200	0.005U	0.005U	0.005U	0.005U	0.005U
PCB201	0.005U	0.005U	0.005U	-	0.005U
PCB206	0.005U	0.005U	0.005U	-	0.005U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-05 3-Mar-06	Storm-06 29-Mar-06	Storm-07 5-Apr-06	Storm-08 15-Apr-06	Dry-02 11-May-06
Conventionals (mg/L unless noted)					
Conductivity (umhos/cm)	1U	1U	1U	-	1U
Alkalinity as CaCO3	1U	1U	1U	-	1U
Hardness as CaCO3	1U	1U	1U	-	1U
Biochemical Oxygen Demand	2U	2U	2U	-	2U
Chemical Oxygen Demand	4U	4U	4U	-	4U
Total Organic Carbon	1U	1U	1U	-	1U
Chloride	1U	1U	1U	-	1U
Fluoride	0.1U	0.1U	0.1U	-	0.1U
MBAS	0.025U	0.025U	0.025U	-	0.025U
Oil and Grease	5U	5U	5U	-	-
Total Ammonia (as N)	0.1U	0.1U	0.1U	-	0.1U
Total Kjeldahl Nitrogen	0.1U	0.1U	0.1U	-	0.1U
Nitrate (as N)	0.1U	0.1U	0.1U	-	0.1U
Nitrite (as N)	0.1U	0.1U	0.1U	-	0.1U
Total Orthophosphate (as P)	0.001U	0.001U	0.001U	-	0.001U
Total Phosphorus	0.03U	0.03U	0.03U	-	0.03U
Total Recoverable Phenolics	0.1U	0.1U	0.1U	-	0.1U
Total Dissolved Solids	10U	10U	10U	-	10U
Total Suspended Solids	1U	1U	1U	5U	1U
Total Volatile Solids	10U	10U	10U	-	10U
Turbidity (NTU)	0.1U	0.1U	0.1U	-	0.1U
Dissolved Metals (µg/L)					
Aluminum	25U	25U	25U	-	25U
Arsenic	0.057J	0.057J	0.057J	-	0.5U
Cadmium	0.2U	0.2U	0.2U	-	0.2U
Chromium	0.09J	0.09J	0.09J	-	0.058J
Copper	0.5U	0.5U	0.5U	-	0.5U
Iron	25U	25U	25U	-	25U
Lead	0.02J	0.02J	0.02J	-	0.066J
Nickel	0.5U	0.5U	0.5U	-	0.5U
Selenium	1U	1U	1U	-	1U
Silver	0.2U	0.2U	0.2U	-	0.2U
Zinc	0.52J	0.52J	0.52J	-	0.39J
Total Metals (µg/L)					
Aluminum	25U	25U	25U	-	25U
Arsenic	0.5U	0.5U	0.5U	-	0.5U
Cadmium	0.2U	0.2U	0.2U	-	0.2U
Chromium	0.049J	0.049J	0.049J	-	0.5U
Copper	0.5U	0.5U	0.5U	-	0.5U
Iron	25U	25U	25U	-	25U
Lead	0.029J	0.029J	0.029J	-	0.2U
Nickel	0.5U	0.5U	0.5U	-	0.5U
Selenium	1U	1U	1U	-	1U
Silver	0.2U	0.2U	0.2U	-	0.2U
Zinc	1U	1U	1U	-	1U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-05 3-Mar-06	Storm-06 29-Mar-06	Storm-07 5-Apr-06	Dry-02 11-May-06
Chlorinated Pesticides (µg/L)				
2,4'-DDD	0.005U	0.005U	0.005U	0.005U
2,4'-DDE	0.005U	0.005U	0.005U	0.005U
2,4'-DDT	0.005U	0.005U	0.005U	0.005U
4,4'-DDD	0.005U	0.005U	0.005U	0.005U
4,4'-DDE	0.005U	0.005U	0.005U	0.005U
4,4'-DDT	0.005U	0.005U	0.005U	0.005U
Aldrin	0.005U	0.005U	0.005U	0.005U
Dieldrin	0.005U	0.005U	0.005U	0.005U
Endrin	0.005U	0.005U	0.005U	0.005U
Endrin aldehyde	0.005U	0.005U	0.005U	0.005U
Endrin ketone	0.005U	0.005U	0.005U	0.005U
alpha-BHC	0.005U	0.005U	0.005U	0.005U
beta-BHC	0.005U	0.005U	0.005U	0.005U
delta-BHC	0.005U	0.005U	0.005U	0.005U
gamma-BHC (Lindane)	0.005U	0.005U	0.005U	0.005U
Endosulfan I	0.005U	0.005U	0.005U	0.005U
Endosulfan II	0.005U	0.005U	0.005U	0.005U
Endosulfan sulfate	0.005U	0.005U	0.005U	0.005U
alpha-Chlordane	0.005U	0.005U	0.005U	0.005U
gamma-Chlordane	0.005U	0.005U	0.005U	0.005U
Heptachlor	0.005U	0.005U	0.005U	0.005U
Heptachlor epoxide	0.005U	0.005U	0.005U	0.005U
Oxychlordane	0.005U	0.005U	0.005U	0.005U
cis-Nonachlor	0.005U	0.005U	0.005U	0.005U
trans-Nonachlor	0.005U	0.005U	0.005U	0.005U
Methoxychlor	0.005U	0.005U	0.005U	0.005U
Mirex	0.005U	0.005U	0.005U	0.005U
Toxaphene	0.05U	0.05U	0.05U	0.05U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-05 3-Mar-06	Storm-06 29-Mar-06	Storm-07 5-Apr-06	Dry-02 11-May-06
Organophosphates (µg/L)				
Bolstar (Sulprofos)	0.004U	0.004U	0.004U	0.004U
Chlorpyrifos	0.002U	0.002U	0.002U	0.002U
Demeton	0.002U	0.002U	0.002U	0.002U
Diazinon	0.004U	0.004U	0.004U	0.004U
Dichlorvos	0.006U	0.006U	0.006U	0.006U
Dimethoate	0.006U	0.006U	0.006U	0.006U
Disulfoton	0.002U	0.002U	0.002U	0.002U
Ethoprop	0.002U	0.002U	0.002U	0.002U
Fensulfothion	0.002U	0.002U	0.002U	0.002U
Fenthion	0.004U	0.004U	0.004U	0.004U
Malathion	0.006U	0.006U	0.006U	0.006U
Merphos	0.002U	0.002U	0.002U	0.002U
Methyl Parathion	0.002U	0.002U	0.002U	0.002U
Mevinphos	0.016U	0.016U	0.016U	0.016U
Phorate	0.012U	0.012U	0.012U	0.012U
Ronnel	0.004U	0.004U	0.004U	0.004U
Tetrachlorvinphos (Stirophos)	0.004U	0.004U	0.004U	0.004U
Tokuthion (Prothiofos)	0.006U	0.006U	0.006U	0.006U
Trichloronate	0.002U	0.002U	0.002U	0.002U
Triazines (µg/L)				
Ametryn	0.01U	0.01U	0.01U	0.01U
Atraton	0.01U	0.01U	0.01U	0.01U
Atrazine	0.01U	0.01U	0.01U	0.01U
Cyanazine	0.01U	0.01U	0.01U	0.01U
Prometon	0.01U	0.01U	0.01U	0.01U
Prometryn	0.01U	0.01U	0.01U	0.01U
Propazine	0.01U	0.01U	0.01U	0.01U
Secbumeton	0.01U	0.01U	0.01U	0.01U
Simazine	0.01U	0.01U	0.01U	0.01U
Simetryn	0.01U	0.01U	0.01U	0.01U
Terbutryn	0.01U	0.01U	0.01U	0.01U
Terbutylazine	0.01U	0.01U	0.01U	0.01U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

	Storm-05	Storm-06	Storm-07	Dry-02
Analytical Parameter	**3-Mar-06**	**29-Mar-06**	**5-Apr-06**	**11-May-06**
PCB Congeners (µg/L)				
PCB018	0.005U	0.005U	0.005U	0.005U
PCB028	0.005U	0.005U	0.005U	0.005U
PCB031	0.005U	0.005U	0.005U	0.005U
PCB033	0.005U	0.005U	0.005U	0.005U
PCB037	0.005U	0.005U	0.005U	0.005U
PCB044	0.005U	0.005U	0.005U	0.005U
PCB049	0.005U	0.005U	0.005U	0.005U
PCB052	0.005U	0.005U	0.005U	0.005U
PCB066	0.005U	0.005U	0.005U	0.005U
PCB070	0.005U	0.005U	0.005U	0.005U
PCB074	0.005U	0.005U	0.005U	0.005U
PCB077	0.005U	0.005U	0.005U	0.005U
PCB081	0.005U	0.005U	0.005U	0.005U
PCB087	0.005U	0.005U	0.005U	0.005U
PCB095	0.005U	0.005U	0.005U	0.005U
PCB097	0.005U	0.005U	0.005U	0.005U
PCB099	0.005U	0.005U	0.005U	0.005U
PCB101	0.005U	0.005U	0.005U	0.005U
PCB105	0.005U	0.005U	0.005U	0.005U
PCB110	0.005U	0.005U	0.005U	0.005U
PCB114	0.005U	0.005U	0.005U	0.005U
PCB118	0.005U	0.005U	0.005U	0.005U
PCB119	0.005U	0.005U	0.005U	0.005U
PCB123	0.005U	0.005U	0.005U	0.005U
PCB126	0.005U	0.005U	0.005U	0.005U
PCB128+167	0.005U	0.005U	0.005U	0.005U
PCB138	0.005U	0.005U	0.005U	0.005U
PCB141	0.005U	0.005U	0.005U	0.005U
PCB149	0.005U	0.005U	0.005U	0.005U
PCB151	0.005U	0.005U	0.005U	0.005U
PCB153	0.005U	0.005U	0.005U	0.005U
PCB156	0.005U	0.005U	0.005U	0.005U
PCB157	0.005U	0.005U	0.005U	0.005U
PCB158	0.005U	0.005U	0.005U	0.005U
PCB168+132	0.005U	0.005U	0.005U	0.005U
PCB169	0.005U	0.005U	0.005U	0.005U
PCB170	0.005U	0.005U	0.005U	0.005U
PCB177	0.005U	0.005U	0.005U	0.005U
PCB180	0.005U	0.005U	0.005U	0.005U
PCB183	0.005U	0.005U	0.005U	0.005U
PCB187	0.005U	0.005U	0.005U	0.005U
PCB189	0.005U	0.005U	0.005U	0.005U
PCB194	0.005U	0.005U	0.005U	0.005U
PCB200	0.005U	0.005U	0.005U	0.005U
PCB201	0.005U	0.005U	0.005U	0.005U
PCB206	0.005U	0.005U	0.005U	0.005U

Table A-5 Laboratory Duplicate Summary for All Sampling Events

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	2230	2200	1.4	27700	27700	0
Alkalinity as CaCO3	140	141	0.7	49	49	0
Hardness as CaCO3	265	270	1.9	386	386	0
Biochemical Oxygen Demand	4.1	4.4	7.1	35.3	30	16.2
Chemical Oxygen Demand	204	210	2.9	173.9	170	2.3
Total Organic Carbon	33.3	35	5.0	1U	1U	N/A
Chloride	584	580	0.7	30.1	30	0.3
Fluoride	0.71	0.7	1.4	0.26	0.25	3.9
MBAS	0.025U	0.025U	N/A	0.06	0.055	8.7
Oil and Grease	5U	5U	N/A	5U	5U	N/A
Total Ammonia (as N)	0.1U	0.1U	N/A	0.575	0.549	4.6
Total Kjeldahl Nitrogen	3.96	3.4	15.2	2.16	2.26	4.5
Nitrate (as N)	0.1U	0.1U	N/A	1.44	1.4	2.8
Nitrite (as N)	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Orthophosphate (as P)	0.016	0.016	0	0.523	0.51	2.5
Total Phosphorus	0.264	0.26	1.5	0.508	0.543	6.7
Total Recoverable Phenolics	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Dissolved Solids	1293	1300	0.5	152	150	1.3
Total Suspended Solids	41.6	44	5.6	12	13.2	9.5
Total Volatile Solids	-	-	N/A	176	170	3.5
Turbidity (NTU)	21.8	22	0.9	104	100	3.9
Dissolved Metals (µg/L)						
Aluminum	50U	50U	N/A	100U	100U	N/A
Arsenic	7.69	8	4.0	1.43	1.4	2.1
Cadmium	0.2U	0.12J	N/A	0.2U	0.2U	N/A
Chromium	0.23	0.23	0	0.726	0.64	12.6
Copper	8.77	8	9.2	1.9	1.9	0
Iron	25U	25U	N/A	144	140	2.8
Lead	0.5U	0.35J	N/A	0.5U	0.1J	N/A
Nickel	1U	1U	N/A	1U	0.68J	N/A
Selenium	1U	0.11J	N/A	1U	1U	N/A
Silver	0.2U	0.061J	N/A	0.2U	0.2U	N/A
Zinc	11.8	12	1.7	**1U**	**2.7**	**N/A**
Total Metals (µg/L)						
Aluminum	25U	14J	N/A	5U	9	N/A
Arsenic	1U	1U	N/A	1U	1U	N/A
Cadmium	0.2U	0.2U	N/A	0.2U	0.032J	N/A
Chromium	0.37	0.36	2.7	1.35	1.4	3.6
Copper	**14.1**	**1U**	**N/A**	0.98	1.3	28.1
Iron	150	160	6.5	7370	7400	0.4
Lead	0.5U	0.5U	N/A	0.5U	0.2J	N/A
Nickel	1U	1U	N/A	1U	0.62J	N/A
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	0.2U	0.044J	N/A	0.2U	0.2U	N/A
Zinc	2.55	2.6	1.9	**2.71**	**4.2**	**43.1**

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**R1**	**R2**	**RPD**
Chlorinated Pesticides (µg/L)			
2,4'-DDD	0.005U	0.005U	N/A
2,4'-DDE	0.005U	0.005U	N/A
2,4'-DDT	0.005U	0.005U	N/A
4,4'-DDD	0.005U	0.005U	N/A
4,4'-DDE	0.005U	0.005U	N/A
4,4'-DDT	0.005U	0.005U	N/A
Aldrin	0.005U	0.005U	N/A
Dieldrin	0.005U	0.005U	N/A
Endrin	0.005U	0.005U	N/A
Endrin aldehyde	0.005U	0.005U	N/A
Endrin ketone	0.005U	0.005U	N/A
alpha-BHC	0.005U	0.005U	N/A
beta-BHC	0.005U	0.005U	N/A
delta-BHC	0.005U	0.005U	N/A
gamma-BHC (Lindane)	0.005U	0.005U	N/A
Endosulfan I	0.005U	0.005U	N/A
Endosulfan II	0.005U	0.005U	N/A
Endosulfan sulfate	0.005U	0.005U	N/A
alpha-Chlordane	0.005U	0.005U	N/A
gamma-Chlordane	0.005U	0.005U	N/A
Heptachlor	0.005U	0.005U	N/A
Heptachlor epoxide	0.005U	0.005U	N/A
Oxychlordane	0.005U	0.005U	N/A
cis-Nonachlor	0.005U	0.005U	N/A
trans-Nonachlor	0.005U	0.005U	N/A
Methoxychlor	0.005U	0.005U	N/A
Mirex	0.005U	0.005U	N/A
Toxaphene	0.05U	0.05U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**R1**	**R2**	**RPD**
Organophosphates(µg/L			
Bolstar (Sulprofos)	0.02U	0.02U	N/A
Chlorpyrifos	0.01U	0.01U	N/A
Demeton	0.02U	0.02U	N/A
Diazinon	0.01U	0.01U	N/A
Dichlorvos	0.02U	0.02U	N/A
Dimethoate	0.01U	0.01U	N/A
Disulfoton	0.02U	0.02U	N/A
Ethoprop	0.02U	0.02U	N/A
Fensulfothion	0.02U	0.02U	N/A
Fenthion	0.02U	0.02U	N/A
Malathion	0.01U	0.01U	N/A
Merphos	0.02U	0.02U	N/A
Methyl Parathion	0.02U	0.02U	N/A
Mevinphos	0.02U	0.02U	N/A
Phorate	0.02U	0.02U	N/A
Ronnel	0.02U	0.02U	N/A
Tetrachlorvinphos (Stirophos)	0.02U	0.02U	N/A
Tokuthion (Prothiofos)	0.02U	0.02U	N/A
Trichloronate	0.02U	0.02U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**R1**	**R2**	**RPD**
PCB Congeners (µg/L)			
PCB018	0.005U	0.005U	N/A
PCB028	0.005U	0.005U	N/A
PCB031	0.005U	0.005U	N/A
PCB033	0.005U	0.005U	N/A
PCB037	0.005U	0.005U	N/A
PCB044	0.005U	0.005U	N/A
PCB049	0.005U	0.005U	N/A
PCB052	0.005U	0.005U	N/A
PCB066	0.005U	0.005U	N/A
PCB070	0.005U	0.005U	N/A
PCB074	0.005U	0.005U	N/A
PCB077	0.005U	0.005U	N/A
PCB081	0.005U	0.005U	N/A
PCB087	0.005U	0.005U	N/A
PCB095	0.005U	0.005U	N/A
PCB097	0.005U	0.005U	N/A
PCB099	0.005U	0.005U	N/A
PCB101	0.005U	0.005U	N/A
PCB105	0.005U	0.005U	N/A
PCB110	0.005U	0.005U	N/A
PCB114	0.005U	0.005U	N/A
PCB118	0.005U	0.005U	N/A
PCB119	0.005U	0.005U	N/A
PCB123	0.005U	0.005U	N/A
PCB126	0.005U	0.005U	N/A
PCB128+167	0.005U	0.005U	N/A
PCB138	0.005U	0.005U	N/A
PCB141	0.005U	0.005U	N/A
PCB149	0.005U	0.005U	N/A
PCB151	0.005U	0.005U	N/A
PCB153	0.005U	0.005U	N/A
PCB156	0.005U	0.005U	N/A
PCB157	0.005U	0.005U	N/A
PCB158	0.005U	0.005U	N/A
PCB168+132	0.005U	0.005U	N/A
PCB169	0.005U	0.005U	N/A
PCB170	0.005U	0.005U	N/A
PCB177	0.005U	0.005U	N/A
PCB180	0.005U	0.005U	N/A
PCB183	0.005U	0.005U	N/A
PCB187	0.005U	0.005U	N/A
PCB189	0.005U	0.005U	N/A
PCB194	0.005U	0.005U	N/A
PCB200	0.005U	0.005U	N/A
PCB201	0.005U	0.005U	N/A
PCB206	0.005U	0.005U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-02 02-Jan-2006			Storm-03 19-Feb-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	248	240	3.3	137	140	2.2
Alkalinity as CaCO3	35	35	0	60.5	61	0.8
Hardness as CaCO3	25	24.8	0.8	23	23	0
Biochemical Oxygen Demand	12.3	11	11.2	37	33	11.4
Chemical Oxygen Demand	91.5	89	2.8	167.4	170	1.5
Total Organic Carbon	16	16	0	11.8	10	16.5
Chloride	58.93	59	0.1	75.1	79	5.1
Fluoride	0.153	0.15	2.0	0.36	0.31	14.9
MBAS	0.1U	0.1U	N/A	0.566	0.594	4.8
Oil and Grease	5U	5U	N/A	-	-	-
Total Ammonia (as N)	0.963	0.949	1.5	0.332	0.342	3.0
Total Kjeldahl Nitrogen	2.63	2.29	13.8	2.53	2.41	4.9
Nitrate (as N)	0.871	0.88	1.0	2.11	2.1	0.5
Nitrite (as N)	0.1U	0.1U	N/A	0.105	0.1U	N/A
Total Orthophosphate (as P)	0.199	0.2	0.5	0.253	0.25	1.2
Total Phosphorus	1.44	1.59	9.9	0.071	0.071	0
Total Recoverable Phenolics	0.1U	0.1U	N/A	0.1U	0.1J	N/A
Total Dissolved Solids	87	88	1.1	345	340	1.5
Total Suspended Solids	87	90	3.4	78	78.7	0.9
Total Volatile Solids	24	28	15.4	66	73	10.1
Turbidity (NTU)	62	60	3.3	72	76	5.4
Dissolved Metals (µg/L)						
Aluminum	25U	25U	N/A	452	460	1.8
Arsenic	0.628	0.67	6.5	1.27	1.3	2.3
Cadmium	0.2U	0.2U	N/A	0.2U	0.12J	N/A
Chromium	0.5U	0.5U	N/A	1.39	1.4	0.7
Copper	1.84	1.81	1.6	6.8	6.9	1.5
Iron	59.3	60	1.2	199	200	0.5
Lead	0.2U	0.2U	N/A	0.915	0.92	0.5
Nickel	2.23	2.23	0	1.68	1.7	1.2
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	0.5U	0.5U	N/A	0.2U	0.2U	N/A
Zinc	2.62	2.42	7.9	52.18	53	1.6
Total Metals (µg/L)						
Aluminum	5.28U	25J	N/A	10940	10770	1.6
Arsenic	4.13	4.21	1.9	4.59	4.6	0.2
Cadmium	0.2U	0.2U	N/A	1.29	1.3	0.8
Chromium	5.28	5.53	4.6	13.45	13	3.4
Copper	0.623	0.68	8.7	109.7	110	0.3
Iron	147	157	6.6	6870	7000	1.9
Lead	0.2U	0.2U	N/A	49.31	51	3.4
Nickel	2.27	2.46	8.0	18.72	18	3.9
Selenium	8.3	8.42	1.4	1U	0.76U	N/A
Silver	0.5U	0.5U	N/A	0.203	0.23	12.5
Zinc	1U	1U	N/A	629.8	620	1.6

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006			Storm-05 03-Mar-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	145	140	3.5	61	62	1.6
Alkalinity as CaCO3	19.7	20	1.5	25.2	25	0.8
Hardness as CaCO3	23	23	0	23	23	0
Biochemical Oxygen Demand	9.75	8.9	9.1	19	18	5.4
Chemical Oxygen Demand	167.4	170	1.5	167.4	170	1.5
Total Organic Carbon	11.8	10	16.5	11.8	10	16.5
Chloride	7.94	7.7	3.1	3.44	3.4	1.2
Fluoride	0.1U	0.059J	N/A	0.1U	0.1U	N/A
MBAS	0.025U	0.2U	N/A	0.1U	0.1U	N/A
Oil and Grease	5U	2.4J	N/A	5U	5U	N/A
Total Ammonia (as N)	0.456	0.436	4.5	0.366	0.39	6.3
Total Kjeldahl Nitrogen	1.38	1.63	16.6	1.78	1.8	1.1
Nitrate (as N)	0.563	0.56	0.5	0.353	0.36	2.0
Nitrite (as N)	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Orthophosphate (as P)	0.107	0.105	1.9	0.113	0.12	6.0
Total Phosphorus	0.201	0.213	5.8	0.182	0.161	12.2
Total Recoverable Phenolics	0.1U	0.1J	N/A	0.1U	0.1J	N/A
Total Dissolved Solids	55	55	0	55	55	0
Total Suspended Solids	23	21.75	5.6	-	-	-
Total Volatile Solids	59	61	3.3	59	61	3.3
Turbidity (NTU)	61	62	1.6	186	190	2.1
Dissolved Metals (µg/L)						
Aluminum	452	460	1.8	26.46	28	5.7
Arsenic	1.27	1.3	2.3	1.15	1.2	4.3
Cadmium	0.2U	0.12J	N/A	0.026	0.031	17.5
Chromium	1.39	1.4	0.7	0.766	0.74	3.5
Copper	6.8	6.9	1.5	8.96	8.7	2.9
Iron	199	200	0.5	199	200	0.5
Lead	0.915	0.92	0.5	0.675	0.67	0.7
Nickel	1.68	1.7	1.2	1.79	1.7	5.2
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	0.2U	0.2U	N/A	0.2U	0.2U	N/A
Zinc	52.18	53	1.6	43.23	42	2.9
Total Metals (µg/L)						
Aluminum	10940	10770	1.6	654	663	1.4
Arsenic	4.59	4.6	0.2	1.72	1.68	2.4
Cadmium	1.29	1.3	0.8	0.11	0.117	6.2
Chromium	13.45	13	3.4	1.82	1.83	0.5
Copper	109.7	110	0.3	11.5	11.2	2.6
Iron	4010	3980	0.8	4010	3980	0.8
Lead	49.31	51	3.4	5.29	3.52	40.2
Nickel	18.72	18	3.9	2.87	2.75	4.3
Selenium	1U	0.76U	N/A	1U	1U	N/A
Silver	0.203	0.23	12.5	0.027	0.019	34.8
Zinc	629.8	620	1.6	53.62	51.95	3.2

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Chlorinated Pesticides (µg/L)			
2,4'-DDD	0.005U	0.005U	N/A
2,4'-DDE	0.005U	0.005U	N/A
2,4'-DDT	0.005U	0.005U	N/A
4,4'-DDD	0.005U	0.005U	N/A
4,4'-DDE	0.005U	0.005U	N/A
4,4'-DDT	0.005U	0.005U	N/A
Aldrin	0.005U	0.005U	N/A
Dieldrin	0.005U	0.005U	N/A
Endrin	0.005U	0.005U	N/A
Endrin aldehyde	0.005U	0.005U	N/A
Endrin ketone	0.005U	0.005U	N/A
alpha-BHC	0.005U	0.005U	N/A
beta-BHC	0.005U	0.005U	N/A
delta-BHC	0.005U	0.005U	N/A
gamma-BHC (Lindane)	0.005U	0.005U	N/A
Endosulfan I	0.005U	0.005U	N/A
Endosulfan II	0.005U	0.005U	N/A
Endosulfan sulfate	0.005U	0.005U	N/A
alpha-Chlordane	0.005U	0.005U	N/A
gamma-Chlordane	0.005U	0.005U	N/A
Heptachlor	0.005U	0.005U	N/A
Heptachlor epoxide	0.005U	0.005U	N/A
Oxychlordane	0.005U	0.005U	N/A
cis-Nonachlor	0.005U	0.005U	N/A
trans-Nonachlor	0.005U	0.005U	N/A
Methoxychlor	0.005U	0.005U	N/A
Mirex	0.005U	0.005U	N/A
Toxaphene	0.05U	0.05U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	0.004U	0.004U	N/A
Chlorpyrifos	0.002U	0.002U	N/A
Demeton	0.002U	0.002U	N/A
Diazinon	0.004U	0.004U	N/A
Dichlorvos	0.006U	0.006U	N/A
Dimethoate	0.006U	0.006U	N/A
Disulfoton	0.002U	0.002U	N/A
Ethoprop	0.002U	0.002U	N/A
Fensulfothion	0.002U	0.002U	N/A
Fenthion	0.004U	0.004U	N/A
Malathion	0.006UJ	0.006UJ	N/A
Merphos	0.002U	0.002U	N/A
Methyl Parathion	0.002U	0.002U	N/A
Mevinphos	0.016U	0.016U	N/A
Phorate	0.012U	0.012U	N/A
Ronnel	0.004U	0.004U	N/A
Tetrachlorvinphos (Stirophos)	0.004U	0.004U	N/A
Tokuthion (Prothiofos)	0.006U	0.006U	N/A
Trichloronate	0.002U	0.002U	N/A
Triazines (µg/L)			
Ametryn	0.01U	0.01U	N/A
Atraton	0.01U	0.01U	N/A
Atrazine	0.01U	0.01U	N/A
Cyanazine	0.01U	0.01U	N/A
Prometon	0.01U	0.01U	N/A
Prometryn	0.01U	0.01U	N/A
Propazine	0.01U	0.01U	N/A
Secbumeton	0.01U	0.01U	N/A
Simazine	0.01U	0.01U	N/A
Simetryn	0.01U	0.01U	N/A
Terbutryn	0.01U	0.01U	N/A
Terbutylazine	0.01U	0.01U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
PCB Congeners (µg/L)			
PCB018	0.005U	0.005U	N/A
PCB028	0.005U	0.005U	N/A
PCB031	0.005U	0.005U	N/A
PCB033	0.005U	0.005U	N/A
PCB037	0.005U	0.005U	N/A
PCB044	0.005U	0.005U	N/A
PCB049	0.005U	0.005U	N/A
PCB052	0.005U	0.005U	N/A
PCB066	0.005U	0.005U	N/A
PCB070	0.005U	0.005U	N/A
PCB074	0.005U	0.005U	N/A
PCB077	0.005U	0.005U	N/A
PCB081	0.005U	0.005U	N/A
PCB087	0.005U	0.005U	N/A
PCB095	0.005U	0.005U	N/A
PCB097	0.005U	0.005U	N/A
PCB099	0.005U	0.005U	N/A
PCB101	0.005U	0.005U	N/A
PCB105	0.005U	0.005U	N/A
PCB110	0.005U	0.005U	N/A
PCB114	0.005U	0.005U	N/A
PCB118	0.005U	0.005U	N/A
PCB119	0.005U	0.005U	N/A
PCB123	0.005U	0.005U	N/A
PCB126	0.005U	0.005U	N/A
PCB128+167	0.005U	0.005U	N/A
PCB138	0.005U	0.005U	N/A
PCB141	0.005U	0.005U	N/A
PCB149	0.005U	0.005U	N/A
PCB151	0.005U	0.005U	N/A
PCB153	0.005U	0.005U	N/A
PCB156	0.005U	0.005U	N/A
PCB157	0.005U	0.005U	N/A
PCB158	0.005U	0.005U	N/A
PCB168+132	0.005U	0.005U	N/A
PCB169	0.005U	0.005U	N/A
PCB170	0.005U	0.005U	N/A
PCB177	0.005U	0.005U	N/A
PCB180	0.005U	0.005U	N/A
PCB183	0.005U	0.005U	N/A
PCB187	0.005U	0.005U	N/A
PCB189	0.005U	0.005U	N/A
PCB194	0.005U	0.005U	N/A
PCB200	0.005U	0.005U	N/A
PCB201	0.005U	0.005U	N/A
PCB206	0.005U	0.005U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	94	94	0	80	80	0
Alkalinity as CaCO3	20.4	20	2.0	22.7	23	1.3
Hardness as CaCO3	21	21	0	450	450	0
Biochemical Oxygen Demand	8.09	7.6	6.2	5.94	6.1	2.7
Chemical Oxygen Demand	64.9	68	4.7	64.9	68	4.7
Total Organic Carbon	10.37	10	3.6	8.96	9.5	5.9
Chloride	10.56	11	4.1	4.82	4.8	0.4
Fluoride	0.0974	0.097	0.4	0.1U	0.1U	N/A
MBAS	0.083	0.11	28.0	0.129	0.12	7.2
Oil and Grease	5	5.1	2.0	-	-	N/A
Total Ammonia (as N)	0.301	0.32	6.1	0.15	0.13	14.3
Total Kjeldahl Nitrogen	1.15	1	14.0	1.15	1	14.0
Nitrate (as N)	0.447	0.43	3.9	0.24	0.24	0
Nitrite (as N)	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Orthophosphate (as P)	0.181	0.19	4.9	0.193	0.19	1.6
Total Phosphorus	0.284	0.29	2.1	0.284	0.29	2.1
Total Recoverable Phenolics	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Dissolved Solids	70	73	4.2	909	910	0.1
Total Suspended Solids	22.9	26	12.7	14.2	14	1.4
Total Volatile Solids	8	7.4	7.8	4.74	4.2	12.1
Turbidity (NTU)	42	44	4.7	21	20	4.9
Dissolved Metals (µg/L)						
Aluminum	26.46	28	5.7	26.46	28	5.7
Arsenic	1.15	1.2	4.3	1.15	1.2	4.3
Cadmium	0.026	0.031	17.5	0.026	0.031	17.5
Chromium	0.766	0.74	3.5	0.766	0.74	3.5
Copper	8.96	8.7	2.9	8.96	8.7	2.9
Iron	249	250	0.4	136	140	2.9
Lead	0.675	0.67	0.7	0.675	0.67	0.7
Nickel	1.79	1.7	5.2	1.79	1.7	5.2
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	0.2U	0.2U	N/A	0.2U	0.2U	N/A
Zinc	43.23	42	2.9	43.23	42	2.9
Total Metals (µg/L)						
Aluminum	654	663	1.4	654	663	1.4
Arsenic	1.72	1.68	2.4	1.72	1.68	2.4
Cadmium	0.11	0.117	6.2	0.11	0.117	6.2
Chromium	1.82	1.83	0.5	1.82	1.83	0.5
Copper	11.5	11.2	2.6	11.5	11.2	2.6
Iron	1210	1300	7.2	947	960	1.4
Lead	5.29	5.32	0.6	5.29	5.32	0.6
Nickel	2.87	2.75	4.3	2.87	2.75	4.3
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	**0.027J**	**0.019**	**34.8**	**0.027**	**0.019J**	**34.8**
Zinc	53.62	51.95	3.2	53.62	51.95	3.2

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Chlorinated Pesticides (µg/L)						
2,4'-DDD	0.005U	0.005U	N/A	0.005U	0.005U	N/A
2,4'-DDE	0.005U	0.005U	N/A	0.005U	0.005U	N/A
2,4'-DDT	0.005U	0.005U	N/A	0.005U	0.005U	N/A
4,4'-DDD	0.005U	0.005U	N/A	0.005U	0.005U	N/A
4,4'-DDE	0.018	0.023	24.4	0.005U	0.005U	N/A
4,4'-DDT	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Aldrin	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Dieldrin	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endrin	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endrin aldehyde	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endrin ketone	0.005U	0.005U	N/A	0.005U	0.005U	N/A
alpha-BHC	0.005U	0.005U	N/A	0.005U	0.005U	N/A
beta-BHC	0.005U	0.005U	N/A	0.005U	0.005U	N/A
delta-BHC	0.005U	0.005U	N/A	0.005U	0.005U	N/A
gamma-BHC (Lindane)	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endosulfan I	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endosulfan II	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endosulfan sulfate	0.005U	0.005U	N/A	0.005U	0.005U	N/A
alpha-Chlordane	0.020	0.024	18.7	0.005U	0.005U	N/A
gamma-Chlordane	0.026	0.020	29.3	**0.004J**	**0.003J**	**44.4**
Heptachlor	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Heptachlor epoxide	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Oxychlordane	0.005U	0.005U	N/A	0.005U	0.005U	N/A
cis-Nonachlor	0.013	0.011	16.5	0.005U	0.005U	N/A
trans-Nonachlor	0.017	0.018	1.7	**0.002J**	**0.001J**	**51.9**
Methoxychlor	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Mirex	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Toxaphene	0.05U	0.05U	N/A	0.05U	0.05U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Organophosphates (µg/L)						
Bolstar (Sulprofos)	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Chlorpyrifos	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Demeton	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Diazinon	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Dichlorvos	0.006U	0.006U	N/A	0.006U	0.006U	N/A
Dimethoate	0.006U	0.006U	N/A	0.006U	0.006U	N/A
Disulfoton	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Ethoprop	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Fensulfothion	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Fenthion	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Malathion	0.197	0.197	0	0.082	0.070	15.4
Merphos	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Methyl Parathion	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Mevinphos	0.016U	0.016U	N/A	0.016U	0.016U	N/A
Phorate	0.012U	0.012U	N/A	0.012U	0.012U	N/A
Ronnel	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Tetrachlorvinphos (Stirophos)	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Tokuthion (Prothiofos)	0.006U	0.006U	N/A	0.006U	0.006U	N/A
Trichloronate	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Triazines (µg/L)						
Ametryn	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Atraton	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Atrazine	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Cyanazine	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Prometon	0.01U	0.01U	N/A	0.045	0.046	0.9
Prometryn	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Propazine	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Secbumeton	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Simazine	0.01U	0.01U	N/A	0.026	0.022	19.2
Simetryn	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Terbutryn	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Terbutylazine	0.01U	0.01U	N/A	0.01U	0.01U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
PCB Congeners (µg/L)						
PCB018	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB028	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB031	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB033	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB037	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB044	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB049	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB052	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB066	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB070	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB074	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB077	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB081	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB087	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB095	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB097	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB099	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB101	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB105	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB110	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB114	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB118	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB119	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB123	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB126	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB128+167	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB138	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB141	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB149	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB151	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB153	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB156	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB157	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB158	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB168+132	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB169	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB170	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB177	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB180	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB183	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB187	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB189	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB194	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB200	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB201	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB206	0.005U	0.005U	N/A	0.005U	0.005U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)			
Conductivity (umhos/cm)	891	890	0.1
Alkalinity as CaCO3	134.5	140	4.0
Hardness as CaCO3	145	140	3.5
Biochemical Oxygen Demand	3.1	3.1	0
Chemical Oxygen Demand	137.9	140	1.5
Total Organic Carbon	38.6	40	3.6
Chloride	121.7	120	1.4
Fluoride	0.58	0.62	6.7
MBAS	0.535	0.6	11.5
Oil and Grease	-	-	-
Total Ammonia (as N)	0.1U	0.1U	N/A
Total Kjeldahl Nitrogen	4.41	4.5	2.0
Nitrate (as N)	0.1U	0.1U	N/A
Nitrite (as N)	0.1U	0.1U	N/A
Total Orthophosphate (as P)	0.01U	0.01U	N/A
Total Phosphorus	0.356	0.32	10.7
Total Recoverable Phenolics	0.1U	0.1U	N/A
Total Dissolved Solids	589	580	1.5
Total Suspended Solids	65.6	72	9.3
Total Volatile Solids	32.4	37	13.3
Turbidity (NTU)	26.8	26	3.0
Dissolved Metals (µg/L)			
Aluminum	3.38	3.81	12.0
Arsenic	4.86	4.88	0.4
Cadmium	0.218	0.232	6.2
Chromium	0.49	0.67	31.0
Copper	14.86	15.06	1.3
Iron	37.3	46	20.9
Lead	0.95	1.07	11.9
Nickel	4.27	4.36	2.1
Selenium	1.3	1.58	19.4
Silver	0.009	0.009	0
Zinc	17.7	18.58	4.9
Total Metals (µg/L)			
Aluminum	46.7	56.4	18.8
Arsenic	2.24	2.35	4.8
Cadmium	0.2U	0.2U	N/A
Chromium	0.556	0.512	8.2
Copper	5.57	5.48	1.6
Iron	186.4	170	9.2
Lead	0.482	0.456	5.5
Nickel	1.35	1.3	3.8
Selenium	**0.379**	**0.276**	**31.5**
Silver	0.2U	0.2U	N/A
Zinc	8.93	9.17	2.7

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Chlorinated Pesticides (µg/L)			
2,4'-DDD	0.005U	0.005U	N/A
2,4'-DDE	0.005U	0.005U	N/A
2,4'-DDT	0.005U	0.005U	N/A
4,4'-DDD	0.005U	0.005U	N/A
4,4'-DDE	0.005U	0.005U	N/A
4,4'-DDT	0.005U	0.005U	N/A
Aldrin	0.005U	0.005U	N/A
Dieldrin	0.005U	0.005U	N/A
Endrin	0.005U	0.005U	N/A
Endrin aldehyde	0.005U	0.005U	N/A
Endrin ketone	0.005U	0.005U	N/A
alpha-BHC	0.005U	0.005U	N/A
beta-BHC	0.005U	0.005U	N/A
delta-BHC	0.005U	0.005U	N/A
gamma-BHC (Lindane)	0.005U	0.005U	N/A
Endosulfan I	0.005U	0.005U	N/A
Endosulfan II	0.005U	0.005U	N/A
Endosulfan sulfate	0.005U	0.005U	N/A
alpha-Chlordane	0.005U	0.005U	N/A
gamma-Chlordane	0.005U	0.005U	N/A
Heptachlor	0.005U	0.005U	N/A
Heptachlor epoxide	0.005U	0.005U	N/A
Oxychlordane	0.005U	0.005U	N/A
cis-Nonachlor	0.005U	0.005U	N/A
trans-Nonachlor	0.005U	0.005U	N/A
Methoxychlor	0.005U	0.005U	N/A
Mirex	0.005U	0.005U	N/A
Toxaphene	0.05U	0.05U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	0.004U	0.004U	N/A
Chlorpyrifos	0.002U	0.002U	N/A
Demeton	0.002U	0.002U	N/A
Diazinon	0.004U	0.004U	N/A
Dichlorvos	0.006U	0.006U	N/A
Dimethoate	0.006U	0.006U	N/A
Disulfoton	0.002U	0.002U	N/A
Ethoprop	0.002U	0.002U	N/A
Fensulfothion	0.002U	0.002U	N/A
Fenthion	0.004U	0.004U	N/A
Malathion	0.006U	0.006U	N/A
Merphos	0.002U	0.002U	N/A
Methyl Parathion	0.002U	0.002U	N/A
Mevinphos	0.016U	0.016U	N/A
Phorate	0.012U	0.012U	N/A
Ronnel	0.004U	0.004U	N/A
Tetrachlorvinphos (Stirophos)	0.004U	0.004U	N/A
Tokuthion (Prothiofos)	0.006U	0.006U	N/A
Trichloronate	0.002U	0.002U	N/A
Triazines (µg/L)			
Ametryn	0.01U	0.01U	N/A
Atraton	0.01U	0.01U	N/A
Atrazine	0.01U	0.01U	N/A
Cyanazine	0.01U	0.01U	N/A
Prometon	0.038	0.052	29.9
Prometryn	0.01U	0.01U	N/A
Propazine	0.01U	0.01U	N/A
Secbumeton	0.01U	0.01U	N/A
Simazine	0.01U	0.01U	N/A
Simetryn	0.01U	0.01U	N/A
Terbutryn	0.01U	0.01U	N/A
Terbutylazine	0.01U	0.01U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
PCB Congeners (µg/L)			
PCB018	0.005U	0.005U	N/A
PCB028	0.005U	0.005U	N/A
PCB031	0.005U	0.005U	N/A
PCB033	0.005U	0.005U	N/A
PCB037	0.005U	0.005U	N/A
PCB044	0.005U	0.005U	N/A
PCB049	0.005U	0.005U	N/A
PCB052	0.005U	0.005U	N/A
PCB066	0.005U	0.005U	N/A
PCB070	0.005U	0.005U	N/A
PCB074	0.005U	0.005U	N/A
PCB077	0.005U	0.005U	N/A
PCB081	0.005U	0.005U	N/A
PCB087	0.005U	0.005U	N/A
PCB095	0.005U	0.005U	N/A
PCB097	0.005U	0.005U	N/A
PCB099	0.005U	0.005U	N/A
PCB101	0.005U	0.005U	N/A
PCB105	0.005U	0.005U	N/A
PCB110	0.005U	0.005U	N/A
PCB114	0.005U	0.005U	N/A
PCB118	0.005U	0.005U	N/A
PCB119	0.005U	0.005U	N/A
PCB123	0.005U	0.005U	N/A
PCB126	0.005U	0.005U	N/A
PCB128+167	0.005U	0.005U	N/A
PCB138	0.005U	0.005U	N/A
PCB141	0.005U	0.005U	N/A
PCB149	0.005U	0.005U	N/A
PCB151	0.005U	0.005U	N/A
PCB153	0.005U	0.005U	N/A
PCB156	0.005U	0.005U	N/A
PCB157	0.005U	0.005U	N/A
PCB158	0.005U	0.005U	N/A
PCB168+132	0.005U	0.005U	N/A
PCB169	0.005U	0.005U	N/A
PCB170	0.005U	0.005U	N/A
PCB177	0.005U	0.005U	N/A
PCB180	0.005U	0.005U	N/A
PCB183	0.005U	0.005U	N/A
PCB187	0.005U	0.005U	N/A
PCB189	0.005U	0.005U	N/A
PCB194	0.005U	0.005U	N/A
PCB200	0.005U	0.005U	N/A
PCB201	0.005U	0.005U	N/A
PCB206	0.005U	0.005U	N/A

Table A-6 Matrix Spike Summary for All Sampling Events

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
Conventionals						
Conductivity	-	-	-	-	-	-
Alkalinity as CaCO3	-	-	-	-	-	-
Hardness as CaCO3	-	-	-	-	-	-
Biochemical Oxygen Demand	-	-	-	-	-	-
Chemical Oxygen Demand	-	-	-	-	-	-
Total Organic Carbon	90	95	5.4	102	102	0.1
Chloride	90	94	4.0	90	95	4.9
Fluoride	104	108	3.8	98	100	2.0
MBAS	-	-	-	-	-	-
Oil and Grease	-	-	-	-	-	-
Total Ammonia (as N)	103	101	1.8	92	94	2.2
Total Kjeldahl Nitrogen	108	114	5.1	94	96	2.1
Nitrate (as N)	110	115	4.3	94	98	4.2
Nitrite (as N)	103	105	1.9	102	103	0.7
Total Orthophosphate (as P)	102	100	2.0	106	108	1.9
Total Phosphorus	104	102	1.9	102	104	1.9
Total Recoverable Phenolics	99	92	7.5	95	93	1.9
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	-	-	-	-	-	-
Dissolved Metals						
Aluminum	95	98	3.9	77	76	1.0
Arsenic	90	91	1.1	109	109	0.3
Cadmium	89	89	0.2	115	117	2.1
Chromium	-	-	-	94	94	0.0
Copper	83	85	2.2	94	94	0.0
Iron	93	90	3.2	91	90	0.8
Lead	108	108	0.6	108	98	9.7
Nickel	79	82	3.7	92	92	0.8
Selenium	106	103	3.3	122	124	2.2
Silver	86	87	1.4	95	95	0.4
Zinc	78	80	2.4	114	116	1.4
Total Metals						
Aluminum	97	97	0.4	99	-	-
Arsenic	98	98	0.4	93	-	-
Cadmium	104	104	0.8	99	-	-
Chromium	-	-	-	86	-	-
Copper	96	96	0.0	96	-	-
Iron	89	91	3.1	93	93	0.0
Lead	101	101	0.0	85	-	-
Nickel	94	94	0.4	94	-	-
Selenium	**59**	**61**	4.2	120	124	3.5
Silver	102	101	0.4	84	-	-
Zinc	103	103	0.0	82	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**MS**	**MSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	103	107	3.8
2,4'-DDE	99	103	4.0
2,4'-DDT	79	85	7.3
4,4'-DDD	104	109	4.7
4,4'-DDE	98	101	3.0
4,4'-DDT	64	71	10.4
Aldrin	96	91	5.3
Dieldrin	95	93	2.1
Endrin	95	103	8.1
Endrin aldehyde	-	-	-
Endrin ketone	95	97	2.1
alpha-BHC	97	97	0.0
beta-BHC	94	90	4.3
delta-BHC	98	94	4.2
gamma-BHC (Lindane)	87	84	3.5
Endosulfan I	94	99	5.2
Endosulfan II	103	96	7.0
Endosulfan sulfate	102	102	0.0
alpha-Chlordane	103	100	3.0
gamma-Chlordane	97	97	0.0
Heptachlor	73	84	14.0
Heptachlor epoxide	97	103	6.0
Oxychlordane	98	95	3.1
cis-Nonachlor	98	98	0.0
trans-Nonachlor	98	99	1.0
Methoxychlor	67	78	15.2
Mirex	91	91	0.0
Toxaphene	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**MS**	**MSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	78	79	1.3
Chlorpyrifos	72	73	1.4
Demeton	67	65	3.0
Diazinon	70	70	0.0
Dichlorvos	75	80	6.5
Dimethoate	80	78	2.5
Disulfoton	58	58	0.0
Ethoprop	66	68	3.0
Fensulfothion	76	83	8.8
Fenthion	65	66	1.5
Malathion	69	80	14.8
Merphos	67	68	1.5
Methyl Parathion	63	73	14.7
Mevinphos	80	80	0.0
Phorate	81	60	29.8
Ronnel	67	68	1.5
Tetrachlorvinphos (Stirophos)	82	87	5.9
Tokuthion (Prothiofos)	66	69	4.4
Trichloronate	65	65	0.0
Triazines			
Ametryn	97	95	2.1
Atraton	-	-	-
Atrazine	-	-	-
Cyanazine	-	-	-
Prometon	-	-	-
Prometryn	-	-	-
Propazine	-	-	-
Secbumeton	-	-	-
Simazine	-	-	-
Simetryn	-	-	-
Terbutryn	-	-	-
Terbutylazine	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**MS**	**MSD**	**RPD**
PCB Congeners			
PCB018	101	96	5.1
PCB028	106	94	12.0
PCB031	95	95	0.0
PCB033	98	95	3.1
PCB037	97	98	1.0
PCB044	103	100	3.0
PCB049	100	93	7.3
PCB052	98	95	3.1
PCB066	97	101	4.0
PCB070	101	99	2.0
PCB074	104	104	0.0
PCB077	100	101	1.0
PCB081	94	93	1.1
PCB087	97	93	4.2
PCB095	101	97	4.0
PCB097	96	92	4.3
PCB099	97	88	9.7
PCB101	90	93	3.3
PCB105	80	91	12.9
PCB110	91	95	4.3
PCB114	88	94	6.6
PCB118	94	86	8.9
PCB119	90	89	1.1
PCB123	90	84	6.9
PCB126	89	90	1.1
PCB128+167	102	104	1.9
PCB138	101	97	4.0
PCB141	100	100	0.0
PCB149	95	101	6.1
PCB151	101	99	2.0
PCB153	105	107	1.9
PCB156	103	107	3.8
PCB157	105	108	2.8
PCB158	100	102	2.0
PCB168+132	98	97	1.0
PCB169	97	100	3.0
PCB170	108	101	6.7
PCB177	94	112	17.5
PCB180	103	103	0.0
PCB183	107	104	2.8
PCB187	105	101	3.9
PCB189	101	102	1.0
PCB194	93	104	11.2
PCB200	102	106	3.8
PCB201	108	101	6.7
PCB206	101	101	0.0

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-02 02-Jan-2006			Storm-03 19-Feb-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
Conventionals						
Conductivity	-	-	-	-	-	-
Alkalinity as CaCO3	-	-	-	-	-	-
Hardness as CaCO3	-	-	-	-	-	-
Biochemical Oxygen Demand	-	-	-	-	-	-
Chemical Oxygen Demand	-	-	-	-	-	-
Total Organic Carbon	82	87	5.9	102	95	7.3
Chloride	87	87	0.1	104	102	2.0
Fluoride	94	100	6.4	99	101	2.2
MBAS	-	-	-	-	-	-
Oil and Grease	-	-	-	-	-	-
Total Ammonia (as N)	90	92	2.2	100	101	1.0
Total Kjeldahl Nitrogen	92	97	5.3	112	115	2.9
Nitrate (as N)	108	110	2.0	109	112	2.8
Nitrite (as N)	103	104	1.3	114	109	4.1
Total Orthophosphate (as P)	102	101	1.0	99	100	1.0
Total Phosphorus	95	106	10.9	100	104	3.9
Total Recoverable Phenolics	89	86	3.7	93	91	2.6
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	-	-	-	-	-	-
Dissolved Metals						
Aluminum	94	94	0.1	113	116	2.6
Arsenic	102	100	2.9	114	115	0.5
Cadmium	99	100	0.3	100	101	1.1
Chromium	103	101	1.7	103	104	0.8
Copper	87	85	2.2	103	106	2.2
Iron	103	105	1.7	91	97	6.1
Lead	100	99	1.6	95	96	1.5
Nickel	88	86	2.3	106	108	1.0
Selenium	107	105	2.0	114	117	2.0
Silver	**54**	**55**	**1.8**	96	96	0.4
Zinc	94	93	0.3	111	113	1.0
Total Metals						
Aluminum	94	96	1.7	103	83	21.6
Arsenic	95	95	0.2	113	113	0.4
Cadmium	97	97	0.3	95	96	0.4
Chromium	100	98	1.5	106	105	1.2
Copper	84	84	0.7	89	91	2.2
Iron	98	99	1.0	87	90	3.3
Lead	99	99	0.6	**71**	**65**	**9.0**
Nickel	83	83	0.5	108	105	3.3
Selenium	101	101	0.4	112	111	1.4
Silver	90	91	0.9	93	93	0.0
Zinc	92	92	0.3	79	77	3.0

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-04 28-Feb-2006 MS	MSD	RPD	Storm-05 03-Mar-2006 MS	MSD	RPD
Conventionals						
Conductivity	-	-	-	-	-	-
Alkalinity as CaCO3	-	-	-	-	-	-
Hardness as CaCO3	-	-	-	-	-	-
Biochemical Oxygen Demand	-	-	-	-	-	-
Chemical Oxygen Demand	-	-	-	-	-	-
Total Organic Carbon	102	95	7.3	102	95	7.3
Chloride	109	114	4.7	102	108	5.1
Fluoride	100	108	7.7	108	109	1.3
MBAS	-	-	-	-	-	-
Oil and Grease	-	-	-	-	-	-
Total Ammonia (as N)	96	98	1.7	87	85	2.8
Total Kjeldahl Nitrogen	97	100	2.8	83	85	2.6
Nitrate (as N)	108	112	3.6	102	106	3.8
Nitrite (as N)	113	112	0.9	102	103	1.7
Total Orthophosphate (as P)	106	96	9.9	104	109	4.7
Total Phosphorus	104	112	7.4	100	105	4.9
Total Recoverable Phenolics	93	91	2.6	93	91	2.6
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	-	-	-	-	-	-
Dissolved Metals						
Aluminum	113	116	2.6	112	111	0.7
Arsenic	114	115	0.5	110	112	1.6
Cadmium	100	101	1.1	98	98	0.2
Chromium	103	104	0.8	110	110	0.3
Copper	103	106	2.2	108	109	0.9
Iron	91	97	6.1	91	97	6.1
Lead	95	96	1.5	98	98	0.3
Nickel	106	108	1.0	109	111	1.6
Selenium	114	117	2.0	105	105	0.4
Silver	96	96	0.4	96	95	0.9
Zinc	111	113	1.0	109	109	0.7
Total Metals						
Aluminum	103	83	21.6	93	94	1.6
Arsenic	113	113	0.4	107	107	0.7
Cadmium	95	96	0.4	98	97	1.1
Chromium	106	105	1.2	106	104	1.3
Copper	89	91	2.2	111	105	5.1
Iron	76	76	0.0	76	76	0.0
Lead	71	65	9.0	96	96	0.0
Nickel	108	105	3.3	106	106	0.2
Selenium	112	111	1.4	106	102	4.0
Silver	93	93	0.0	93	93	0.2
Zinc	79	77	3.0	108	106	2.5

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	81	85	4.8
2,4'-DDE	91	88	3.4
2,4'-DDT	55	68	21.1
4,4'-DDD	85	84	1.2
4,4'-DDE	95	96	1.0
4,4'-DDT	55	68	21
Aldrin	77	86	11.0
Dieldrin	65	65	0.0
Endrin	67	78	15.2
Endrin aldehyde	-	-	-
Endrin ketone	65	78	18.2
alpha-BHC	94	92	2.2
beta-BHC	99	92	7.3
delta-BHC	93	87	6.7
gamma-BHC (Lindane)	97	93	4.2
Endosulfan I	81	84	3.6
Endosulfan II	75	76	1.3
Endosulfan sulfate	62	63	1.6
alpha-Chlordane	84	76	10.0
gamma-Chlordane	80	88	9.5
Heptachlor	75	81	7.7
Heptachlor epoxide	90	84	6.9
Oxychlordane	93	90	3.3
cis-Nonachlor	82	99	18.8
trans-Nonachlor	82	90	9.3
Methoxychlor	**0**	**0**	**N/A**
Mirex	67	71	5.8
Toxaphene	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	99	92	7.3
Chlorpyrifos	84	81	3.6
Demeton	80	79	1.3
Diazinon	95	78	19.7
Dichlorvos	84	82	2.4
Dimethoate	82	90	9.3
Disulfoton	74	73	1.4
Ethoprop	82	80	2.5
Fensulfothion	89	78	13.2
Fenthion	99	94	5.2
Malathion	111	113	1.8
Merphos	89	84	5.8
Methyl Parathion	78	86	9.8
Mevinphos	96	97	1.0
Phorate	82	77	6.3
Ronnel	83	85	2.4
Tetrachlorvinphos (Stirophos)	101	98	3.0
Tokuthion (Prothiofos)	91	86	5.6
Trichloronate	79	90	13.0
Triazines			
Ametryn	100	94	6.2
Atraton	95	99	4.1
Atrazine	88	95	7.7
Cyanazine	-	-	-
Prometon	95	97	2.1
Prometryn	95	95	0.0
Propazine	89	89	0.0
Secbumeton	92	96	4.3
Simazine	87	88	1.1
Simetryn	101	98	3.0
Terbutryn	93	100	7.3
Terbutylazine	93	101	8.2

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
PCB Congeners			
PCB018	91	80	12.9
PCB028	97	89	8.6
PCB031	87	99	12.9
PCB033	92	82	11.5
PCB037	92	93	1.1
PCB044	87	75	14.8
PCB049	88	82	7.1
PCB052	88	82	7.1
PCB066	87	74	16.1
PCB070	89	80	10.7
PCB074	87	83	4.7
PCB077	92	80	14.0
PCB081	92	87	5.6
PCB087	89	83	7.0
PCB095	89	81	9.4
PCB097	104	87	17.8
PCB099	96	92	4.3
PCB101	94	87	7.7
PCB105	88	90	2.2
PCB110	93	87	6.7
PCB114	95	87	8.8
PCB118	95	84	12.3
PCB119	99	91	8.4
PCB123	92	86	6.7
PCB126	90	82	9.3
PCB128+167	87	91	4.5
PCB138	100	98	2.0
PCB141	92	75	20.4
PCB149	99	90	9.5
PCB151	91	86	5.6
PCB153	90	86	4.5
PCB156	77	89	14.5
PCB157	90	85	5.7
PCB158	89	89	0.0
PCB168+132	94	95	1.1
PCB169	79	83	4.9
PCB170	91	87	4.5
PCB177	99	97	2.0
PCB180	94	96	2.1
PCB183	102	95	7.1
PCB187	101	97	4.0
PCB189	92	90	2.2
PCB194	92	93	1.1
PCB200	99	89	10.6
PCB201	100	99	1.0
PCB206	92	88	4.4

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-06 29-Mar-2006 MS	MSD	RPD	Storm-07 05-Apr-2006 MS	MSD	RPD
Conventionals						
Conductivity	-	-	-	-	-	-
Alkalinity as CaCO3	-	-	-	-	-	-
Hardness as CaCO3	-	-	-	-	-	-
Biochemical Oxygen Demand	-	-	-	-	-	-
Chemical Oxygen Demand	-	-	-	-	-	-
Total Organic Carbon	105	103	1.9	103	103	0
Chloride	98	103	5.0	98	92	6.3
Fluoride	100	95	5.1	114	109	4.5
MBAS	-	-	-	-	-	-
Oil and Grease	-	-	-	-	-	-
Total Ammonia (as N)	100	101	1.0	105	105	0
Total Kjeldahl Nitrogen	102	99	3.0	102	99	3.0
Nitrate (as N)	105	109	3.7	95	90	5.4
Nitrite (as N)	106	106	0	96	100	4.1
Total Orthophosphate (as P)	97	106	8.9	100	99	1.0
Total Phosphorus	104	105	1.0	104	105	1.0
Total Recoverable Phenolics	93	95	2.1	93	95	2.1
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	-	-	-	-	-	-
Dissolved Metals						
Aluminum	112	111	0.7	112	111	0.7
Arsenic	110	112	1.6	110	112	1.6
Cadmium	98	98	0.2	98	98	0.2
Chromium	110	110	0.3	110	110	0.3
Copper	108	109	0.9	108	109	0.9
Iron	95	102	7.1	100	100	0
Lead	98	98	0.3	98	98	0.3
Nickel	109	111	1.6	109	111	1.6
Selenium	105	105	0.4	105	105	0.4
Silver	96	95	0.9	96	95	0.9
Zinc	109	109	0.7	109	109	0.7
Total Metals						
Aluminum	93	94	1.6	93	94	1.6
Arsenic	107	107	0.7	107	107	0.7
Cadmium	98	97	1.1	98	97	1.1
Chromium	106	104	1.3	106	104	1.3
Copper	111	105	5.1	111	105	5.1
Iron	90	96	6.5	94	89	5.5
Lead	96	96	0	96	96	0
Nickel	106	106	0.2	106	106	0.2
Selenium	106	102	4.0	106	102	4.0
Silver	93	93	0.2	93	93	0.2
Zinc	108	106	2.5	108	106	2.5

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
Chlorinated Pesticides						
2,4'-DDD	98	91	7.4	101	109	7.6
2,4'-DDE	95	87	8.8	93	100	7.3
2,4'-DDT	86	74	15.0	68	64	6.1
4,4'-DDD	101	96	5.1	110	110	0.0
4,4'-DDE	100	92	8.3	98	99	1.0
4,4'-DDT	58	54	7.1	33	38	14.1
Aldrin	96	86	11.0	94	97	3.1
Dieldrin	90	89	1.1	88	98	10.8
Endrin	98	87	11.9	104	104	0.0
Endrin aldehyde	-	-	-	-	-	-
Endrin ketone	77	83	7.5	76	76	0.0
alpha-BHC	99	97	2.0	88	93	5.5
beta-BHC	102	103	1.0	98	98	0.0
delta-BHC	101	99	2.0	99	101	2.0
gamma-BHC (Lindane)	99	97	2.0	89	97	8.6
Endosulfan I	99	95	4.1	103	100	3.0
Endosulfan II	94	83	12.4	92	94	2.2
Endosulfan sulfate	95	90	5.4	101	111	9.4
alpha-Chlordane	97	90	7.5	91	99	8.4
gamma-Chlordane	92	90	2.2	99	101	2.0
Heptachlor	101	99	2.0	99	107	7.8
Heptachlor epoxide	103	94	9.1	97	103	6.0
Oxychlordane	95	106	10.9	87	89	2.3
cis-Nonachlor	95	87	8.8	88	91	3.4
trans-Nonachlor	97	85	13.2	95	93	2.1
Methoxychlor	54	44	20.4	31	31	0.0
Mirex	99	80	21.2	76	81	6.4
Toxaphene	-	-	-	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
Organophosphates						
Bolstar (Sulprofos)	107	102	4.8	101	107	5.8
Chlorpyrifos	105	102	2.9	98	96	2.1
Demeton	80	73	9.2	93	93	0.0
Diazinon	101	96	5.1	99	93	6.3
Dichlorvos	101	93	8.2	102	100	2.0
Dimethoate	99	94	5.2	102	100	2.0
Disulfoton	83	80	3.7	91	89	2.2
Ethoprop	101	102	1.0	103	102	1.0
Fensulfothion	99	100	1.0	96	92	4.3
Fenthion	100	95	5.1	100	100	0.0
Malathion	74	76	2.7	127	119	6.5
Merphos	96	98	2.1	103	104	1.0
Methyl Parathion	102	96	6.1	98	97	1.0
Mevinphos	96	94	2.1	102	100	2.0
Phorate	92	88	4.4	102	99	3.0
Ronnel	103	97	6.0	100	102	2.0
Tetrachlorvinphos (Stirophos)	101	105	3.9	102	105	2.9
Tokuthion (Prothiofos)	99	98	1.0	103	101	2.0
Trichloronate	98	99	1.0	100	106	5.8
Triazines						
Ametryn	106	98	7.8	117	106	9.9
Atraton	104	102	1.9	110	115	4.4
Atrazine	102	95	7.1	109	107	1.9
Cyanazine	103	100	3.0	107	110	2.8
Prometon	115	100	14.0	119	114	4.3
Prometryn	106	98	7.8	111	107	3.7
Propazine	104	96	8.0	111	107	3.7
Secbumeton	108	100	7.7	113	107	5.5
Simazine	102	99	3.0	116	114	1.7
Simetryn	107	101	5.8	115	114	0.9
Terbutryn	108	100	7.7	114	111	2.7
Terbutylazine	107	94	12.9	110	106	3.7

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
PCB Congeners						
PCB018	87	90	3.4	85	94	10.1
PCB028	91	93	2.2	92	95	3.2
PCB031	90	94	4.3	89	96	7.6
PCB033	91	96	5.3	90	97	7.5
PCB037	99	100	1.0	103	106	2.9
PCB044	90	92	2.2	92	97	5.3
PCB049	90	93	3.3	92	96	4.3
PCB052	89	88	1.1	89	96	7.6
PCB066	93	92	1.1	96	101	5.1
PCB070	93	93	0.0	96	100	4.1
PCB074	97	99	2.0	100	105	4.9
PCB077	97	97	0.0	99	106	6.8
PCB081	96	98	2.1	97	105	7.9
PCB087	92	92	0.0	98	101	3.0
PCB095	86	87	1.2	84	91	8.0
PCB097	92	94	2.2	95	100	5.1
PCB099	87	93	6.7	94	103	9.1
PCB101	92	94	2.2	96	99	3.1
PCB105	88	85	3.5	93	99	6.3
PCB110	95	90	5.4	95	99	4.1
PCB114	99	103	4.0	102	107	4.8
PCB118	96	98	2.1	95	101	6.1
PCB119	95	93	2.1	96	99	3.1
PCB123	101	102	1.0	101	106	4.8
PCB126	101	95	6.1	104	109	4.7
PCB128+167	97	94	3.1	96	102	6.1
PCB138	95	92	3.2	95	104	9.0
PCB141	92	95	3.2	94	104	10.1
PCB149	89	86	3.4	89	96	7.6
PCB151	93	90	3.3	93	100	7.3
PCB153	98	87	11.9	93	101	8.2
PCB156	95	90	5.4	104	108	3.8
PCB157	92	95	3.2	94	101	7.2
PCB158	93	90	3.3	98	105	6.9
PCB168+132	88	87	1.1	91	98	7.4
PCB169	95	108	12.8	100	105	4.9
PCB170	94	91	3.2	100	98	2.0
PCB177	96	95	1.0	100	103	3.0
PCB180	98	93	5.2	99	102	3.0
PCB183	88	88	0.0	92	101	9.3
PCB187	96	97	1.0	94	99	5.2
PCB189	102	91	11.4	100	104	3.9
PCB194	90	102	12.5	100	107	6.8
PCB200	82	88	7.1	88	93	5.5
PCB201	94	103	9.1	94	100	6.2
PCB206	86	105	19.9	96	104	8.0

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Conventionals			
Conductivity	-	-	-
Alkalinity as CaCO3	-	-	-
Hardness as CaCO3	-	-	-
Biochemical Oxygen Demand	-	-	-
Chemical Oxygen Demand	-	-	-
Total Organic Carbon	93	94	1.7
Chloride	95	93	2.1
Fluoride	95	93	2.6
MBAS	-	-	-
Oil and Grease	-	-	-
Total Ammonia (as N)	107	101	5.0
Total Kjeldahl Nitrogen	109	107	1.9
Nitrate (as N)	111	116	4.7
Nitrite (as N)	99	96	3.4
Total Orthophosphate (as P)	105	101	3.9
Total Phosphorus	106	105	0.9
Total Recoverable Phenolics	94	90	3.9
Total Dissolved Solids	-	-	-
Total Suspended Solids	-	-	-
Total Volatile Solids	-	-	-
Turbidity	-	-	-
Dissolved Metals			
Aluminum	117	116	1.2
Arsenic	107	113	6.3
Cadmium	94	97	2.7
Chromium	104	107	3.0
Copper	97	104	6.1
Iron	96	93	3.2
Lead	96	95	1.7
Nickel	100	104	3.4
Selenium	109	107	1.8
Silver	88	90	2.8
Zinc	101	105	4.0
Total Metals			
Aluminum	101	99	2.0
Arsenic	106	106	0.0
Cadmium	93	93	0.8
Chromium	106	108	2.1
Copper	98	99	0.9
Iron	91	92	0.4
Lead	100	100	0.6
Nickel	101	102	1.3
Selenium	102	97	5.2
Silver	88	89	0.3
Zinc	98	98	0.2

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	94	86	8.9
2,4'-DDE	97	91	6.4
2,4'-DDT	87	85	2.3
4,4'-DDD	90	90	0.0
4,4'-DDE	96	90	6.5
4,4'-DDT	91	83	9.2
Aldrin	96	96	0.0
Dieldrin	99	90	9.5
Endrin	97	96	1.0
Endrin aldehyde	-	-	-
Endrin ketone	91	80	12.9
alpha-BHC	98	96	2.1
beta-BHC	91	93	2.2
delta-BHC	81	87	7.1
gamma-BHC (Lindane)	96	88	8.7
Endosulfan I	94	74	23.8
Endosulfan II	88	90	2.2
Endosulfan sulfate	79	83	4.9
alpha-Chlordane	98	95	3.1
gamma-Chlordane	112	104	7.4
Heptachlor	99	102	3.0
Heptachlor epoxide	95	103	8.1
Oxychlordane	100	98	2.0
cis-Nonachlor	100	96	4.1
trans-Nonachlor	96	94	2.1
Methoxychlor	95	90	5.4
Mirex	91	80	12.9
Toxaphene	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	89	95	6.5
Chlorpyrifos	96	102	6.1
Demeton	101	103	2.0
Diazinon	94	88	6.6
Dichlorvos	83	76	8.8
Dimethoate	94	86	8.9
Disulfoton	96	100	4.1
Ethoprop	99	99	0.0
Fensulfothion	83	95	13.5
Fenthion	99	99	0.0
Malathion	102	98	4.0
Merphos	92	94	2.2
Methyl Parathion	96	98	2.1
Mevinphos	93	91	2.2
Phorate	95	95	0.0
Ronnel	93	93	0.0
Tetrachlorvinphos (Stirophos)	99	102	3.0
Tokuthion (Prothiofos)	102	96	6.1
Trichloronate	95	94	1.1
Triazines			
Ametryn	91	91	0.0
Atraton	94	92	2.2
Atrazine	90	86	4.5
Cyanazine	101	100	1.0
Prometon	86	87	1.2
Prometryn	91	89	2.2
Propazine	90	88	2.2
Secbumeton	92	94	2.2
Simazine	85	88	3.5
Simetryn	89	92	3.3
Terbutryn	85	89	4.6
Terbutylazine	87	94	7.7

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
PCB Congeners			
PCB018	91	95	4.3
PCB028	92	99	7.3
PCB031	85	108	23.8
PCB033	101	101	0.0
PCB037	91	78	15.4
PCB044	103	92	11.3
PCB049	98	89	9.6
PCB052	99	98	1.0
PCB066	87	86	1.2
PCB070	84	83	1.2
PCB074	84	84	0.0
PCB077	93	97	4.2
PCB081	85	93	9.0
PCB087	86	96	11.0
PCB095	96	87	9.8
PCB097	84	103	20.3
PCB099	92	82	11.5
PCB101	88	103	15.7
PCB105	81	93	13.8
PCB110	88	94	6.6
PCB114	104	102	1.9
PCB118	93	99	6.3
PCB119	89	73	19.8
PCB123	77	89	14.5
PCB126	71	84	16.8
PCB128+167	89	88	1.1
PCB138	94	76	21.2
PCB141	86	86	0.0
PCB149	101	96	5.1
PCB151	103	104	1.0
PCB153	103	109	5.7
PCB156	79	86	8.5
PCB157	85	86	1.2
PCB158	102	99	3.0
PCB168+132	95	81	15.9
PCB169	79	72	9.3
PCB170	96	103	7.0
PCB177	84	78	7.4
PCB180	105	100	4.9
PCB183	82	83	1.2
PCB187	104	106	1.9
PCB189	89	73	19.8
PCB194	66	60	9.5
PCB200	81	109	29.5
PCB201	96	85	12.2
PCB206	86	73	16.4

Table A-7 Laboratory Control Spike Summary for All Sampling Events

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**LCS**	**LCSD**	**RPD**	**LCS**	**LCSD**	**RPD**
Conventionals						
Conductivity	96	-	-	95	-	-
Alkalinity as CaCO3	98	-	-	101	-	-
Hardness as CaCO3	102	-	-	101	-	-
Biochemical Oxygen Demand	109	-	-	109	-	-
Chemical Oxygen Demand	98	-	-	101	-	-
Total Organic Carbon	104	-	-	102	-	-
Chloride	97	-	-	100	-	-
Fluoride	120	-	-	105	-	-
MBAS	88	-	-	89	-	-
Oil and Grease	95	-	-	102	-	-
Total Ammonia (as N)	98	-	-	102	-	-
Total Kjeldahl Nitrogen	107	-	-	106	-	-
Nitrate (as N)	109	-	-	98	-	-
Nitrite (as N)	98	-	-	92	-	-
Total Orthophosphate (as P)	102	-	-	94	-	-
Total Phosphorus	89	-	-	109	-	-
Total Recoverable Phenolics	96	-	-	92	-	-
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	97	-	-	96	-	-
Dissolved Metals						
Aluminum	105	104	1.2	-	-	-
Arsenic	100	99	0.4	-	-	-
Cadmium	102	102	0.4	-	-	-
Chromium	-	-	-	-	-	-
Copper	99	99	0.4	-	-	-
Iron	102	-	-	102	-	-
Lead	98	101	2.4	-	-	-
Nickel	101	102	0.4	-	-	-
Selenium	-	-	-	-	-	-
Silver	106	106	0.4	-	-	-
Zinc	102	102	0.8	-	-	-
Total Metals						
Aluminum	105	104	1.2	-	-	-
Arsenic	100	99	0.4	-	-	-
Cadmium	102	102	0.4	-	-	-
Chromium	97	95	2.1	-	-	-
Copper	99	99	0.4	-	-	-
Iron	101	-	-	99	-	-
Lead	98	101	2.4	-	-	-
Nickel	101	102	0.4	-	-	-
Selenium	-	-	-	-	-	-
Silver	106	106	0.4	-	-	-
Zinc	101	100	0.8	-	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-02 02-Jan-2006			Storm-03 19-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**	**LCS**	**LCSD**	**RPD**
Conventionals						
Conductivity	97	-	-	95	-	-
Alkalinity as CaCO3	101	-	-	99	-	-
Hardness as CaCO3	102	-	-	94	-	-
Biochemical Oxygen Demand	111	-	-	107	-	-
Chemical Oxygen Demand	104	-	-	98	-	-
Total Organic Carbon	99	-	-	108	-	-
Chloride	97	-	-	107	-	-
Fluoride	93	-	-	99	-	-
MBAS	88	-	-	104	-	-
Oil and Grease	95	-	-	-	-	-
Total Ammonia (as N)	116	-	-	119	-	-
Total Kjeldahl Nitrogen	93	-	-	99	-	-
Nitrate (as N)	110	-	-	110	-	-
Nitrite (as N)	107	-	-	115	-	-
Total Orthophosphate (as P)	98	-	-	100	-	-
Total Phosphorus	89	-	-	98	-	-
Total Recoverable Phenolics	91	-	-	89	-	-
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	96	-	-	96	-	-
Dissolved Metals						
Aluminum	100	-	-	114	-	-
Arsenic	85	-	-	106	-	-
Cadmium	99	-	-	93	-	-
Chromium	96	-	-	104	-	-
Copper	97	-	-	106	-	-
Iron	109	-	-	107	-	-
Lead	98	-	-	97	-	-
Nickel	97	-	-	108	-	-
Selenium	96	-	-	105	-	-
Silver	96	-	-	96	-	-
Zinc	102	-	-	109	-	-
Total Metals						
Aluminum	98	-	-	107	-	-
Arsenic	86	-	-	113	-	-
Cadmium	99	-	-	94	-	-
Chromium	96	-	-	112	-	-
Copper	96	-	-	112	-	-
Iron	109	-	-	105	-	-
Lead	99	-	-	96	-	-
Nickel	96	-	-	114	-	-
Selenium	102	-	-	106	-	-
Silver	96	-	-	99	-	-
Zinc	100	-	-	114	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-03 19-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	90	80	11.8
2,4'-DDE	95	86	9.9
2,4'-DDT	98	90	8.5
4,4'-DDD	89	78	13.2
4,4'-DDE	98	91	7.4
4,4'-DDT	97	79	20.5
Aldrin	101	93	8.2
Dieldrin	96	105	9.0
Endrin	97	94	3.1
Endrin aldehyde	-	-	-
Endrin ketone	77	84	8.7
alpha-BHC	102	82	21.7
beta-BHC	100	94	6.2
delta-BHC	95	92	3.2
gamma-BHC (Lindane)	96	92	4.3
Endosulfan I	104	91	13.3
Endosulfan II	92	86	6.7
Endosulfan sulfate	76	75	1.3
alpha-Chlordane	94	84	11.2
gamma-Chlordane	95	83	13.5
Heptachlor	102	94	8.2
Heptachlor epoxide	94	82	13.6
Oxychlordane	101	93	8.2
cis-Nonachlor	87	89	2.3
trans-Nonachlor	96	92	4.3
Methoxychlor	91	75	19.3
Mirex	89	77	14.5
Toxaphene	-	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-03 19-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	98	96	2.1
Chlorpyrifos	101	87	14.9
Demeton	78	60	26.1
Diazinon	101	82	20.8
Dichlorvos	92	88	4.4
Dimethoate	84	65	25.5
Disulfoton	45	46	2.2
Ethoprop	96	87	9.8
Fensulfothion	74	65	12.9
Fenthion	84	75	11.3
Malathion	98	85	14.2
Merphos	80	68	16.2
Methyl Parathion	81	60	29.8
Mevinphos	94	88	6.6
Phorate	87	75	14.8
Ronnel	93	85	9.0
Tetrachlorvinphos (Stirophos)	98	82	17.8
Tokuthion (Prothiofos)	91	70	26.1
Trichloronate	94	90	4.3
Triazines			
Ametryn	93	84	10.2
Atraton	91	79	14.1
Atrazine	96	87	9.8
Cyanazine	-	-	-
Prometon	88	78	12.0
Prometryn	98	85	14.2
Propazine	101	99	2.0
Secbumeton	88	80	9.5
Simazine	93	86	7.8
Simetryn	88	83	5.8
Terbutryn	92	87	5.6
Terbutylazine	101	96	5.1

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-03 19-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
PCB Congeners			
PCB018	106	87	19.7
PCB028	93	85	9.0
PCB031	101	96	5.1
PCB033	97	89	8.6
PCB037	90	80	11.8
PCB044	92	81	12.7
PCB049	106	92	14.1
PCB052	103	92	11.3
PCB066	99	82	18.8
PCB070	101	89	12.6
PCB074	103	87	16.8
PCB077	94	80	16.1
PCB081	90	78	14.3
PCB087	106	88	18.6
PCB095	97	85	13.2
PCB097	96	95	1.0
PCB099	100	91	9.4
PCB101	99	95	4.1
PCB105	93	85	9.0
PCB110	98	87	11.9
PCB114	93	82	12.6
PCB118	102	95	7.1
PCB119	102	88	14.7
PCB123	99	90	9.5
PCB126	91	95	4.3
PCB128+167	85	92	7.9
PCB138	91	74	20.6
PCB141	91	75	19.3
PCB149	104	87	17.8
PCB151	95	98	3.1
PCB153	99	79	22.5
PCB156	80	85	6.1
PCB157	97	88	9.7
PCB158	98	87	11.9
PCB168+132	102	87	15.9
PCB169	100	77	26.0
PCB170	74	79	6.5
PCB177	90	97	7.5
PCB180	86	85	1.2
PCB183	93	75	21.4
PCB187	100	85	16.2
PCB189	86	88	2.3
PCB194	100	80	22.2
PCB200	95	98	3.1
PCB201	75	87	14.8
PCB206	71	74	4.1

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006			Storm-05 03-Mar-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**	**LCS**	**LCSD**	**RPD**
Conventionals						
Conductivity	102	-	-	96.8	-	-
Alkalinity as CaCO3	100	-	-	100.5	-	-
Hardness as CaCO3	93.5	-	-	93.5	-	-
Biochemical Oxygen Demand	111	-	-	126.3	-	-
Chemical Oxygen Demand	97.6	-	-	97.6	-	-
Total Organic Carbon	107.6	-	-	107.6	-	-
Chloride	101	-	-	102.8	-	-
Fluoride	94	-	-	94.9	-	-
MBAS	86	-	-	90.7	-	-
Oil and Grease	103	-	-	103.7	-	-
Total Ammonia (as N)	112	-	-	119.3	-	-
Total Kjeldahl Nitrogen	104	-	-	94	-	-
Nitrate (as N)	111	-	-	105.6	-	-
Nitrite (as N)	112	-	-	107.2	-	-
Total Orthophosphate (as P)	94	-	-	103.3	-	-
Total Phosphorus	98	-	-	100.3	-	-
Total Recoverable Phenolics	88.9	-	-	88.9	-	-
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	98	-	-	98.7	-	-
Dissolved Metals						
Aluminum	114.1	-	-	110.7	-	-
Arsenic	106.3	-	-	100.7	-	-
Cadmium	92.5	-	-	95.4	-	-
Chromium	103.9	-	-	102.8	-	-
Copper	106.1	-	-	102.8	-	-
Iron	106.9	-	-	106.9	-	-
Lead	96.7	-	-	97.8	-	-
Nickel	107.6	-	-	104.4	-	-
Selenium	104.9	-	-	99.5	-	-
Silver	96.4	-	-	92.2	-	-
Zinc	108.7	-	-	106.2	-	-
Total Metals						
Aluminum	107.3	-	-	108.1	-	-
Arsenic	112.6	-	-	98.2	-	-
Cadmium	94.2	-	-	95.4	-	-
Chromium	112	-	-	104.4	-	-
Copper	112	-	-	105.4	-	-
Iron	103.6	-	-	103.6	-	-
Lead	96.1	-	-	97.6	-	-
Nickel	114.1	-	-	105.9	-	-
Selenium	106.2	-	-	94.3	-	-
Silver	99.3	-	-	94	-	-
Zinc	114.1	-	-	107.3	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	90	80	11.8
2,4'-DDE	95	86	9.9
2,4'-DDT	98	90	8.5
4,4'-DDD	89	78	13.2
4,4'-DDE	98	91	7.4
4,4'-DDT	97	79	20.5
Aldrin	101	93	8.2
Dieldrin	96	105	9.0
Endrin	97	94	3.1
Endrin aldehyde	-	-	-
Endrin ketone	77	84	8.7
alpha-BHC	102	82	21.7
beta-BHC	100	94	6.2
delta-BHC	95	92	3.2
gamma-BHC (Lindane)	96	92	4.3
Endosulfan I	104	91	13.3
Endosulfan II	92	86	6.7
Endosulfan sulfate	76	75	1.3
alpha-Chlordane	94	84	11.2
gamma-Chlordane	95	83	13.5
Heptachlor	102	94	8.2
Heptachlor epoxide	94	82	13.6
Oxychlordane	101	93	8.2
cis-Nonachlor	87	89	2.3
trans-Nonachlor	96	92	4.3
Methoxychlor	91	75	19.3
Mirex	89	77	14.5
Toxaphene	-	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	98	96	2.1
Chlorpyrifos	101	87	14.9
Demeton	58	55	5.3
Diazinon	101	82	20.8
Dichlorvos	92	88	4.4
Dimethoate	84	65	25.5
Disulfoton	45	46	2.2
Ethoprop	96	87	9.8
Fensulfothion	74	65	12.9
Fenthion	84	75	11.3
Malathion	98	85	14.2
Merphos	80	68	16.2
Methyl Parathion	81	60	29.8
Mevinphos	94	88	6.6
Phorate	87	75	14.8
Ronnel	93	85	9.0
Tetrachlorvinphos (Stirophos)	98	82	17.8
Tokuthion (Prothiofos)	91	70	26.1
Trichloronate	94	90	4.3
Triazines			
Ametryn	93	84	10.2
Atraton	91	79	14.1
Atrazine	96	87	9.8
Cyanazine	-	-	-
Prometon	88	78	12.0
Prometryn	98	85	14.2
Propazine	101	99	2.0
Secbumeton	88	80	9.5
Simazine	93	86	7.8
Simetryn	88	83	5.8
Terbutryn	92	87	5.6
Terbutylazine	101	96	5.1

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
PCB Congeners			
PCB018	106	87	19.7
PCB028	93	85	9.0
PCB031	101	96	5.1
PCB033	97	89	8.6
PCB037	90	80	11.8
PCB044	92	81	12.7
PCB049	106	92	14.1
PCB052	103	92	11.3
PCB066	99	82	18.8
PCB070	101	89	12.6
PCB074	103	87	16.8
PCB077	94	80	16.1
PCB081	90	78	14.3
PCB087	106	88	18.6
PCB095	97	85	13.2
PCB097	96	95	1.0
PCB099	100	91	9.4
PCB101	99	95	4.1
PCB105	93	85	9.0
PCB110	98	87	11.9
PCB114	93	82	12.6
PCB118	102	95	7.1
PCB119	102	88	14.7
PCB123	99	90	9.5
PCB126	95	91	4.3
PCB128+167	92	85	7.9
PCB138	91	74	20.6
PCB141	91	75	19.3
PCB149	104	87	17.8
PCB151	95	98	3.1
PCB153	99	79	22.5
PCB156	85	80	6.1
PCB157	97	88	9.7
PCB158	98	87	11.9
PCB168+132	102	87	15.9
PCB169	100	77	26.0
PCB170	79	74	6.5
PCB177	97	90	7.5
PCB180	86	85	1.2
PCB183	93	75	21.4
PCB187	100	85	16.2
PCB189	88	86	2.3
PCB194	100	80	22.2
PCB200	95	98	3.1
PCB201	87	75	14.8
PCB206	74	71	4.1

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**	**LCS**	**LCSD**	**RPD**
Conventionals						
Conductivity	96	-	-	102	-	-
Alkalinity as CaCO3	102	-	-	102	-	-
Hardness as CaCO3	99	-	-	98	-	-
Biochemical Oxygen Demand	100	-	-	98	-	-
Chemical Oxygen Demand	109	-	-	93	-	-
Total Organic Carbon	98	-	-	116	-	-
Chloride	96	-	-	96	-	-
Fluoride	105	-	-	104	-	-
MBAS	94	-	-	98	-	-
Oil and Grease	98	-	-	98	-	-
Total Ammonia (as N)	99	-	-	101	-	-
Total Kjeldahl Nitrogen	87	-	-	102	-	-
Nitrate (as N)	90	-	-	102	-	-
Nitrite (as N)	103	-	-	110	-	-
Total Orthophosphate (as P)	101	-	-	84	-	-
Total Phosphorus	102	-	-	102	-	-
Total Recoverable Phenolics	95	-	-	95	-	-
Total Dissolved Solids	108	-	-	95	-	-
Total Suspended Solids	97	-	-	101	-	-
Total Volatile Solids	110	-	-	101	-	-
Turbidity	111	-	-	108	-	-
Dissolved Metals	112	-	-	108	-	-
Aluminum	97	-	-	97	-	-
Arsenic	89	-	-	89	-	-
Cadmium	-	-	-	-	-	-
Chromium	-	-	-	-	-	-
Copper	-	-	-	-	-	-
Iron	101	-	-	98	-	-
Lead	96	-	-	98	-	-
Nickel	-	-	-	-	-	-
Selenium	110.7	-	-	110.7	-	-
Silver	100.7	-	-	100.7	-	-
Zinc	95.4	-	-	95.4	-	-
Total Metals	102.8	-	-	102.8	-	-
Aluminum	102.8	-	-	102.8	-	-
Arsenic	105	-	-	104	-	-
Cadmium	97.8	-	-	97.8	-	-
Chromium	104.4	-	-	104.4	-	-
Copper	99.5	-	-	99.5	-	-
Iron	92.2	-	-	92.2	-	-
Lead	106.2	-	-	106.2	-	-
Nickel	-	-	-	-	-	-
Selenium	108.1	-	-	108.1	-	-
Silver	98.2	-	-	98.2	-	-
Zinc	95.4	-	-	95.4	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Dry-02	11-May-2006	
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Conventionals			
Conductivity	98	-	-
Alkalinity as CaCO3	100	-	-
Hardness as CaCO3	96	-	-
Biochemical Oxygen Demand	96	-	-
Chemical Oxygen Demand	99	-	-
Total Organic Carbon	110	-	-
Chloride	100	-	-
Fluoride	99	-	-
MBAS	103	-	-
Oil and Grease	-	-	-
Total Ammonia (as N)	97	-	-
Total Kjeldahl Nitrogen	103	-	-
Nitrate (as N)	108	-	-
Nitrite (as N)	103	-	-
Total Orthophosphate (as P)	101	-	-
Total Phosphorus	94	-	-
Total Recoverable Phenolics	88	-	-
Total Dissolved Solids	-	-	-
Total Suspended Solids	-	-	-
Total Volatile Solids	-	-	-
Turbidity	100	-	-
Dissolved Metals			
Aluminum	106	-	-
Arsenic	98	-	-
Cadmium	97	-	-
Chromium	101	-	-
Copper	101	-	-
Iron	99	-	-
Lead	98	-	-
Nickel	102	-	-
Selenium	95	-	-
Silver	95	-	-
Zinc	104	-	-
Total Metals			
Aluminum	120	-	-
Arsenic	101	-	-
Cadmium	96	-	-
Chromium	110	-	-
Copper	109	-	-
Iron	106	-	-
Lead	100	-	-
Nickel	112	-	-
Selenium	102	-	-
Silver	95	-	-
Zinc	109	-	-

Table A-8 Standard Reference Material Summary

	Dry-01		Storm-01	
	18-Aug-05		18-Oct-05	
Analytical Parameter	**SRM-1**	**SRM-2**	**SRM-1**	**SRM-2**
Dissolved Metals				
Aluminum	117	101	90	85
Arsenic	98	97	99	98
Cadmium	101	104	102	100
Chromium	-	-	95	93
Copper	99	96	94	92
Iron	-	-	-	-
Lead	101	103	99	100
Nickel	98	99	93	92
Selenium	96	-	101	113
Silver	105	107	100	98
Zinc	105	96	96	97
Total Metals				
Aluminum	101	117	96	112
Arsenic	97	93	100	100
Cadmium	104	101	92	97
Chromium	-	-	84	85
Copper	96	99	118	96
Iron	-	-	-	-
Lead	101	103	83	83
Nickel	99	98	94	95
Selenium	103	-	-	-
Silver	105	107	77	96
Zinc	105	105	100	84

Table A-9 Surrogate Summary for All Sampling Events

	Belmont Pump	Bouton Creek	Los Cerritos Channel	Dominguez Gap	BLK	DUP	MS	MSD
Dry-0 - 18-Aug-05								
Tetrachloro-m-xylene	71	72	67	-	57	65	78	76
PCB030	74	69	73	-	63	69	78	77
PCB112	93	91	83	-	91	83	93	90
PCB198	104	101	87	-	106	101	99	97
Storm-01 - 18-Oct-05								
Tetrachloro-m-xylene	88	-	90	-	76	-	-	-
PCB030	88	-	88	-	79	-	-	-
PCB112	92	-	89	-	89	-	-	-
PCB198	95	-	90	-	95	-	-	-
Storm-02 - 02-Jan-06								
Tetrachloro-m-xylene	96	94	89	-	103	-	-	-
PCB030	97	95	91	-	105	-	-	-
PCB112	89	91	91	-	104	-	-	-
PCB198	100	95	99	-	106	-	-	-
Storm-03 - 19-Feb-06								
Tetrachloro-m-xylene	81	-	-	-	91	-	-	-
PCB030	86	-	-	-	95	-	-	-
PCB112	83	-	-	-	98	-	-	-
PCB198	83	-	-	-	103	-	-	-
Storm-04 - 28-Feb-06								
Tetrachloro-m-xylene	83	79	81	-	91	-	-	-
PCB030	83	84	83	-	95	-	-	-
PCB112	82	82	85	-	98	-	-	-
PCB198	94	83	95	-	103	-	-	-
Storm-05 - 03-Mar-06								
Tetrachloro-m-xylene	-	69	73	-	89	83	77	76
PCB030	-	75	70	-	90	82	78	75
PCB112	-	81	75	-	95	87	87	83
PCB198	-	86	80	-	99	90	87	92
Storm-06 - 29-Mar-06								
Tetrachloro-m-xylene	83	84	-	84	59	87	87	88
PCB030	87	88	-	90	68	90	95	92
PCB112	87	92	-	89	85	89	94	91
PCB198	81	83	-	83	82	82	86	84
Storm-07 - 05-Apr-06								
Tetrachloro-m-xylene	-	-	-	93	93	93	89	90
PCB030	-	-	-	99	99	95	91	95
PCB112	-	-	-	101	101	95	95	97
PCB198	-	-	-	88	88	85	86	89
Dry-02 - 11-May-06								
Tetrachloro-m-xylene	96	96	88	-	97	84	79	70
PCB030	100	97	98	-	91	92	85	86
PCB112	96	97	83	-	98	92	86	88
PCB198	84	80	68	-	104	91	76	81

Table A-10 Long Beach Stormwater Toxicity Testing QA Exceptions.

Sample Date	Experiment	Species	Sample	Description
1/2/2006	601001	Water Flea	Bouton, Belmont,Cerritos	Control survival <80% in both sample and reference toxicant, control reproduction <15 neonates in Cerritos Channel sample. Results judged to provide valid toxicity assessments
3/3/2006	603003	Water Flea	Cerritos	Control reproduction <15 neonates per female in sample test. Results judged to provide valid toxicity asessment.
3/3/2006	603003	Sea Urchin	Bouton	Brine control < 70% fertilization. Results should be viewed with caution
5/11/2006	605007	Water Flea	Cerritos	Control reproduction < 15 neonates.Results judged to provide valid toxicity assessment

Table A-11 Sample Holding Times Long Beach Stormwater Samples, 2005/2006

Date Collected	Sample Location	Hours Held Before Testing	
		Water Flea	Sea Urchin
8/18/05	Belmont Pump	16	32
8/18/05	Bouton Creek	16	32
8/18/05	Cerritos Channel	16	31
10/8/05	Belmont Pump	26	30
10/8/05/	Cerritos Channel	26	30
1/2/06	Belmont Pump	34	48
1/2/06	Bouton Creek	34	48
1.2.06	Cerritos Channel	34	49
2/28/06	Belmont Pump	18	20
2/28/06	Bouton Creek	18	20
2/28/06	Cerritos Channel	18	20
3/3/06	Bouton Creek	45	49
3/3/06	Cerritos Channel	46	50
3/29/06	Belmont Pump	35	37
3/29/06	Bouton Creek	30	32
5/11/06	Belmont Pump	40	39
5/11/06	Bouton Creek	31	30
5/11/05	Cerritos Channel	28	27

Bold typeface: Test initiation exceeded 72 hour hold time

Table A-1 Summary of Blanking Results Associated with Field Activities.

Analyte	Reporting Limit	Installed Intake Hose		Subsampling Hose		Composite Bottles	
		Number of Detections	Number of Analyses	Number of Detections	Number of Analyses	Number of Detections	Number of Analyses
CONVENTIONALS (mg/L)							
Chemical Oxygen Demand (COD)	4.0	0	1	0	1	0	4
Total Organic Carbon (TOC)	0.5-1.0	0	1	0	1	0	4
Nitrate-N	0.10	0	1	0	1	0	4
Total P	0.01-0.002	0	1	0	1	0	4
TOTAL METALS (µg/L)							
Aluminum	100	0	1	0	1	0	4
Arsenic	1.0	0	1	0	1	0	4
Cadmium	0.25	0	1	0	1	0	4
Chromium	0.50	0	1	0	1	0	4
Copper	0.50	0	1	0	1	0	4
Lead	0.50	0	1	0	1	0	4
Nickel	1.0	0	1	0	1	0	4
Silver	0.25	0	1	0	1	0	4
Zinc	1.0	0	1	0	1	0	4

Table A-2 Field Duplicate Stations for Each Event.

Event Category	Global Event ID	Sample Date	Composite or Grab	Duplicated Station
Dry Weather	Event-01	18-Aug-2005	Comp	Los Cerritos Channel
Dry Weather	Event-01	18-Aug-2005	Grab	Los Cerritos Channel
Storm	Event-01	18-Oct-2005	Grab	Belmont Pump
Storm	Event-02	02-Jan-2006	Grab	Belmont Pump
Storm	Event-04	28-Feb-2006	Comp	Bouton Creek
Storm	Event-04	28-Feb-2006	Grab	Belmont Pump
Storm	Event-05	03-Mar-2006	Comp	Belmont Pump
Storm	Event-05	03-Mar-3006	Grab	Bouton Creek
Storm	Event-06	29-Mar-2006	Comp	Bouton Creek
Storm	Event-06	29-Mar-2006	Grab	Bouton Creek
Dry Weather	Event-02	11-May-2006	Comp	Los Cerritos Channel
Dry Weather	Event-02	11-May-2006	Grab	Belmont Pump

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Conventionals(mg/L unless noted)						
Conductivity (umhos/cm)	2200	2200	0	-	-	-
Alkalinity as CaCO3	140	130	7	-	-	-
Hardness as CaCO3	270	270	0	-	-	-
Biochemical Oxygen Demand	22	20	10	-	-	-
Chemical Oxygen Demand	210	210	0	-	-	-
Total Organic Carbon	35	34	3	-	-	-
Chloride	580	590	2	-	-	-
Fluoride	0.7	0.7	0	-	-	-
MBAS	ND	ND	N/A	-	-	-
Oil and Grease	ND	ND	N/A	ND	4.2	N/A
Total Ammonia (as N)	ND	ND	N/A	-	-	-
Total Kjeldahl Nitrogen	3.4	3.7	8	-	-	-
Nitrate (as N)	ND	ND	N/A	-	-	-
Nitrite (as N)	ND	ND	N/A	-	-	-
Total Orthophosphate (as P)	0.016	0.015	6	-	-	-
Total Phosphorus	0.26	0.26	0	-	-	-
Total Recoverable Phenolics	ND	ND	N/A	-	-	-
Total Dissolved Solids	1300	1300	0	-	-	-
Total Suspended Solids	44	44	0	-	-	-
Total Volatile Solids	-	-		-	-	-
Turbidity (NTU)	22	18	20	-	-	-
Dissolved Metals (µg/L)						
Aluminum	ND	ND	N/A	-	-	-
Arsenic	5.8	5.7	2	-	-	-
Cadmium	ND	ND	N/A	-	-	-
Chromium	0.22	0.23	4	-	-	-
Copper	9.3	12	25	-	-	-
Iron	ND	ND	N/A	-	-	-
Lead	ND	0.6	N/A	-	-	-
Nickel	ND	ND	N/A	-	-	-
Selenium	ND	ND	N/A	-	-	-
Silver	ND	ND	N/A	-	-	-
Zinc	**8.4**	**43**	**135**	-	-	-
Total Metals (µg/L)						
Aluminum	ND	170	N/A	-	-	-
Arsenic	5.4	5.1	6	-	-	-
Cadmium	0.22	0.26	17	-	-	-
Chromium	0.63	0.62	2	-	-	-
Copper	12	17	34	-	-	-
Iron	160	120	29	-	-	-
Lead	1.4	2.8	67	-	-	-
Nickel	ND	ND	N/A	-	-	-
Selenium	0.42	0.39	7	-	-	-
Silver	ND	ND	N/A	-	-	-
Zinc	**22**	**40**	**58**	-	-	-

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Bacteria (MPN/100 ml)						
Enterococcus	3000	4200	33	**79000**	**174000**	**75**
Fecal Coliform	**1700**	**3000**	**55**	1600000	1600000	0
Total Coliform	30000	50000	50	1600000	1600000	0
Aroclors (µg/L)						
Aroclor 1016	ND	ND	N/A	-	-	-
Aroclor 1221	ND	ND	N/A	-	-	-
Aroclor 1232	ND	ND	N/A	-	-	-
Aroclor 1242	ND	ND	N/A	-	-	-
Aroclor 1248	ND	ND	N/A	-	-	-
Aroclor 1254	ND	ND	N/A	-	-	-
Aroclor 1260	ND	ND	N/A	-	-	-
Chlorinated Pesticides (µg/L)						
2,4'-DDD	ND	ND	N/A	-	-	-
2,4'-DDE	ND	ND	N/A	-	-	-
2,4'-DDT	ND	ND	N/A	-	-	-
4,4'-DDD	ND	ND	N/A	-	-	-
4,4'-DDE	ND	ND	N/A	-	-	-
4,4'-DDT	ND	ND	N/A	-	-	-
Total DDT	ND	ND	N/A	-	-	-
Aldrin	ND	ND	N/A	-	-	-
Dieldrin	ND	ND	N/A	-	-	-
Endrin	ND	ND	N/A	-	-	-
Endrin aldehyde	ND	ND	N/A	-	-	-
Endrin ketone	ND	ND	N/A	-	-	-
alpha-BHC	ND	ND	N/A	-	-	-
beta-BHC	ND	ND	N/A	-	-	-
delta-BHC	ND	ND	N/A	-	-	-
gamma-BHC (Lindane)	ND	ND	N/A	-	-	-
Endosulfan I	ND	ND	N/A	-	-	-
Endosulfan II	ND	ND	N/A	-	-	-
Endosulfan sulfate	ND	ND	N/A	-	-	-
alpha-Chlordane	ND	ND	N/A	-	-	-
gamma-Chlordane	ND	ND	N/A	-	-	-
Heptachlor	ND	ND	N/A	-	-	-
Heptachlor epoxide	ND	ND	N/A	-	-	-
Oxychlordane	ND	ND	N/A	-	-	-
cis-Nonachlor	ND	ND	N/A	-	-	-
trans-Nonachlor	ND	ND	N/A	-	-	-
Total Chlordane	ND	ND	N/A	-	-	-
Methoxychlor	ND	ND	N/A	-	-	-
Mirex	ND	ND	N/A	-	-	-
Toxaphene	ND	ND	N/A	-	-	-

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**DUP**	**Result**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	ND	ND	N/A
Chlorpyrifos	ND	ND	N/A
Demeton	ND	ND	N/A
Diazinon	ND	ND	N/A
Dichlorvos	ND	ND	N/A
Dimethoate	ND	ND	N/A
Disulfoton	ND	ND	N/A
Ethoprop	ND	ND	N/A
Fensulfothion	ND	ND	N/A
Fenthion	ND	ND	N/A
Malathion	ND	ND	N/A
Merphos	ND	ND	N/A
Methyl Parathion	ND	ND	N/A
Mevinphos	ND	ND	N/A
Phorate	ND	ND	N/A
Ronnel	ND	ND	N/A
Tetrachlorvinphos (Stirophos)	ND	ND	N/A
Tokuthion (Prothiofos)	ND	ND	N/A
Trichloronate	ND	ND	N/A
Triazines (µg/L)			
Ametryn	ND	ND	N/A
Atraton	ND	ND	N/A
Atrazine	ND	ND	N/A
Cyanazine	ND	ND	N/A
Prometon	ND	ND	N/A
Prometryn	ND	ND	N/A
Propazine	ND	ND	N/A
Secbumeton	ND	ND	N/A
Simazine	ND	ND	N/A
Simetryn	ND	ND	N/A
Terbutryn	ND	ND	N/A
Terbutylazine	ND	ND	N/A

ND – Analyte was no detected

N/A – RPD could not be calculated because one or both of the values was not-detected
- indicates field DUPlicate not available due to low water volume

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-02 02-Jan-2006			Storm-04 28-Feb-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	-	-	-	140	140	0
Alkalinity as CaCO3	-	-	-	20	20	0
Hardness as CaCO3	-	-	-	25	25	0
Biochemical Oxygen Demand	-	-	-	8.9	8.4	6
Chemical Oxygen Demand	-	-	-	53	51	4
Total Organic Carbon	-	-	-	9.4	9.2	2
Chloride	-	-	-	26	25	4
Fluoride	-	-	-	ND	0.083	N/A
MBAS	-	-	-	ND	ND	N/A
Oil and Grease	ND	4.5	N/A	ND	2.4	N/A
Total Ammonia (as N)	-	-	-	0.4	0.55	32
Total Kjeldahl Nitrogen	-	-	-	1.4	1.2	15
Nitrate (as N)	-	-	-	0.52	0.52	0
Nitrite (as N)	-	-	-	ND	ND	N/A
Total Orthophosphate (as P)	-	-	-	0.17	0.17	0
Total Phosphorus	-	-	-	0.53	0.54	2
Total Recoverable Phenolics	-	-	-	ND	ND	N/A
Total Dissolved Solids	-	-	-	89	91	2
Total Suspended Solids	-	-	-	56	55	2
Total Volatile Solids	-	-	-	20	17	16
Turbidity (NTU)	-	-	-	40	41	2
Dissolved Metals (µg/L)						
Aluminum	-	-	-	58	63	8
Arsenic	-	-	-	1.1	1.2	9
Cadmium	-	-	-	ND	0.03	N/A
Chromium	-	-	-	0.96	1	4
Copper	-	-	-	7.3	7.6	4
Iron	-	-	-	58	58	0
Lead	-	-	-	1	0.98	2
Nickel	-	-	-	1.6	1.7	6
Selenium	-	-	-	ND	ND	N/A
Silver	-	-	-	ND	ND	N/A
Zinc	-	-	-	40	40	0
Total Metals (µg/L)						
Aluminum	-	-	-	1700	1700	0
Arsenic	-	-	-	1.9	1.9	0
Cadmium	-	-	-	0.24	0.24	0
Chromium	-	-	-	11	11	0
Copper	-	-	-	21	21	0
Iron	-	-	-	2200	2000	10
Lead	-	-	-	13	10	26
Nickel	-	-	-	6	4.8	22
Selenium	-	-	-	ND	0.25	N/A
Silver	-	-	-	ND	0.037	N/A
Zinc	-	-	-	130	130	0

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-02 02-Jan-2006			Storm-04 28-Feb-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Bacteria (MPN/100 ml)						
Enterococcus	18900	23300	21	14200	7500	62
Fecal Coliform	**1100**	**13000**	**169**	3000	3000	0
Total Coliform	**50000**	**160000**	**105**	30000	30000	0
Aroclors (µg/L)						
Aroclor 1016	-	-	-	ND	ND	N/A
Aroclor 1221	-	-	-	ND	ND	N/A
Aroclor 1232	-	-	-	ND	ND	N/A
Aroclor 1242	-	-	-	ND	ND	N/A
Aroclor 1248	-	-	-	ND	ND	N/A
Aroclor 1254	-	-	-	ND	ND	N/A
Aroclor 1260	-	-	-	ND	ND	N/A
Chlorinated Pesticides (µg/L)						
2,4'-DDD	-	-	-	ND	ND	N/A
2,4'-DDE	-	-	-	ND	ND	N/A
2,4'-DDT	-	-	-	ND	ND	N/A
4,4'-DDD	-	-	-	ND	ND	N/A
4,4'-DDE	-	-	-	ND	ND	N/A
4,4'-DDT	-	-	-	ND	ND	N/A
Total DDT	-	-	-	ND	ND	N/A
Aldrin	-	-	-	ND	ND	N/A
Dieldrin	-	-	-	ND	ND	N/A
Endrin	-	-	-	ND	ND	N/A
Endrin aldehyde	-	-	-	ND	ND	N/A
Endrin ketone	-	-	-	ND	ND	N/A
alpha-BHC	-	-	-	ND	ND	N/A
beta-BHC	-	-	-	ND	ND	N/A
delta-BHC	-	-	-	ND	ND	N/A
gamma-BHC (Lindane)	-	-	-	ND	ND	N/A
Endosulfan I	-	-	-	ND	ND	N/A
Endosulfan II	-	-	-	ND	ND	N/A
Endosulfan sulfate	-	-	-	ND	ND	N/A
alpha-Chlordane	-	-	-	ND	ND	N/A
gamma-Chlordane	-	-	-	ND	ND	N/A
Heptachlor	-	-	-	ND	ND	N/A
Heptachlor epoxide	-	-	-	ND	ND	N/A
Oxychlordane	-	-	-	ND	ND	N/A
cis-Nonachlor	-	-	-	ND	ND	N/A
trans-Nonachlor	-	-	-	ND	ND	N/A
Total Chlordane	-	-	-	ND	ND	N/A
Methoxychlor	-	-	-	ND	ND	N/A
Mirex	-	-	-	ND	ND	N/A
Toxaphene	-	-	-	ND	ND	N/A

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-04 28-Feb-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	ND	ND	N/A
Chlorpyrifos	ND	ND	N/A
Demeton	ND	ND	N/A
Diazinon	ND	ND	N/A
Dichlorvos	ND	ND	N/A
Dimethoate	ND	ND	N/A
Disulfoton	ND	ND	N/A
Ethoprop	ND	ND	N/A
Fensulfothion	ND	ND	N/A
Fenthion	ND	ND	N/A
Malathion	0.041	0.039	5
Merphos	ND	ND	N/A
Methyl Parathion	ND	ND	N/A
Mevinphos	ND	ND	N/A
Phorate	ND	ND	N/A
Ronnel	ND	ND	N/A
Tetrachlorvinphos (Stirophos)	ND	ND	N/A
Tokuthion (Prothiofos)	ND	ND	N/A
Trichloronate	ND	ND	N/A
Triazines (µg/L)			
Ametryn	ND	ND	N/A
Atraton	ND	ND	N/A
Atrazine	ND	ND	N/A
Cyanazine	ND	ND	N/A
Prometon	0.017	0.021	19
Prometryn	ND	ND	N/A
Propazine	ND	ND	N/A
Secbumeton	ND	ND	N/A
Simazine	ND	ND	N/A
Simetryn	ND	ND	N/A
Terbutryn	ND	ND	N/A
Terbutylazine	ND	ND	N/A

ND – Analyte was no detected

N/A – RPD could not be calculated because one or both of the values was not-detected
- indicates field DUPlicate not available due to low water volume

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-05 03-Mar-2006			Storm-06 29-Mar-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	120	120	0	130	130	0
Alkalinity as CaCO3	16	16	0	15	16	6
Hardness as CaCO3	22	22	0	22	23	4
Biochemical Oxygen Demand	17	27	45	8.7	7.8	11
Chemical Oxygen Demand	120	110	9	71	68	4
Total Organic Carbon	9	10	11	9.2	9.4	2
Chloride	21	21	0	24	23	4
Fluoride	ND	ND	N/A	0.075	0.074	1
MBAS	ND	ND	N/A	0.12	0.091	27
Oil and Grease	ND	ND	N/A	1.1	1.3	17
Total Ammonia (as N)	0.31	0.32	3	0.2	0.23	14
Total Kjeldahl Nitrogen	1.7	1.7	0	0.67	0.74	10
Nitrate (as N)	0.41	0.41	0	0.36	0.35	3
Nitrite (as N)	ND	ND	N/A	ND	ND	N/A
Total Orthophosphate (as P)	0.12	0.12	0	0.12	0.11	9
Total Phosphorus	0.74	0.64	14	0.35	0.38	8
Total Recoverable Phenolics	ND	ND	N/A	ND	ND	N/A
Total Dissolved Solids	82	78	5	86	87	1
Total Suspended Solids	230	230	0	110	87	23
Total Volatile Solids	55	54	2	30	26	14
Turbidity (NTU)	95	94	1	56	55	2
Dissolved Metals (µg/L)						
Aluminum	41	38	8	55	56	2
Arsenic	0.96	1	4	1.1	1	10
Cadmium	0.048	0.058	19	0.053	0.052	2
Chromium	1.4	1.4	0	1.4	1.3	7
Copper	6.4	6.2	3	7.2	6.9	4
Iron	66	62	6	81	80	1
Lead	0.8	0.78	3	0.89	0.87	2
Nickel	1.3	1.4	7	1.8	1.6	12
Selenium	ND	ND	N/A	ND	ND	N/A
Silver	ND	ND	N/A	ND	ND	N/A
Zinc	27	32	17	34	33	3
Total Metals (µg/L)						
Aluminum	5900	6200	5	3400	3100	9
Arsenic	3	3.3	10	2.6	2.4	8
Cadmium	0.88	0.89	1	0.56	0.51	9
Chromium	13	14	7	10	8.9	12
Copper	51	55	8	38	35	8
Iron	7400	7500	1	4700	4200	11
Lead	52	53	2	25	22	13
Nickel	11	13	17	8	7.2	11
Selenium	1.2	1.2	0	1	1	0
Silver	0.1	0.13	26	0.057	0.069	19
Zinc	350	380	8	240	210	13

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-05 03-Mar-2006			Storm-06 29-Mar-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Bacteria (MPN/100 ml)						
Enterococcus	12100	7400	48	16200	20600	24
Fecal Coliform	**50000**	**22000**	**78**	1700	2400	34
Total Coliform	**160000**	**300000**	**61**	50000	50000	0
Aroclors (µg/L)						
Aroclor 1016	ND	ND	N/A	ND	ND	N/A
Aroclor 1221	ND	ND	N/A	ND	ND	N/A
Aroclor 1232	ND	ND	N/A	ND	ND	N/A
Aroclor 1242	ND	ND	N/A	ND	ND	N/A
Aroclor 1248	ND	ND	N/A	ND	ND	N/A
Aroclor 1254	ND	ND	N/A	ND	ND	N/A
Aroclor 1260	ND	ND	N/A	ND	ND	N/A
Chlorinated Pesticides (µg/L)						
2,4'-DDD	ND	ND	N/A	ND	ND	N/A
2,4'-DDE	ND	ND	N/A	ND	ND	N/A
2,4'-DDT	ND	ND	N/A	ND	ND	N/A
4,4'-DDD	ND	ND	N/A	ND	ND	N/A
4,4'-DDE	ND	ND	N/A	ND	ND	N/A
4,4'-DDT	ND	ND	N/A	ND	ND	N/A
Total DDT	ND	ND	N/A	ND	ND	N/A
Aldrin	ND	ND	N/A	ND	ND	N/A
Dieldrin	ND	ND	N/A	ND	ND	N/A
Endrin	ND	ND	N/A	ND	ND	N/A
Endrin aldehyde	ND	ND	N/A	ND	ND	N/A
Endrin ketone	ND	ND	N/A	ND	ND	N/A
alpha-BHC	ND	ND	N/A	ND	ND	N/A
beta-BHC	ND	ND	N/A	ND	ND	N/A
delta-BHC	ND	ND	N/A	ND	ND	N/A
gamma-BHC (Lindane)	ND	ND	N/A	ND	ND	N/A
Endosulfan I	ND	ND	N/A	ND	ND	N/A
Endosulfan II	ND	ND	N/A	ND	ND	N/A
Endosulfan sulfate	ND	ND	N/A	ND	ND	N/A
alpha-Chlordane	ND	ND	N/A	0.0129	0.0091	35
gamma-Chlordane	ND	ND	N/A	**0.0209**	**0.0052**	**120**
Heptachlor	ND	ND	N/A	ND	ND	N/A
Heptachlor epoxide	ND	ND	N/A	ND	ND	N/A
Oxychlordane	ND	ND	N/A	ND	ND	N/A
cis-Nonachlor	ND	ND	N/A	ND	0.0018	N/A
trans-Nonachlor	ND	ND	N/A	**0.0122**	**0.0054**	**77**
Total Chlordane	ND	ND	N/A	**0.046**	**0.0215**	**73**
Methoxychlor	ND	ND	N/A	ND	ND	N/A
Mirex	ND	ND	N/A	ND	ND	N/A
Toxaphene	ND	ND	N/A	ND	ND	N/A

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Storm-05 03-Mar-2006			Storm-06 29-Mar-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**	**DUP**	**Result**	**RPD**
Organophosphates (µg/L)						
Bolstar (Sulprofos)	ND	ND	N/A	ND	ND	N/A
Chlorpyrifos	ND	ND	N/A	ND	ND	N/A
Demeton	ND	ND	N/A	ND	ND	N/A
Diazinon	ND	ND	N/A	ND	ND	N/A
Dichlorvos	ND	ND	N/A	ND	ND	N/A
Dimethoate	ND	ND	N/A	ND	ND	N/A
Disulfoton	ND	ND	N/A	ND	ND	N/A
Ethoprop	ND	ND	N/A	ND	ND	N/A
Fensulfothion	ND	ND	N/A	ND	ND	N/A
Fenthion	ND	ND	N/A	ND	ND	N/A
Malathion	**0.061**	**ND**	**N/A**	**0.130**	**ND**	**N/A**
Merphos	ND	ND	N/A	ND	ND	N/A
Methyl Parathion	ND	ND	N/A	ND	ND	N/A
Mevinphos	ND	ND	N/A	ND	ND	N/A
Phorate	ND	ND	N/A	ND	ND	N/A
Ronnel	ND	ND	N/A	ND	ND	N/A
Tetrachlorvinphos (Stirophos)	ND	ND	N/A	ND	ND	N/A
Tokuthion (Prothiofos)	ND	ND	N/A	ND	ND	N/A
Trichloronate	ND	ND	N/A	ND	ND	N/A
Triazines (µg/L)						
Ametryn	ND	ND	N/A	ND	ND	N/A
Atraton	ND	ND	N/A	ND	ND	N/A
Atrazine	ND	ND	N/A	ND	ND	N/A
Cyanazine	ND	ND	N/A	ND	ND	N/A
Prometon	0.034	0.026	27	ND	ND	N/A
Prometryn	ND	ND	N/A	ND	ND	N/A
Propazine	ND	ND	N/A	ND	ND	N/A
Secbumeton	ND	ND	N/A	ND	ND	N/A
Simazine	ND	ND	N/A	ND	ND	N/A
Simetryn	ND	ND	N/A	ND	ND	N/A
Terbutryn	ND	ND	N/A	ND	ND	N/A
Terbutylazine	ND	ND	N/A	ND	ND	N/A

ND – Analyte was no detected

N/A – RPD could not be calculated because one or both of the values was not-detected
- indicates field DUPlicate not available due to low water volume

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-02 11-May-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**
Conventionals (mg/L unless noted)			
Conductivity (umhos/cm)	890	890	0
Alkalinity as CaCO3	140	140	0
Hardness as CaCO3	140	140	0
Biochemical Oxygen Demand	34	30	13
Chemical Oxygen Demand	150	140	7
Total Organic Carbon	40	39	3
Chloride	120	120	0
Fluoride	0.62	0.62	0
MBAS	0.48	0.6	22
Oil and Grease	3.8	ND	N/A
Total Ammonia (as N)	ND	ND	N/A
Total Kjeldahl Nitrogen	4.3	4.5	5
Nitrate (as N)	ND	ND	N/A
Nitrite (as N)	ND	ND	N/A
Total Orthophosphate (as P)	0.013	ND	N/A
Total Phosphorus	0.33	0.32	3
Total Recoverable Phenolics	ND	ND	N/A
Total Dissolved Solids	570	580	2
Total Suspended Solids	71	72	1
Total Volatile Solids	32	37	14
Turbidity (NTU)	26	26	0
Dissolved Metals (µg/L)			
Aluminum	2.4	3.8	45
Arsenic	4.7	4.9	4
Cadmium	0.19	0.23	19
Chromium	0.76	0.67	13
Copper	14	15	7
Iron	34	38	11
Lead	0.94	1.1	16
Nickel	3.8	4.4	15
Selenium	1.2	1.6	29
Silver	ND	0.009	N/A
Zinc	16	19	17
Total Metals (µg/L)			
Aluminum	390	400	3
Arsenic	5.7	5.8	2
Cadmium	0.32	0.32	0
Chromium	1.8	1.5	18
Copper	22	22	0
Iron	540	560	4
Lead	3.3	3.6	9
Nickel	6.5	6.5	0
Selenium	1.6	1.4	13
Silver	0.025	0.022	13
Zinc	67	68	1

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-02 11-May-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**
Bacteria (MPN/100 ml)			
Enterococcus	5800	5400	7
Fecal Coliform	1600	1100	37
Total Coliform	**50000**	**22000**	**78**
Aroclors (µg/L)			
Aroclor 1016	ND	ND	N/A
Aroclor 1221	ND	ND	N/A
Aroclor 1232	ND	ND	N/A
Aroclor 1242	ND	ND	N/A
Aroclor 1248	ND	ND	N/A
Aroclor 1254	ND	ND	N/A
Aroclor 1260	ND	ND	N/A
Chlorinated Pesticides (µg/L)			
2,4'-DDD	ND	ND	N/A
2,4'-DDE	ND	ND	N/A
2,4'-DDT	ND	ND	N/A
4,4'-DDD	ND	ND	N/A
4,4'-DDE	ND	ND	N/A
4,4'-DDT	ND	ND	N/A
Total DDT	ND	ND	N/A
Aldrin	ND	ND	N/A
Dieldrin	ND	ND	N/A
Endrin	ND	ND	N/A
Endrin aldehyde	ND	ND	N/A
Endrin ketone	ND	ND	N/A
alpha-BHC	ND	ND	N/A
beta-BHC	ND	ND	N/A
delta-BHC	ND	ND	N/A
gamma-BHC (Lindane)	ND	ND	N/A
Endosulfan I	ND	ND	N/A
Endosulfan II	ND	ND	N/A
Endosulfan sulfate	ND	ND	N/A
alpha-Chlordane	ND	ND	N/A
gamma-Chlordane	ND	ND	N/A
Heptachlor	ND	ND	N/A
Heptachlor epoxide	ND	ND	N/A
Oxychlordane	ND	ND	N/A
cis-Nonachlor	ND	ND	N/A
trans-Nonachlor	ND	ND	N/A
Total Chlordane	ND	ND	N/A
Methoxychlor	ND	ND	N/A
Mirex	ND	ND	N/A
Toxaphene	ND	ND	N/A

Table A-3 Relative Percent Difference of Field Duplicates For All Sampling Events (continued)

	Dry-02 11-May-2006		
Analytical Parameter	**DUP**	**Result**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	ND	ND	N/A
Chlorpyrifos	ND	ND	N/A
Demeton	ND	ND	N/A
Diazinon	ND	ND	N/A
Dichlorvos	ND	ND	N/A
Dimethoate	ND	ND	N/A
Disulfoton	ND	ND	N/A
Ethoprop	ND	ND	N/A
Fensulfothion	ND	ND	N/A
Fenthion	ND	ND	N/A
Malathion	ND	ND	N/A
Merphos	ND	ND	N/A
Methyl Parathion	ND	ND	N/A
Mevinphos	ND	ND	N/A
Phorate	ND	ND	N/A
Ronnel	ND	ND	N/A
Tetrachlorvinphos (Stirophos)	ND	ND	N/A
Tokuthion (Prothiofos)	ND	ND	N/A
Trichloronate	ND	ND	N/A
Triazines (µg/L)			
Ametryn	ND	ND	N/A
Atraton	ND	ND	N/A
Atrazine	ND	ND	N/A
Cyanazine	ND	ND	N/A
Prometon	ND	ND	N/A
Prometryn	ND	ND	N/A
Propazine	ND	ND	N/A
Secbumeton	ND	ND	N/A
Simazine	ND	ND	N/A
Simetryn	ND	ND	N/A
Terbutryn	ND	ND	N/A
Terbutylazine	ND	ND	N/A

ND – Analyte was no detected

N/A – RPD could not be calculated because one or both of the values was not-detected
- indicates field Duplicate not available due to low water volume

Table A-4 Method Blank Summary for All Sampling Events

Analytical Parameter	Dry-01 18-Aug-05	Storm-01 18-Oct-05	Storm-02 02-Jan-06	Storm-03 19-Feb-06	Storm-04 28-Feb-06
Conventionals (mg/L unless noted)					
Conductivity (umhos/cm)	1U	1U	1U	1U	1U
Alkalinity as CaCO3	1U	1U	1U	1U	1U
Hardness as CaCO3	1U	1U	1U	1U	1U
Biochemical Oxygen Demand	2U	2U	2U	2U	2U
Chemical Oxygen Demand	4U	4U	4U	4U	4U
Total Organic Carbon	1U	1U	1U	1U	1U
Chloride	1U	1U	1U	1U	1U
Fluoride	0.1U	0.1U	0.1U	0.1U	0.1U
MBAS	0.025U	0.025U	0.025U	0.025U	0.025U
Oil and Grease	5U	5U	5U	-	5U
Total Ammonia (as N)	0.1U	0.1U	0.1U	0.1U	0.1U
Total Kjeldahl Nitrogen	0.1U	0.1U	0.1U	**0.18**	**0.12**
Nitrate (as N)	0.1U	0.1U	0.1U	0.1U	0.1U
Nitrite (as N)	0.1U	0.1U	0.1U	0.1U	0.1U
Total Orthophosphate (as P)	0.001U	0.001U	0.001U	0.001U	0.001U
Total Phosphorus	0.03U	0.03U	0.03U	0.03U	0.03U
Total Recoverable Phenolics	0.1U	0.1U	0.1U	0.1U	0.1U
Total Dissolved Solids	10U	10U	10U	10U	10U
Total Suspended Solids	1U	1U	1U	1U	1U
Total Volatile Solids	-	10U	10U	10U	10U
Turbidity (NTU)	0.1U	0.1U	0.1U	0.1U	0.1U
Dissolved Metals (µg/L)					
Aluminum	50U	-	25U	25U	25U
Arsenic	1U	-	0.5U	0.5U	0.5U
Cadmium	0.2U	-	0.2U	0.2U	0.2U
Chromium	-	-	0.5U	0.5U	0.5U
Copper	1U	-	0.5U	0.5U	0.5U
Iron	25U	-	25U	25U	25U
Lead	0.5U	-	0.2U	0.2U	0.2U
Nickel	1U	-	0.5U	0.5U	0.5U
Selenium	-	-	1U	1U	1U
Silver	0.2U	-	0.5U	0.5U	0.5U
Zinc	1U	-	1U	1U	1U
Total Metals (µg/L)					
Aluminum	25U	5U	25U	25U	25U
Arsenic	1U	1U	0.5U	0.5U	0.5U
Cadmium	0.2U	0.0271J	0.2U	0.2U	0.2U
Chromium	0.01U	**2.18**	0.5U	0.5U	0.5U
Copper	1U	0.185J	0.5U	0.5U	0.5U
Iron	25U	-	25U	25U	25U
Lead	0.5U	0.0457J	0.2U	0.2U	0.2U
Nickel	1U	0.29J	0.5U	0.5U	0.5U
Selenium	1U	1U	1U	1U	1U
Silver	0.2U	**0.235**	0.5U	0.5U	0.5U
Zinc	1U	**3.13**	1U	1U	1U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Dry-01 18-Aug-05	Storm-01 18-Oct-05	Storm-02 02-Jan-06	Storm-03 19-Feb-06	Storm-04 28-Feb-06
Chlorinated Pesticides (µg/L)					
2,4'-DDD	0.005U	0.005U	0.005U	0.005U	0.005U
2,4'-DDE	0.005U	0.005U	0.005U	0.005U	0.005U
2,4'-DDT	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDD	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDE	0.005U	0.005U	0.005U	0.005U	0.005U
4,4'-DDT	0.005U	0.005U	0.005U	0.005U	0.005U
Aldrin	0.005U	0.005U	0.005U	0.005U	0.005U
Dieldrin	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin aldehyde	0.005U	0.005U	0.005U	0.005U	0.005U
Endrin ketone	0.005U	0.005U	0.005U	0.005U	0.005U
alpha-BHC	0.005U	0.005U	0.005U	0.005U	0.005U
beta-BHC	0.005U	0.005U	0.005U	0.005U	0.005U
delta-BHC	0.005U	0.005U	0.005U	0.005U	0.005U
gamma-BHC (Lindane)	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan I	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan II	0.005U	0.005U	0.005U	0.005U	0.005U
Endosulfan sulfate	0.005U	0.005U	0.005U	0.005U	0.005U
alpha-Chlordane	0.005U	0.005U	0.005U	0.005U	0.005U
gamma-Chlordane	0.005U	0.005U	0.005U	0.005U	0.005U
Heptachlor	0.005U	0.005U	0.005U	0.005U	0.005U
Heptachlor epoxide	0.005U	0.005U	0.005U	0.005U	0.005U
Oxychlordane	0.005U	0.005U	0.005U	0.005U	0.005U
cis-Nonachlor	0.005U	0.005U	0.005U	0.005U	0.005U
trans-Nonachlor	0.005U	0.005U	0.005U	0.005U	0.005U
Methoxychlor	0.005U	0.005U	0.005U	0.005U	0.005U
Mirex	0.005U	0.005U	0.005U	0.005U	0.005U
Toxaphene	0.05U	0.05U	0.05U	0.05U	0.05U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Dry-01 18-Aug-05	Storm-01 18-Oct-05	Storm-02 02-Jan-06	Storm-03 19-Feb-06	Storm-04 28-Feb-06
Organophosphates (µg/L)					
Bolstar (Sulprofos)	0.02U	0.02U	0.02U	0.02U	0.02U
Chlorpyrifos	0.01U	0.01U	0.01U	0.01U	0.01U
Demeton	0.02U	0.02U	0.02U	0.02U	0.02U
Diazinon	0.01U	0.01U	0.01U	0.01U	0.01U
Dichlorvos	0.02U	0.02U	0.02U	0.02U	0.02U
Dimethoate	0.01U	0.01U	0.01U	0.01U	0.01U
Disulfoton	0.02U	0.02U	0.02U	0.02U	0.02U
Ethoprop	0.02U	0.02U	0.02U	0.02U	0.02U
Fensulfothion	0.02U	0.02U	0.02U	0.02U	0.02U
Fenthion	0.02U	0.02U	0.02U	0.02U	0.02U
Malathion	0.01U	0.01U	0.01U	0.01U	0.01U
Merphos	0.02U	0.02U	0.02U	0.02U	0.02U
Methyl Parathion	0.02U	0.02U	0.02U	0.02U	0.02U
Mevinphos	0.02U	0.02U	0.02U	0.02U	0.02U
Phorate	0.02U	0.02U	0.02U	0.02U	0.02U
Ronnel	0.02U	0.02U	0.02U	0.02U	0.02U
Tetrachlorvinphos (Stirophos)	0.02U	0.02U	0.02U	0.02U	0.02U
Tokuthion (Prothiofos)	0.02U	0.02U	0.02U	0.02U	0.02U
Trichloronate	0.02U	0.02U	0.02U	0.02U	0.02U
Triazines (µg/L)					
Ametryn	0.01U	0.01U	0.01U	0.01U	0.01U
Atraton	-	0.01U	0.01U	0.01U	0.01U
Atrazine	-	0.01U	0.01U	0.01U	0.01U
Cyanazine	-	0.01U	0.01U	0.01U	0.01U
Prometon	-	0.01U	0.01U	0.01U	0.01U
Prometryn	-	0.01U	0.01U	0.01U	0.01U
Propazine	-	0.01U	0.01U	0.01U	0.01U
Secbumeton	-	0.01U	0.01U	0.01U	0.01U
Simazine	-	0.01U	0.01U	0.01U	0.01U
Simetryn	-	0.01U	0.01U	0.01U	0.01U
Terbutryn	-	0.01U	0.01U	0.01U	0.01U
Terbutylazine	-	0.01U	0.01U	0.01U	0.01U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Dry-01 18-Aug-05	Storm-01 18-Oct-05	Storm-02 02-Jan-06	Storm-03 19-Feb-06	Storm-04 28-Feb-06
PCB Congeners (µg/L)					
PCB018	0.005U	0.005U	0.005U	0.005U	0.005U
PCB028	0.005U	0.005U	0.005U	0.005U	0.005U
PCB031	0.005U	0.005U	0.005U	0.005U	0.005U
PCB033	0.005U	0.005U	0.005U	0.005U	0.005U
PCB037	0.005U	0.005U	0.005U	0.005U	0.005U
PCB044	0.005U	0.005U	0.005U	0.005U	0.005U
PCB049	0.005U	0.005U	0.005U	0.005U	0.005U
PCB052	0.005U	0.005U	0.005U	0.005U	0.005U
PCB066	0.005U	0.005U	0.005U	0.005U	0.005U
PCB070	0.005U	0.005U	0.005U	0.005U	0.005U
PCB074	0.005U	0.005U	0.005U	0.005U	0.005U
PCB077	0.005U	0.005U	0.005U	0.005U	0.005U
PCB081	0.005U	0.005U	0.005U	0.005U	0.005U
PCB087	0.005U	0.005U	0.005U	0.005U	0.005U
PCB095	0.005U	0.005U	0.005U	0.005U	0.005U
PCB097	0.005U	0.005U	0.005U	0.005U	0.005U
PCB099	0.005U	0.005U	0.005U	0.005U	0.005U
PCB101	0.005U	0.005U	0.005U	0.005U	0.005U
PCB105	0.005U	0.005U	0.005U	0.005U	0.005U
PCB110	0.005U	0.005U	0.005U	0.005U	0.005U
PCB114	0.005U	0.005U	0.005U	0.005U	0.005U
PCB118	0.005U	0.005U	0.005U	0.005U	0.005U
PCB119	0.005U	0.005U	0.005U	0.005U	0.005U
PCB123	0.005U	0.005U	0.005U	0.005U	0.005U
PCB126	0.005U	0.005U	0.005U	0.005U	0.005U
PCB128+167	0.005U	0.005U	0.005U	0.005U	0.005U
PCB138	0.005U	0.005U	0.005U	0.005U	0.005U
PCB141	0.005U	0.005U	0.005U	0.005U	0.005U
PCB149	0.005U	0.005U	0.005U	0.005U	0.005U
PCB151	0.005U	0.005U	0.005U	0.005U	0.005U
PCB153	0.005U	0.005U	0.005U	0.005U	0.005U
PCB156	0.005U	0.005U	0.005U	0.005U	0.005U
PCB157	0.005U	0.005U	0.005U	0.005U	0.005U
PCB158	0.005U	0.005U	0.005U	0.005U	0.005U
PCB168+132	0.005U	0.005U	0.005U	0.005U	0.005U
PCB169	0.005U	0.005U	0.005U	0.005U	0.005U
PCB170	0.005U	0.005U	0.005U	-	0.005U
PCB177	0.005U	0.005U	0.005U	0.005U	0.005U
PCB180	0.005U	0.005U	0.005U	0.005U	0.005U
PCB183	0.005U	0.005U	0.005U	0.005U	0.005U
PCB187	0.005U	0.005U	0.005U	0.005U	0.005U
PCB189	0.005U	0.005U	0.005U	-	0.005U
PCB194	0.005U	0.005U	0.005U	-	0.005U
PCB200	0.005U	0.005U	0.005U	0.005U	0.005U
PCB201	0.005U	0.005U	0.005U	-	0.005U
PCB206	0.005U	0.005U	0.005U	-	0.005U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-05 3-Mar-06	Storm-06 29-Mar-06	Storm-07 5-Apr-06	Storm-08 15-Apr-06	Dry-02 11-May-06
Conventionals (mg/L unless noted)					
Conductivity (umhos/cm)	1U	1U	1U	-	1U
Alkalinity as CaCO3	1U	1U	1U	-	1U
Hardness as CaCO3	1U	1U	1U	-	1U
Biochemical Oxygen Demand	2U	2U	2U	-	2U
Chemical Oxygen Demand	4U	4U	4U	-	4U
Total Organic Carbon	1U	1U	1U	-	1U
Chloride	1U	1U	1U	-	1U
Fluoride	0.1U	0.1U	0.1U	-	0.1U
MBAS	0.025U	0.025U	0.025U	-	0.025U
Oil and Grease	5U	5U	5U	-	-
Total Ammonia (as N)	0.1U	0.1U	0.1U	-	0.1U
Total Kjeldahl Nitrogen	0.1U	0.1U	0.1U	-	0.1U
Nitrate (as N)	0.1U	0.1U	0.1U	-	0.1U
Nitrite (as N)	0.1U	0.1U	0.1U	-	0.1U
Total Orthophosphate (as P)	0.001U	0.001U	0.001U	-	0.001U
Total Phosphorus	0.03U	0.03U	0.03U	-	0.03U
Total Recoverable Phenolics	0.1U	0.1U	0.1U	-	0.1U
Total Dissolved Solids	10U	10U	10U	-	10U
Total Suspended Solids	1U	1U	1U	5U	1U
Total Volatile Solids	10U	10U	10U	-	10U
Turbidity (NTU)	0.1U	0.1U	0.1U	-	0.1U
Dissolved Metals (µg/L)					
Aluminum	25U	25U	25U	-	25U
Arsenic	0.057J	0.057J	0.057J	-	0.5U
Cadmium	0.2U	0.2U	0.2U	-	0.2U
Chromium	0.09J	0.09J	0.09J	-	0.058J
Copper	0.5U	0.5U	0.5U	-	0.5U
Iron	25U	25U	25U	-	25U
Lead	0.02J	0.02J	0.02J	-	0.066J
Nickel	0.5U	0.5U	0.5U	-	0.5U
Selenium	1U	1U	1U	-	1U
Silver	0.2U	0.2U	0.2U	-	0.2U
Zinc	0.52J	0.52J	0.52J	-	0.39J
Total Metals (µg/L)					
Aluminum	25U	25U	25U	-	25U
Arsenic	0.5U	0.5U	0.5U	-	0.5U
Cadmium	0.2U	0.2U	0.2U	-	0.2U
Chromium	0.049J	0.049J	0.049J	-	0.5U
Copper	0.5U	0.5U	0.5U	-	0.5U
Iron	25U	25U	25U	-	25U
Lead	0.029J	0.029J	0.029J	-	0.2U
Nickel	0.5U	0.5U	0.5U	-	0.5U
Selenium	1U	1U	1U	-	1U
Silver	0.2U	0.2U	0.2U	-	0.2U
Zinc	1U	1U	1U	-	1U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-05 3-Mar-06	Storm-06 29-Mar-06	Storm-07 5-Apr-06	Dry-02 11-May-06
Chlorinated Pesticides (µg/L)				
2,4'-DDD	0.005U	0.005U	0.005U	0.005U
2,4'-DDE	0.005U	0.005U	0.005U	0.005U
2,4'-DDT	0.005U	0.005U	0.005U	0.005U
4,4'-DDD	0.005U	0.005U	0.005U	0.005U
4,4'-DDE	0.005U	0.005U	0.005U	0.005U
4,4'-DDT	0.005U	0.005U	0.005U	0.005U
Aldrin	0.005U	0.005U	0.005U	0.005U
Dieldrin	0.005U	0.005U	0.005U	0.005U
Endrin	0.005U	0.005U	0.005U	0.005U
Endrin aldehyde	0.005U	0.005U	0.005U	0.005U
Endrin ketone	0.005U	0.005U	0.005U	0.005U
alpha-BHC	0.005U	0.005U	0.005U	0.005U
beta-BHC	0.005U	0.005U	0.005U	0.005U
delta-BHC	0.005U	0.005U	0.005U	0.005U
gamma-BHC (Lindane)	0.005U	0.005U	0.005U	0.005U
Endosulfan I	0.005U	0.005U	0.005U	0.005U
Endosulfan II	0.005U	0.005U	0.005U	0.005U
Endosulfan sulfate	0.005U	0.005U	0.005U	0.005U
alpha-Chlordane	0.005U	0.005U	0.005U	0.005U
gamma-Chlordane	0.005U	0.005U	0.005U	0.005U
Heptachlor	0.005U	0.005U	0.005U	0.005U
Heptachlor epoxide	0.005U	0.005U	0.005U	0.005U
Oxychlordane	0.005U	0.005U	0.005U	0.005U
cis-Nonachlor	0.005U	0.005U	0.005U	0.005U
trans-Nonachlor	0.005U	0.005U	0.005U	0.005U
Methoxychlor	0.005U	0.005U	0.005U	0.005U
Mirex	0.005U	0.005U	0.005U	0.005U
Toxaphene	0.05U	0.05U	0.05U	0.05U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-05 3-Mar-06	Storm-06 29-Mar-06	Storm-07 5-Apr-06	Dry-02 11-May-06
Organophosphates (µg/L)				
Bolstar (Sulprofos)	0.004U	0.004U	0.004U	0.004U
Chlorpyrifos	0.002U	0.002U	0.002U	0.002U
Demeton	0.002U	0.002U	0.002U	0.002U
Diazinon	0.004U	0.004U	0.004U	0.004U
Dichlorvos	0.006U	0.006U	0.006U	0.006U
Dimethoate	0.006U	0.006U	0.006U	0.006U
Disulfoton	0.002U	0.002U	0.002U	0.002U
Ethoprop	0.002U	0.002U	0.002U	0.002U
Fensulfothion	0.002U	0.002U	0.002U	0.002U
Fenthion	0.004U	0.004U	0.004U	0.004U
Malathion	0.006U	0.006U	0.006U	0.006U
Merphos	0.002U	0.002U	0.002U	0.002U
Methyl Parathion	0.002U	0.002U	0.002U	0.002U
Mevinphos	0.016U	0.016U	0.016U	0.016U
Phorate	0.012U	0.012U	0.012U	0.012U
Ronnel	0.004U	0.004U	0.004U	0.004U
Tetrachlorvinphos (Stirophos)	0.004U	0.004U	0.004U	0.004U
Tokuthion (Prothiofos)	0.006U	0.006U	0.006U	0.006U
Trichloronate	0.002U	0.002U	0.002U	0.002U
Triazines (µg/L)				
Ametryn	0.01U	0.01U	0.01U	0.01U
Atraton	0.01U	0.01U	0.01U	0.01U
Atrazine	0.01U	0.01U	0.01U	0.01U
Cyanazine	0.01U	0.01U	0.01U	0.01U
Prometon	0.01U	0.01U	0.01U	0.01U
Prometryn	0.01U	0.01U	0.01U	0.01U
Propazine	0.01U	0.01U	0.01U	0.01U
Secbumeton	0.01U	0.01U	0.01U	0.01U
Simazine	0.01U	0.01U	0.01U	0.01U
Simetryn	0.01U	0.01U	0.01U	0.01U
Terbutryn	0.01U	0.01U	0.01U	0.01U
Terbutylazine	0.01U	0.01U	0.01U	0.01U

Table A-4 Method Blank Summary for All Sampling Events (Continued)

	Storm-05	Storm-06	Storm-07	Dry-02
Analytical Parameter	**3-Mar-06**	**29-Mar-06**	**5-Apr-06**	**11-May-06**
PCB Congeners (µg/L)				
PCB018	0.005U	0.005U	0.005U	0.005U
PCB028	0.005U	0.005U	0.005U	0.005U
PCB031	0.005U	0.005U	0.005U	0.005U
PCB033	0.005U	0.005U	0.005U	0.005U
PCB037	0.005U	0.005U	0.005U	0.005U
PCB044	0.005U	0.005U	0.005U	0.005U
PCB049	0.005U	0.005U	0.005U	0.005U
PCB052	0.005U	0.005U	0.005U	0.005U
PCB066	0.005U	0.005U	0.005U	0.005U
PCB070	0.005U	0.005U	0.005U	0.005U
PCB074	0.005U	0.005U	0.005U	0.005U
PCB077	0.005U	0.005U	0.005U	0.005U
PCB081	0.005U	0.005U	0.005U	0.005U
PCB087	0.005U	0.005U	0.005U	0.005U
PCB095	0.005U	0.005U	0.005U	0.005U
PCB097	0.005U	0.005U	0.005U	0.005U
PCB099	0.005U	0.005U	0.005U	0.005U
PCB101	0.005U	0.005U	0.005U	0.005U
PCB105	0.005U	0.005U	0.005U	0.005U
PCB110	0.005U	0.005U	0.005U	0.005U
PCB114	0.005U	0.005U	0.005U	0.005U
PCB118	0.005U	0.005U	0.005U	0.005U
PCB119	0.005U	0.005U	0.005U	0.005U
PCB123	0.005U	0.005U	0.005U	0.005U
PCB126	0.005U	0.005U	0.005U	0.005U
PCB128+167	0.005U	0.005U	0.005U	0.005U
PCB138	0.005U	0.005U	0.005U	0.005U
PCB141	0.005U	0.005U	0.005U	0.005U
PCB149	0.005U	0.005U	0.005U	0.005U
PCB151	0.005U	0.005U	0.005U	0.005U
PCB153	0.005U	0.005U	0.005U	0.005U
PCB156	0.005U	0.005U	0.005U	0.005U
PCB157	0.005U	0.005U	0.005U	0.005U
PCB158	0.005U	0.005U	0.005U	0.005U
PCB168+132	0.005U	0.005U	0.005U	0.005U
PCB169	0.005U	0.005U	0.005U	0.005U
PCB170	0.005U	0.005U	0.005U	0.005U
PCB177	0.005U	0.005U	0.005U	0.005U
PCB180	0.005U	0.005U	0.005U	0.005U
PCB183	0.005U	0.005U	0.005U	0.005U
PCB187	0.005U	0.005U	0.005U	0.005U
PCB189	0.005U	0.005U	0.005U	0.005U
PCB194	0.005U	0.005U	0.005U	0.005U
PCB200	0.005U	0.005U	0.005U	0.005U
PCB201	0.005U	0.005U	0.005U	0.005U
PCB206	0.005U	0.005U	0.005U	0.005U

Table A-5 Laboratory Duplicate Summary for All Sampling Events

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	2230	2200	1.4	27700	27700	0
Alkalinity as CaCO3	140	141	0.7	49	49	0
Hardness as CaCO3	265	270	1.9	386	386	0
Biochemical Oxygen Demand	4.1	4.4	7.1	35.3	30	16.2
Chemical Oxygen Demand	204	210	2.9	173.9	170	2.3
Total Organic Carbon	33.3	35	5.0	1U	1U	N/A
Chloride	584	580	0.7	30.1	30	0.3
Fluoride	0.71	0.7	1.4	0.26	0.25	3.9
MBAS	0.025U	0.025U	N/A	0.06	0.055	8.7
Oil and Grease	5U	5U	N/A	5U	5U	N/A
Total Ammonia (as N)	0.1U	0.1U	N/A	0.575	0.549	4.6
Total Kjeldahl Nitrogen	3.96	3.4	15.2	2.16	2.26	4.5
Nitrate (as N)	0.1U	0.1U	N/A	1.44	1.4	2.8
Nitrite (as N)	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Orthophosphate (as P)	0.016	0.016	0	0.523	0.51	2.5
Total Phosphorus	0.264	0.26	1.5	0.508	0.543	6.7
Total Recoverable Phenolics	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Dissolved Solids	1293	1300	0.5	152	150	1.3
Total Suspended Solids	41.6	44	5.6	12	13.2	9.5
Total Volatile Solids	-	-	N/A	176	170	3.5
Turbidity (NTU)	21.8	22	0.9	104	100	3.9
Dissolved Metals (µg/L)						
Aluminum	50U	50U	N/A	100U	100U	N/A
Arsenic	7.69	8	4.0	1.43	1.4	2.1
Cadmium	0.2U	0.12J	N/A	0.2U	0.2U	N/A
Chromium	0.23	0.23	0	0.726	0.64	12.6
Copper	8.77	8	9.2	1.9	1.9	0
Iron	25U	25U	N/A	144	140	2.8
Lead	0.5U	0.35J	N/A	0.5U	0.1J	N/A
Nickel	1U	1U	N/A	1U	0.68J	N/A
Selenium	1U	0.11J	N/A	1U	1U	N/A
Silver	0.2U	0.061J	N/A	0.2U	0.2U	N/A
Zinc	11.8	12	1.7	**1U**	**2.7**	**N/A**
Total Metals (µg/L)						
Aluminum	25U	14J	N/A	5U	9	N/A
Arsenic	1U	1U	N/A	1U	1U	N/A
Cadmium	0.2U	0.2U	N/A	0.2U	0.032J	N/A
Chromium	0.37	0.36	2.7	1.35	1.4	3.6
Copper	**14.1**	**1U**	**N/A**	0.98	1.3	28.1
Iron	150	160	6.5	7370	7400	0.4
Lead	0.5U	0.5U	N/A	0.5U	0.2J	N/A
Nickel	1U	1U	N/A	1U	0.62J	N/A
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	0.2U	0.044J	N/A	0.2U	0.2U	N/A
Zinc	2.55	2.6	1.9	**2.71**	**4.2**	**43.1**

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**R1**	**R2**	**RPD**
Chlorinated Pesticides (µg/L)			
2,4'-DDD	0.005U	0.005U	N/A
2,4'-DDE	0.005U	0.005U	N/A
2,4'-DDT	0.005U	0.005U	N/A
4,4'-DDD	0.005U	0.005U	N/A
4,4'-DDE	0.005U	0.005U	N/A
4,4'-DDT	0.005U	0.005U	N/A
Aldrin	0.005U	0.005U	N/A
Dieldrin	0.005U	0.005U	N/A
Endrin	0.005U	0.005U	N/A
Endrin aldehyde	0.005U	0.005U	N/A
Endrin ketone	0.005U	0.005U	N/A
alpha-BHC	0.005U	0.005U	N/A
beta-BHC	0.005U	0.005U	N/A
delta-BHC	0.005U	0.005U	N/A
gamma-BHC (Lindane)	0.005U	0.005U	N/A
Endosulfan I	0.005U	0.005U	N/A
Endosulfan II	0.005U	0.005U	N/A
Endosulfan sulfate	0.005U	0.005U	N/A
alpha-Chlordane	0.005U	0.005U	N/A
gamma-Chlordane	0.005U	0.005U	N/A
Heptachlor	0.005U	0.005U	N/A
Heptachlor epoxide	0.005U	0.005U	N/A
Oxychlordane	0.005U	0.005U	N/A
cis-Nonachlor	0.005U	0.005U	N/A
trans-Nonachlor	0.005U	0.005U	N/A
Methoxychlor	0.005U	0.005U	N/A
Mirex	0.005U	0.005U	N/A
Toxaphene	0.05U	0.05U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**R1**	**R2**	**RPD**
Organophosphates(µg/L			
Bolstar (Sulprofos)	0.02U	0.02U	N/A
Chlorpyrifos	0.01U	0.01U	N/A
Demeton	0.02U	0.02U	N/A
Diazinon	0.01U	0.01U	N/A
Dichlorvos	0.02U	0.02U	N/A
Dimethoate	0.01U	0.01U	N/A
Disulfoton	0.02U	0.02U	N/A
Ethoprop	0.02U	0.02U	N/A
Fensulfothion	0.02U	0.02U	N/A
Fenthion	0.02U	0.02U	N/A
Malathion	0.01U	0.01U	N/A
Merphos	0.02U	0.02U	N/A
Methyl Parathion	0.02U	0.02U	N/A
Mevinphos	0.02U	0.02U	N/A
Phorate	0.02U	0.02U	N/A
Ronnel	0.02U	0.02U	N/A
Tetrachlorvinphos (Stirophos)	0.02U	0.02U	N/A
Tokuthion (Prothiofos)	0.02U	0.02U	N/A
Trichloronate	0.02U	0.02U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**R1**	**R2**	**RPD**
PCB Congeners (µg/L)			
PCB018	0.005U	0.005U	N/A
PCB028	0.005U	0.005U	N/A
PCB031	0.005U	0.005U	N/A
PCB033	0.005U	0.005U	N/A
PCB037	0.005U	0.005U	N/A
PCB044	0.005U	0.005U	N/A
PCB049	0.005U	0.005U	N/A
PCB052	0.005U	0.005U	N/A
PCB066	0.005U	0.005U	N/A
PCB070	0.005U	0.005U	N/A
PCB074	0.005U	0.005U	N/A
PCB077	0.005U	0.005U	N/A
PCB081	0.005U	0.005U	N/A
PCB087	0.005U	0.005U	N/A
PCB095	0.005U	0.005U	N/A
PCB097	0.005U	0.005U	N/A
PCB099	0.005U	0.005U	N/A
PCB101	0.005U	0.005U	N/A
PCB105	0.005U	0.005U	N/A
PCB110	0.005U	0.005U	N/A
PCB114	0.005U	0.005U	N/A
PCB118	0.005U	0.005U	N/A
PCB119	0.005U	0.005U	N/A
PCB123	0.005U	0.005U	N/A
PCB126	0.005U	0.005U	N/A
PCB128+167	0.005U	0.005U	N/A
PCB138	0.005U	0.005U	N/A
PCB141	0.005U	0.005U	N/A
PCB149	0.005U	0.005U	N/A
PCB151	0.005U	0.005U	N/A
PCB153	0.005U	0.005U	N/A
PCB156	0.005U	0.005U	N/A
PCB157	0.005U	0.005U	N/A
PCB158	0.005U	0.005U	N/A
PCB168+132	0.005U	0.005U	N/A
PCB169	0.005U	0.005U	N/A
PCB170	0.005U	0.005U	N/A
PCB177	0.005U	0.005U	N/A
PCB180	0.005U	0.005U	N/A
PCB183	0.005U	0.005U	N/A
PCB187	0.005U	0.005U	N/A
PCB189	0.005U	0.005U	N/A
PCB194	0.005U	0.005U	N/A
PCB200	0.005U	0.005U	N/A
PCB201	0.005U	0.005U	N/A
PCB206	0.005U	0.005U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-02 02-Jan-2006			Storm-03 19-Feb-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	248	240	3.3	137	140	2.2
Alkalinity as CaCO3	35	35	0	60.5	61	0.8
Hardness as CaCO3	25	24.8	0.8	23	23	0
Biochemical Oxygen Demand	12.3	11	11.2	37	33	11.4
Chemical Oxygen Demand	91.5	89	2.8	167.4	170	1.5
Total Organic Carbon	16	16	0	11.8	10	16.5
Chloride	58.93	59	0.1	75.1	79	5.1
Fluoride	0.153	0.15	2.0	0.36	0.31	14.9
MBAS	0.1U	0.1U	N/A	0.566	0.594	4.8
Oil and Grease	5U	5U	N/A	-	-	-
Total Ammonia (as N)	0.963	0.949	1.5	0.332	0.342	3.0
Total Kjeldahl Nitrogen	2.63	2.29	13.8	2.53	2.41	4.9
Nitrate (as N)	0.871	0.88	1.0	2.11	2.1	0.5
Nitrite (as N)	0.1U	0.1U	N/A	0.105	0.1U	N/A
Total Orthophosphate (as P)	0.199	0.2	0.5	0.253	0.25	1.2
Total Phosphorus	1.44	1.59	9.9	0.071	0.071	0
Total Recoverable Phenolics	0.1U	0.1U	N/A	0.1U	0.1J	N/A
Total Dissolved Solids	87	88	1.1	345	340	1.5
Total Suspended Solids	87	90	3.4	78	78.7	0.9
Total Volatile Solids	24	28	15.4	66	73	10.1
Turbidity (NTU)	62	60	3.3	72	76	5.4
Dissolved Metals (µg/L)						
Aluminum	25U	25U	N/A	452	460	1.8
Arsenic	0.628	0.67	6.5	1.27	1.3	2.3
Cadmium	0.2U	0.2U	N/A	0.2U	0.12J	N/A
Chromium	0.5U	0.5U	N/A	1.39	1.4	0.7
Copper	1.84	1.81	1.6	6.8	6.9	1.5
Iron	59.3	60	1.2	199	200	0.5
Lead	0.2U	0.2U	N/A	0.915	0.92	0.5
Nickel	2.23	2.23	0	1.68	1.7	1.2
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	0.5U	0.5U	N/A	0.2U	0.2U	N/A
Zinc	2.62	2.42	7.9	52.18	53	1.6
Total Metals (µg/L)						
Aluminum	5.28U	25J	N/A	10940	10770	1.6
Arsenic	4.13	4.21	1.9	4.59	4.6	0.2
Cadmium	0.2U	0.2U	N/A	1.29	1.3	0.8
Chromium	5.28	5.53	4.6	13.45	13	3.4
Copper	0.623	0.68	8.7	109.7	110	0.3
Iron	147	157	6.6	6870	7000	1.9
Lead	0.2U	0.2U	N/A	49.31	51	3.4
Nickel	2.27	2.46	8.0	18.72	18	3.9
Selenium	8.3	8.42	1.4	1U	0.76U	N/A
Silver	0.5U	0.5U	N/A	0.203	0.23	12.5
Zinc	1U	1U	N/A	629.8	620	1.6

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006			Storm-05 03-Mar-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	145	140	3.5	61	62	1.6
Alkalinity as CaCO3	19.7	20	1.5	25.2	25	0.8
Hardness as CaCO3	23	23	0	23	23	0
Biochemical Oxygen Demand	9.75	8.9	9.1	19	18	5.4
Chemical Oxygen Demand	167.4	170	1.5	167.4	170	1.5
Total Organic Carbon	11.8	10	16.5	11.8	10	16.5
Chloride	7.94	7.7	3.1	3.44	3.4	1.2
Fluoride	0.1U	0.059J	N/A	0.1U	0.1U	N/A
MBAS	0.025U	0.2U	N/A	0.1U	0.1U	N/A
Oil and Grease	5U	2.4J	N/A	5U	5U	N/A
Total Ammonia (as N)	0.456	0.436	4.5	0.366	0.39	6.3
Total Kjeldahl Nitrogen	1.38	1.63	16.6	1.78	1.8	1.1
Nitrate (as N)	0.563	0.56	0.5	0.353	0.36	2.0
Nitrite (as N)	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Orthophosphate (as P)	0.107	0.105	1.9	0.113	0.12	6.0
Total Phosphorus	0.201	0.213	5.8	0.182	0.161	12.2
Total Recoverable Phenolics	0.1U	0.1J	N/A	0.1U	0.1J	N/A
Total Dissolved Solids	55	55	0	55	55	0
Total Suspended Solids	23	21.75	5.6	-	-	-
Total Volatile Solids	59	61	3.3	59	61	3.3
Turbidity (NTU)	61	62	1.6	186	190	2.1
Dissolved Metals (µg/L)						
Aluminum	452	460	1.8	26.46	28	5.7
Arsenic	1.27	1.3	2.3	1.15	1.2	4.3
Cadmium	0.2U	0.12J	N/A	0.026	0.031	17.5
Chromium	1.39	1.4	0.7	0.766	0.74	3.5
Copper	6.8	6.9	1.5	8.96	8.7	2.9
Iron	199	200	0.5	199	200	0.5
Lead	0.915	0.92	0.5	0.675	0.67	0.7
Nickel	1.68	1.7	1.2	1.79	1.7	5.2
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	0.2U	0.2U	N/A	0.2U	0.2U	N/A
Zinc	52.18	53	1.6	43.23	42	2.9
Total Metals (µg/L)						
Aluminum	10940	10770	1.6	654	663	1.4
Arsenic	4.59	4.6	0.2	1.72	1.68	2.4
Cadmium	1.29	1.3	0.8	0.11	0.117	6.2
Chromium	13.45	13	3.4	1.82	1.83	0.5
Copper	109.7	110	0.3	11.5	11.2	2.6
Iron	4010	3980	0.8	4010	3980	0.8
Lead	49.31	51	3.4	5.29	3.52	40.2
Nickel	18.72	18	3.9	2.87	2.75	4.3
Selenium	1U	0.76U	N/A	1U	1U	N/A
Silver	0.203	0.23	12.5	0.027	0.019	34.8
Zinc	629.8	620	1.6	53.62	51.95	3.2

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Chlorinated Pesticides (µg/L)			
2,4'-DDD	0.005U	0.005U	N/A
2,4'-DDE	0.005U	0.005U	N/A
2,4'-DDT	0.005U	0.005U	N/A
4,4'-DDD	0.005U	0.005U	N/A
4,4'-DDE	0.005U	0.005U	N/A
4,4'-DDT	0.005U	0.005U	N/A
Aldrin	0.005U	0.005U	N/A
Dieldrin	0.005U	0.005U	N/A
Endrin	0.005U	0.005U	N/A
Endrin aldehyde	0.005U	0.005U	N/A
Endrin ketone	0.005U	0.005U	N/A
alpha-BHC	0.005U	0.005U	N/A
beta-BHC	0.005U	0.005U	N/A
delta-BHC	0.005U	0.005U	N/A
gamma-BHC (Lindane)	0.005U	0.005U	N/A
Endosulfan I	0.005U	0.005U	N/A
Endosulfan II	0.005U	0.005U	N/A
Endosulfan sulfate	0.005U	0.005U	N/A
alpha-Chlordane	0.005U	0.005U	N/A
gamma-Chlordane	0.005U	0.005U	N/A
Heptachlor	0.005U	0.005U	N/A
Heptachlor epoxide	0.005U	0.005U	N/A
Oxychlordane	0.005U	0.005U	N/A
cis-Nonachlor	0.005U	0.005U	N/A
trans-Nonachlor	0.005U	0.005U	N/A
Methoxychlor	0.005U	0.005U	N/A
Mirex	0.005U	0.005U	N/A
Toxaphene	0.05U	0.05U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	0.004U	0.004U	N/A
Chlorpyrifos	0.002U	0.002U	N/A
Demeton	0.002U	0.002U	N/A
Diazinon	0.004U	0.004U	N/A
Dichlorvos	0.006U	0.006U	N/A
Dimethoate	0.006U	0.006U	N/A
Disulfoton	0.002U	0.002U	N/A
Ethoprop	0.002U	0.002U	N/A
Fensulfothion	0.002U	0.002U	N/A
Fenthion	0.004U	0.004U	N/A
Malathion	0.006UJ	0.006UJ	N/A
Merphos	0.002U	0.002U	N/A
Methyl Parathion	0.002U	0.002U	N/A
Mevinphos	0.016U	0.016U	N/A
Phorate	0.012U	0.012U	N/A
Ronnel	0.004U	0.004U	N/A
Tetrachlorvinphos (Stirophos)	0.004U	0.004U	N/A
Tokuthion (Prothiofos)	0.006U	0.006U	N/A
Trichloronate	0.002U	0.002U	N/A
Triazines (µg/L)			
Ametryn	0.01U	0.01U	N/A
Atraton	0.01U	0.01U	N/A
Atrazine	0.01U	0.01U	N/A
Cyanazine	0.01U	0.01U	N/A
Prometon	0.01U	0.01U	N/A
Prometryn	0.01U	0.01U	N/A
Propazine	0.01U	0.01U	N/A
Secbumeton	0.01U	0.01U	N/A
Simazine	0.01U	0.01U	N/A
Simetryn	0.01U	0.01U	N/A
Terbutryn	0.01U	0.01U	N/A
Terbutylazine	0.01U	0.01U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
PCB Congeners (µg/L)			
PCB018	0.005U	0.005U	N/A
PCB028	0.005U	0.005U	N/A
PCB031	0.005U	0.005U	N/A
PCB033	0.005U	0.005U	N/A
PCB037	0.005U	0.005U	N/A
PCB044	0.005U	0.005U	N/A
PCB049	0.005U	0.005U	N/A
PCB052	0.005U	0.005U	N/A
PCB066	0.005U	0.005U	N/A
PCB070	0.005U	0.005U	N/A
PCB074	0.005U	0.005U	N/A
PCB077	0.005U	0.005U	N/A
PCB081	0.005U	0.005U	N/A
PCB087	0.005U	0.005U	N/A
PCB095	0.005U	0.005U	N/A
PCB097	0.005U	0.005U	N/A
PCB099	0.005U	0.005U	N/A
PCB101	0.005U	0.005U	N/A
PCB105	0.005U	0.005U	N/A
PCB110	0.005U	0.005U	N/A
PCB114	0.005U	0.005U	N/A
PCB118	0.005U	0.005U	N/A
PCB119	0.005U	0.005U	N/A
PCB123	0.005U	0.005U	N/A
PCB126	0.005U	0.005U	N/A
PCB128+167	0.005U	0.005U	N/A
PCB138	0.005U	0.005U	N/A
PCB141	0.005U	0.005U	N/A
PCB149	0.005U	0.005U	N/A
PCB151	0.005U	0.005U	N/A
PCB153	0.005U	0.005U	N/A
PCB156	0.005U	0.005U	N/A
PCB157	0.005U	0.005U	N/A
PCB158	0.005U	0.005U	N/A
PCB168+132	0.005U	0.005U	N/A
PCB169	0.005U	0.005U	N/A
PCB170	0.005U	0.005U	N/A
PCB177	0.005U	0.005U	N/A
PCB180	0.005U	0.005U	N/A
PCB183	0.005U	0.005U	N/A
PCB187	0.005U	0.005U	N/A
PCB189	0.005U	0.005U	N/A
PCB194	0.005U	0.005U	N/A
PCB200	0.005U	0.005U	N/A
PCB201	0.005U	0.005U	N/A
PCB206	0.005U	0.005U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)						
Conductivity (umhos/cm)	94	94	0	80	80	0
Alkalinity as CaCO3	20.4	20	2.0	22.7	23	1.3
Hardness as CaCO3	21	21	0	450	450	0
Biochemical Oxygen Demand	8.09	7.6	6.2	5.94	6.1	2.7
Chemical Oxygen Demand	64.9	68	4.7	64.9	68	4.7
Total Organic Carbon	10.37	10	3.6	8.96	9.5	5.9
Chloride	10.56	11	4.1	4.82	4.8	0.4
Fluoride	0.0974	0.097	0.4	0.1U	0.1U	N/A
MBAS	0.083	0.11	28.0	0.129	0.12	7.2
Oil and Grease	5	5.1	2.0	-	-	N/A
Total Ammonia (as N)	0.301	0.32	6.1	0.15	0.13	14.3
Total Kjeldahl Nitrogen	1.15	1	14.0	1.15	1	14.0
Nitrate (as N)	0.447	0.43	3.9	0.24	0.24	0
Nitrite (as N)	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Orthophosphate (as P)	0.181	0.19	4.9	0.193	0.19	1.6
Total Phosphorus	0.284	0.29	2.1	0.284	0.29	2.1
Total Recoverable Phenolics	0.1U	0.1U	N/A	0.1U	0.1U	N/A
Total Dissolved Solids	70	73	4.2	909	910	0.1
Total Suspended Solids	22.9	26	12.7	14.2	14	1.4
Total Volatile Solids	8	7.4	7.8	4.74	4.2	12.1
Turbidity (NTU)	42	44	4.7	21	20	4.9
Dissolved Metals (µg/L)						
Aluminum	26.46	28	5.7	26.46	28	5.7
Arsenic	1.15	1.2	4.3	1.15	1.2	4.3
Cadmium	0.026	0.031	17.5	0.026	0.031	17.5
Chromium	0.766	0.74	3.5	0.766	0.74	3.5
Copper	8.96	8.7	2.9	8.96	8.7	2.9
Iron	249	250	0.4	136	140	2.9
Lead	0.675	0.67	0.7	0.675	0.67	0.7
Nickel	1.79	1.7	5.2	1.79	1.7	5.2
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	0.2U	0.2U	N/A	0.2U	0.2U	N/A
Zinc	43.23	42	2.9	43.23	42	2.9
Total Metals (µg/L)						
Aluminum	654	663	1.4	654	663	1.4
Arsenic	1.72	1.68	2.4	1.72	1.68	2.4
Cadmium	0.11	0.117	6.2	0.11	0.117	6.2
Chromium	1.82	1.83	0.5	1.82	1.83	0.5
Copper	11.5	11.2	2.6	11.5	11.2	2.6
Iron	1210	1300	7.2	947	960	1.4
Lead	5.29	5.32	0.6	5.29	5.32	0.6
Nickel	2.87	2.75	4.3	2.87	2.75	4.3
Selenium	1U	1U	N/A	1U	1U	N/A
Silver	**0.027J**	**0.019**	**34.8**	**0.027**	**0.019J**	**34.8**
Zinc	53.62	51.95	3.2	53.62	51.95	3.2

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Chlorinated Pesticides (µg/L)						
2,4'-DDD	0.005U	0.005U	N/A	0.005U	0.005U	N/A
2,4'-DDE	0.005U	0.005U	N/A	0.005U	0.005U	N/A
2,4'-DDT	0.005U	0.005U	N/A	0.005U	0.005U	N/A
4,4'-DDD	0.005U	0.005U	N/A	0.005U	0.005U	N/A
4,4'-DDE	0.018	0.023	24.4	0.005U	0.005U	N/A
4,4'-DDT	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Aldrin	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Dieldrin	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endrin	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endrin aldehyde	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endrin ketone	0.005U	0.005U	N/A	0.005U	0.005U	N/A
alpha-BHC	0.005U	0.005U	N/A	0.005U	0.005U	N/A
beta-BHC	0.005U	0.005U	N/A	0.005U	0.005U	N/A
delta-BHC	0.005U	0.005U	N/A	0.005U	0.005U	N/A
gamma-BHC (Lindane)	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endosulfan I	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endosulfan II	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Endosulfan sulfate	0.005U	0.005U	N/A	0.005U	0.005U	N/A
alpha-Chlordane	0.020	0.024	18.7	0.005U	0.005U	N/A
gamma-Chlordane	0.026	0.020	29.3	**0.004J**	**0.003J**	**44.4**
Heptachlor	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Heptachlor epoxide	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Oxychlordane	0.005U	0.005U	N/A	0.005U	0.005U	N/A
cis-Nonachlor	0.013	0.011	16.5	0.005U	0.005U	N/A
trans-Nonachlor	0.017	0.018	1.7	**0.002J**	**0.001J**	**51.9**
Methoxychlor	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Mirex	0.005U	0.005U	N/A	0.005U	0.005U	N/A
Toxaphene	0.05U	0.05U	N/A	0.05U	0.05U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
Organophosphates (µg/L)						
Bolstar (Sulprofos)	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Chlorpyrifos	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Demeton	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Diazinon	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Dichlorvos	0.006U	0.006U	N/A	0.006U	0.006U	N/A
Dimethoate	0.006U	0.006U	N/A	0.006U	0.006U	N/A
Disulfoton	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Ethoprop	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Fensulfothion	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Fenthion	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Malathion	0.197	0.197	0	0.082	0.070	15.4
Merphos	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Methyl Parathion	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Mevinphos	0.016U	0.016U	N/A	0.016U	0.016U	N/A
Phorate	0.012U	0.012U	N/A	0.012U	0.012U	N/A
Ronnel	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Tetrachlorvinphos (Stirophos)	0.004U	0.004U	N/A	0.004U	0.004U	N/A
Tokuthion (Prothiofos)	0.006U	0.006U	N/A	0.006U	0.006U	N/A
Trichloronate	0.002U	0.002U	N/A	0.002U	0.002U	N/A
Triazines (µg/L)						
Ametryn	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Atraton	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Atrazine	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Cyanazine	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Prometon	0.01U	0.01U	N/A	0.045	0.046	0.9
Prometryn	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Propazine	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Secbumeton	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Simazine	0.01U	0.01U	N/A	0.026	0.022	19.2
Simetryn	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Terbutryn	0.01U	0.01U	N/A	0.01U	0.01U	N/A
Terbutylazine	0.01U	0.01U	N/A	0.01U	0.01U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**R1**	**R2**	**RPD**	**R1**	**R2**	**RPD**
PCB Congeners (µg/L)						
PCB018	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB028	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB031	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB033	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB037	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB044	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB049	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB052	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB066	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB070	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB074	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB077	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB081	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB087	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB095	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB097	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB099	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB101	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB105	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB110	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB114	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB118	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB119	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB123	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB126	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB128+167	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB138	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB141	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB149	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB151	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB153	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB156	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB157	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB158	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB168+132	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB169	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB170	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB177	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB180	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB183	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB187	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB189	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB194	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB200	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB201	0.005U	0.005U	N/A	0.005U	0.005U	N/A
PCB206	0.005U	0.005U	N/A	0.005U	0.005U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Conventionals (mg/L unless noted)			
Conductivity (umhos/cm)	891	890	0.1
Alkalinity as CaCO3	134.5	140	4.0
Hardness as CaCO3	145	140	3.5
Biochemical Oxygen Demand	3.1	3.1	0
Chemical Oxygen Demand	137.9	140	1.5
Total Organic Carbon	38.6	40	3.6
Chloride	121.7	120	1.4
Fluoride	0.58	0.62	6.7
MBAS	0.535	0.6	11.5
Oil and Grease	-	-	-
Total Ammonia (as N)	0.1U	0.1U	N/A
Total Kjeldahl Nitrogen	4.41	4.5	2.0
Nitrate (as N)	0.1U	0.1U	N/A
Nitrite (as N)	0.1U	0.1U	N/A
Total Orthophosphate (as P)	0.01U	0.01U	N/A
Total Phosphorus	0.356	0.32	10.7
Total Recoverable Phenolics	0.1U	0.1U	N/A
Total Dissolved Solids	589	580	1.5
Total Suspended Solids	65.6	72	9.3
Total Volatile Solids	32.4	37	13.3
Turbidity (NTU)	26.8	26	3.0
Dissolved Metals (µg/L)			
Aluminum	3.38	3.81	12.0
Arsenic	4.86	4.88	0.4
Cadmium	0.218	0.232	6.2
Chromium	0.49	0.67	31.0
Copper	14.86	15.06	1.3
Iron	37.3	46	20.9
Lead	0.95	1.07	11.9
Nickel	4.27	4.36	2.1
Selenium	1.3	1.58	19.4
Silver	0.009	0.009	0
Zinc	17.7	18.58	4.9
Total Metals (µg/L)			
Aluminum	46.7	56.4	18.8
Arsenic	2.24	2.35	4.8
Cadmium	0.2U	0.2U	N/A
Chromium	0.556	0.512	8.2
Copper	5.57	5.48	1.6
Iron	186.4	170	9.2
Lead	0.482	0.456	5.5
Nickel	1.35	1.3	3.8
Selenium	**0.379**	**0.276**	**31.5**
Silver	0.2U	0.2U	N/A
Zinc	8.93	9.17	2.7

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Chlorinated Pesticides (µg/L)			
2,4'-DDD	0.005U	0.005U	N/A
2,4'-DDE	0.005U	0.005U	N/A
2,4'-DDT	0.005U	0.005U	N/A
4,4'-DDD	0.005U	0.005U	N/A
4,4'-DDE	0.005U	0.005U	N/A
4,4'-DDT	0.005U	0.005U	N/A
Aldrin	0.005U	0.005U	N/A
Dieldrin	0.005U	0.005U	N/A
Endrin	0.005U	0.005U	N/A
Endrin aldehyde	0.005U	0.005U	N/A
Endrin ketone	0.005U	0.005U	N/A
alpha-BHC	0.005U	0.005U	N/A
beta-BHC	0.005U	0.005U	N/A
delta-BHC	0.005U	0.005U	N/A
gamma-BHC (Lindane)	0.005U	0.005U	N/A
Endosulfan I	0.005U	0.005U	N/A
Endosulfan II	0.005U	0.005U	N/A
Endosulfan sulfate	0.005U	0.005U	N/A
alpha-Chlordane	0.005U	0.005U	N/A
gamma-Chlordane	0.005U	0.005U	N/A
Heptachlor	0.005U	0.005U	N/A
Heptachlor epoxide	0.005U	0.005U	N/A
Oxychlordane	0.005U	0.005U	N/A
cis-Nonachlor	0.005U	0.005U	N/A
trans-Nonachlor	0.005U	0.005U	N/A
Methoxychlor	0.005U	0.005U	N/A
Mirex	0.005U	0.005U	N/A
Toxaphene	0.05U	0.05U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
Organophosphates (µg/L)			
Bolstar (Sulprofos)	0.004U	0.004U	N/A
Chlorpyrifos	0.002U	0.002U	N/A
Demeton	0.002U	0.002U	N/A
Diazinon	0.004U	0.004U	N/A
Dichlorvos	0.006U	0.006U	N/A
Dimethoate	0.006U	0.006U	N/A
Disulfoton	0.002U	0.002U	N/A
Ethoprop	0.002U	0.002U	N/A
Fensulfothion	0.002U	0.002U	N/A
Fenthion	0.004U	0.004U	N/A
Malathion	0.006U	0.006U	N/A
Merphos	0.002U	0.002U	N/A
Methyl Parathion	0.002U	0.002U	N/A
Mevinphos	0.016U	0.016U	N/A
Phorate	0.012U	0.012U	N/A
Ronnel	0.004U	0.004U	N/A
Tetrachlorvinphos (Stirophos)	0.004U	0.004U	N/A
Tokuthion (Prothiofos)	0.006U	0.006U	N/A
Trichloronate	0.002U	0.002U	N/A
Triazines (µg/L)			
Ametryn	0.01U	0.01U	N/A
Atraton	0.01U	0.01U	N/A
Atrazine	0.01U	0.01U	N/A
Cyanazine	0.01U	0.01U	N/A
Prometon	0.038	0.052	29.9
Prometryn	0.01U	0.01U	N/A
Propazine	0.01U	0.01U	N/A
Secbumeton	0.01U	0.01U	N/A
Simazine	0.01U	0.01U	N/A
Simetryn	0.01U	0.01U	N/A
Terbutryn	0.01U	0.01U	N/A
Terbutylazine	0.01U	0.01U	N/A

Table A-5 Laboratory Duplicate Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**R1**	**R2**	**RPD**
PCB Congeners (µg/L)			
PCB018	0.005U	0.005U	N/A
PCB028	0.005U	0.005U	N/A
PCB031	0.005U	0.005U	N/A
PCB033	0.005U	0.005U	N/A
PCB037	0.005U	0.005U	N/A
PCB044	0.005U	0.005U	N/A
PCB049	0.005U	0.005U	N/A
PCB052	0.005U	0.005U	N/A
PCB066	0.005U	0.005U	N/A
PCB070	0.005U	0.005U	N/A
PCB074	0.005U	0.005U	N/A
PCB077	0.005U	0.005U	N/A
PCB081	0.005U	0.005U	N/A
PCB087	0.005U	0.005U	N/A
PCB095	0.005U	0.005U	N/A
PCB097	0.005U	0.005U	N/A
PCB099	0.005U	0.005U	N/A
PCB101	0.005U	0.005U	N/A
PCB105	0.005U	0.005U	N/A
PCB110	0.005U	0.005U	N/A
PCB114	0.005U	0.005U	N/A
PCB118	0.005U	0.005U	N/A
PCB119	0.005U	0.005U	N/A
PCB123	0.005U	0.005U	N/A
PCB126	0.005U	0.005U	N/A
PCB128+167	0.005U	0.005U	N/A
PCB138	0.005U	0.005U	N/A
PCB141	0.005U	0.005U	N/A
PCB149	0.005U	0.005U	N/A
PCB151	0.005U	0.005U	N/A
PCB153	0.005U	0.005U	N/A
PCB156	0.005U	0.005U	N/A
PCB157	0.005U	0.005U	N/A
PCB158	0.005U	0.005U	N/A
PCB168+132	0.005U	0.005U	N/A
PCB169	0.005U	0.005U	N/A
PCB170	0.005U	0.005U	N/A
PCB177	0.005U	0.005U	N/A
PCB180	0.005U	0.005U	N/A
PCB183	0.005U	0.005U	N/A
PCB187	0.005U	0.005U	N/A
PCB189	0.005U	0.005U	N/A
PCB194	0.005U	0.005U	N/A
PCB200	0.005U	0.005U	N/A
PCB201	0.005U	0.005U	N/A
PCB206	0.005U	0.005U	N/A

Table A-6 Matrix Spike Summary for All Sampling Events

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
Conventionals						
Conductivity	-	-	-	-	-	-
Alkalinity as CaCO3	-	-	-	-	-	-
Hardness as CaCO3	-	-	-	-	-	-
Biochemical Oxygen Demand	-	-	-	-	-	-
Chemical Oxygen Demand	-	-	-	-	-	-
Total Organic Carbon	90	95	5.4	102	102	0.1
Chloride	90	94	4.0	90	95	4.9
Fluoride	104	108	3.8	98	100	2.0
MBAS	-	-	-	-	-	-
Oil and Grease	-	-	-	-	-	-
Total Ammonia (as N)	103	101	1.8	92	94	2.2
Total Kjeldahl Nitrogen	108	114	5.1	94	96	2.1
Nitrate (as N)	110	115	4.3	94	98	4.2
Nitrite (as N)	103	105	1.9	102	103	0.7
Total Orthophosphate (as P)	102	100	2.0	106	108	1.9
Total Phosphorus	104	102	1.9	102	104	1.9
Total Recoverable Phenolics	99	92	7.5	95	93	1.9
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	-	-	-	-	-	-
Dissolved Metals						
Aluminum	95	98	3.9	77	76	1.0
Arsenic	90	91	1.1	109	109	0.3
Cadmium	89	89	0.2	115	117	2.1
Chromium	-	-	-	94	94	0.0
Copper	83	85	2.2	94	94	0.0
Iron	93	90	3.2	91	90	0.8
Lead	108	108	0.6	108	98	9.7
Nickel	79	82	3.7	92	92	0.8
Selenium	106	103	3.3	122	124	2.2
Silver	86	87	1.4	95	95	0.4
Zinc	78	80	2.4	114	116	1.4
Total Metals						
Aluminum	97	97	0.4	99	-	-
Arsenic	98	98	0.4	93	-	-
Cadmium	104	104	0.8	99	-	-
Chromium	-	-	-	86	-	-
Copper	96	96	0.0	96	-	-
Iron	89	91	3.1	93	93	0.0
Lead	101	101	0.0	85	-	-
Nickel	94	94	0.4	94	-	-
Selenium	**59**	**61**	4.2	120	124	3.5
Silver	102	101	0.4	84	-	-
Zinc	103	103	0.0	82	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**MS**	**MSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	103	107	3.8
2,4'-DDE	99	103	4.0
2,4'-DDT	79	85	7.3
4,4'-DDD	104	109	4.7
4,4'-DDE	98	101	3.0
4,4'-DDT	64	71	10.4
Aldrin	96	91	5.3
Dieldrin	95	93	2.1
Endrin	95	103	8.1
Endrin aldehyde	-	-	-
Endrin ketone	95	97	2.1
alpha-BHC	97	97	0.0
beta-BHC	94	90	4.3
delta-BHC	98	94	4.2
gamma-BHC (Lindane)	87	84	3.5
Endosulfan I	94	99	5.2
Endosulfan II	103	96	7.0
Endosulfan sulfate	102	102	0.0
alpha-Chlordane	103	100	3.0
gamma-Chlordane	97	97	0.0
Heptachlor	73	84	14.0
Heptachlor epoxide	97	103	6.0
Oxychlordane	98	95	3.1
cis-Nonachlor	98	98	0.0
trans-Nonachlor	98	99	1.0
Methoxychlor	67	78	15.2
Mirex	91	91	0.0
Toxaphene	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**MS**	**MSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	78	79	1.3
Chlorpyrifos	72	73	1.4
Demeton	67	65	3.0
Diazinon	70	70	0.0
Dichlorvos	75	80	6.5
Dimethoate	80	78	2.5
Disulfoton	58	58	0.0
Ethoprop	66	68	3.0
Fensulfothion	76	83	8.8
Fenthion	65	66	1.5
Malathion	69	80	14.8
Merphos	67	68	1.5
Methyl Parathion	63	73	14.7
Mevinphos	80	80	0.0
Phorate	81	60	29.8
Ronnel	67	68	1.5
Tetrachlorvinphos (Stirophos)	82	87	5.9
Tokuthion (Prothiofos)	66	69	4.4
Trichloronate	65	65	0.0
Triazines			
Ametryn	97	95	2.1
Atraton	-	-	-
Atrazine	-	-	-
Cyanazine	-	-	-
Prometon	-	-	-
Prometryn	-	-	-
Propazine	-	-	-
Secbumeton	-	-	-
Simazine	-	-	-
Simetryn	-	-	-
Terbutryn	-	-	-
Terbutylazine	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-01 18-Aug-2005		
Analytical Parameter	**MS**	**MSD**	**RPD**
PCB Congeners			
PCB018	101	96	5.1
PCB028	106	94	12.0
PCB031	95	95	0.0
PCB033	98	95	3.1
PCB037	97	98	1.0
PCB044	103	100	3.0
PCB049	100	93	7.3
PCB052	98	95	3.1
PCB066	97	101	4.0
PCB070	101	99	2.0
PCB074	104	104	0.0
PCB077	100	101	1.0
PCB081	94	93	1.1
PCB087	97	93	4.2
PCB095	101	97	4.0
PCB097	96	92	4.3
PCB099	97	88	9.7
PCB101	90	93	3.3
PCB105	80	91	12.9
PCB110	91	95	4.3
PCB114	88	94	6.6
PCB118	94	86	8.9
PCB119	90	89	1.1
PCB123	90	84	6.9
PCB126	89	90	1.1
PCB128+167	102	104	1.9
PCB138	101	97	4.0
PCB141	100	100	0.0
PCB149	95	101	6.1
PCB151	101	99	2.0
PCB153	105	107	1.9
PCB156	103	107	3.8
PCB157	105	108	2.8
PCB158	100	102	2.0
PCB168+132	98	97	1.0
PCB169	97	100	3.0
PCB170	108	101	6.7
PCB177	94	112	17.5
PCB180	103	103	0.0
PCB183	107	104	2.8
PCB187	105	101	3.9
PCB189	101	102	1.0
PCB194	93	104	11.2
PCB200	102	106	3.8
PCB201	108	101	6.7
PCB206	101	101	0.0

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-02 02-Jan-2006			Storm-03 19-Feb-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
Conventionals						
Conductivity	-	-	-	-	-	-
Alkalinity as CaCO3	-	-	-	-	-	-
Hardness as CaCO3	-	-	-	-	-	-
Biochemical Oxygen Demand	-	-	-	-	-	-
Chemical Oxygen Demand	-	-	-	-	-	-
Total Organic Carbon	82	87	5.9	102	95	7.3
Chloride	87	87	0.1	104	102	2.0
Fluoride	94	100	6.4	99	101	2.2
MBAS	-	-	-	-	-	-
Oil and Grease	-	-	-	-	-	-
Total Ammonia (as N)	90	92	2.2	100	101	1.0
Total Kjeldahl Nitrogen	92	97	5.3	112	115	2.9
Nitrate (as N)	108	110	2.0	109	112	2.8
Nitrite (as N)	103	104	1.3	114	109	4.1
Total Orthophosphate (as P)	102	101	1.0	99	100	1.0
Total Phosphorus	95	106	10.9	100	104	3.9
Total Recoverable Phenolics	89	86	3.7	93	91	2.6
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	-	-	-	-	-	-
Dissolved Metals						
Aluminum	94	94	0.1	113	116	2.6
Arsenic	102	100	2.9	114	115	0.5
Cadmium	99	100	0.3	100	101	1.1
Chromium	103	101	1.7	103	104	0.8
Copper	87	85	2.2	103	106	2.2
Iron	103	105	1.7	91	97	6.1
Lead	100	99	1.6	95	96	1.5
Nickel	88	86	2.3	106	108	1.0
Selenium	107	105	2.0	114	117	2.0
Silver	**54**	**55**	**1.8**	96	96	0.4
Zinc	94	93	0.3	111	113	1.0
Total Metals						
Aluminum	94	96	1.7	103	83	21.6
Arsenic	95	95	0.2	113	113	0.4
Cadmium	97	97	0.3	95	96	0.4
Chromium	100	98	1.5	106	105	1.2
Copper	84	84	0.7	89	91	2.2
Iron	98	99	1.0	87	90	3.3
Lead	99	99	0.6	**71**	**65**	**9.0**
Nickel	83	83	0.5	108	105	3.3
Selenium	101	101	0.4	112	111	1.4
Silver	90	91	0.9	93	93	0.0
Zinc	92	92	0.3	79	77	3.0

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-04 28-Feb-2006 MS	MSD	RPD	Storm-05 03-Mar-2006 MS	MSD	RPD
Conventionals						
Conductivity	-	-	-	-	-	-
Alkalinity as CaCO3	-	-	-	-	-	-
Hardness as CaCO3	-	-	-	-	-	-
Biochemical Oxygen Demand	-	-	-	-	-	-
Chemical Oxygen Demand	-	-	-	-	-	-
Total Organic Carbon	102	95	7.3	102	95	7.3
Chloride	109	114	4.7	102	108	5.1
Fluoride	100	108	7.7	108	109	1.3
MBAS	-	-	-	-	-	-
Oil and Grease	-	-	-	-	-	-
Total Ammonia (as N)	96	98	1.7	87	85	2.8
Total Kjeldahl Nitrogen	97	100	2.8	83	85	2.6
Nitrate (as N)	108	112	3.6	102	106	3.8
Nitrite (as N)	113	112	0.9	102	103	1.7
Total Orthophosphate (as P)	106	96	9.9	104	109	4.7
Total Phosphorus	104	112	7.4	100	105	4.9
Total Recoverable Phenolics	93	91	2.6	93	91	2.6
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	-	-	-	-	-	-
Dissolved Metals						
Aluminum	113	116	2.6	112	111	0.7
Arsenic	114	115	0.5	110	112	1.6
Cadmium	100	101	1.1	98	98	0.2
Chromium	103	104	0.8	110	110	0.3
Copper	103	106	2.2	108	109	0.9
Iron	91	97	6.1	91	97	6.1
Lead	95	96	1.5	98	98	0.3
Nickel	106	108	1.0	109	111	1.6
Selenium	114	117	2.0	105	105	0.4
Silver	96	96	0.4	96	95	0.9
Zinc	111	113	1.0	109	109	0.7
Total Metals						
Aluminum	103	83	21.6	93	94	1.6
Arsenic	113	113	0.4	107	107	0.7
Cadmium	95	96	0.4	98	97	1.1
Chromium	106	105	1.2	106	104	1.3
Copper	89	91	2.2	111	105	5.1
Iron	76	76	0.0	76	76	0.0
Lead	71	65	9.0	96	96	0.0
Nickel	108	105	3.3	106	106	0.2
Selenium	112	111	1.4	106	102	4.0
Silver	93	93	0.0	93	93	0.2
Zinc	79	77	3.0	108	106	2.5

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	81	85	4.8
2,4'-DDE	91	88	3.4
2,4'-DDT	55	68	21.1
4,4'-DDD	85	84	1.2
4,4'-DDE	95	96	1.0
4,4'-DDT	55	68	21
Aldrin	77	86	11.0
Dieldrin	65	65	0.0
Endrin	67	78	15.2
Endrin aldehyde	-	-	-
Endrin ketone	65	78	18.2
alpha-BHC	94	92	2.2
beta-BHC	99	92	7.3
delta-BHC	93	87	6.7
gamma-BHC (Lindane)	97	93	4.2
Endosulfan I	81	84	3.6
Endosulfan II	75	76	1.3
Endosulfan sulfate	62	63	1.6
alpha-Chlordane	84	76	10.0
gamma-Chlordane	80	88	9.5
Heptachlor	75	81	7.7
Heptachlor epoxide	90	84	6.9
Oxychlordane	93	90	3.3
cis-Nonachlor	82	99	18.8
trans-Nonachlor	82	90	9.3
Methoxychlor	**0**	**0**	**N/A**
Mirex	67	71	5.8
Toxaphene	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	99	92	7.3
Chlorpyrifos	84	81	3.6
Demeton	80	79	1.3
Diazinon	95	78	19.7
Dichlorvos	84	82	2.4
Dimethoate	82	90	9.3
Disulfoton	74	73	1.4
Ethoprop	82	80	2.5
Fensulfothion	89	78	13.2
Fenthion	99	94	5.2
Malathion	111	113	1.8
Merphos	89	84	5.8
Methyl Parathion	78	86	9.8
Mevinphos	96	97	1.0
Phorate	82	77	6.3
Ronnel	83	85	2.4
Tetrachlorvinphos (Stirophos)	101	98	3.0
Tokuthion (Prothiofos)	91	86	5.6
Trichloronate	79	90	13.0
Triazines			
Ametryn	100	94	6.2
Atraton	95	99	4.1
Atrazine	88	95	7.7
Cyanazine	-	-	-
Prometon	95	97	2.1
Prometryn	95	95	0.0
Propazine	89	89	0.0
Secbumeton	92	96	4.3
Simazine	87	88	1.1
Simetryn	101	98	3.0
Terbutryn	93	100	7.3
Terbutylazine	93	101	8.2

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-05 03-Mar-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
PCB Congeners			
PCB018	91	80	12.9
PCB028	97	89	8.6
PCB031	87	99	12.9
PCB033	92	82	11.5
PCB037	92	93	1.1
PCB044	87	75	14.8
PCB049	88	82	7.1
PCB052	88	82	7.1
PCB066	87	74	16.1
PCB070	89	80	10.7
PCB074	87	83	4.7
PCB077	92	80	14.0
PCB081	92	87	5.6
PCB087	89	83	7.0
PCB095	89	81	9.4
PCB097	104	87	17.8
PCB099	96	92	4.3
PCB101	94	87	7.7
PCB105	88	90	2.2
PCB110	93	87	6.7
PCB114	95	87	8.8
PCB118	95	84	12.3
PCB119	99	91	8.4
PCB123	92	86	6.7
PCB126	90	82	9.3
PCB128+167	87	91	4.5
PCB138	100	98	2.0
PCB141	92	75	20.4
PCB149	99	90	9.5
PCB151	91	86	5.6
PCB153	90	86	4.5
PCB156	77	89	14.5
PCB157	90	85	5.7
PCB158	89	89	0.0
PCB168+132	94	95	1.1
PCB169	79	83	4.9
PCB170	91	87	4.5
PCB177	99	97	2.0
PCB180	94	96	2.1
PCB183	102	95	7.1
PCB187	101	97	4.0
PCB189	92	90	2.2
PCB194	92	93	1.1
PCB200	99	89	10.6
PCB201	100	99	1.0
PCB206	92	88	4.4

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

Analytical Parameter	Storm-06 29-Mar-2006 MS	MSD	RPD	Storm-07 05-Apr-2006 MS	MSD	RPD
Conventionals						
Conductivity	-	-	-	-	-	-
Alkalinity as CaCO3	-	-	-	-	-	-
Hardness as CaCO3	-	-	-	-	-	-
Biochemical Oxygen Demand	-	-	-	-	-	-
Chemical Oxygen Demand	-	-	-	-	-	-
Total Organic Carbon	105	103	1.9	103	103	0
Chloride	98	103	5.0	98	92	6.3
Fluoride	100	95	5.1	114	109	4.5
MBAS	-	-	-	-	-	-
Oil and Grease	-	-	-	-	-	-
Total Ammonia (as N)	100	101	1.0	105	105	0
Total Kjeldahl Nitrogen	102	99	3.0	102	99	3.0
Nitrate (as N)	105	109	3.7	95	90	5.4
Nitrite (as N)	106	106	0	96	100	4.1
Total Orthophosphate (as P)	97	106	8.9	100	99	1.0
Total Phosphorus	104	105	1.0	104	105	1.0
Total Recoverable Phenolics	93	95	2.1	93	95	2.1
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	-	-	-	-	-	-
Dissolved Metals						
Aluminum	112	111	0.7	112	111	0.7
Arsenic	110	112	1.6	110	112	1.6
Cadmium	98	98	0.2	98	98	0.2
Chromium	110	110	0.3	110	110	0.3
Copper	108	109	0.9	108	109	0.9
Iron	95	102	7.1	100	100	0
Lead	98	98	0.3	98	98	0.3
Nickel	109	111	1.6	109	111	1.6
Selenium	105	105	0.4	105	105	0.4
Silver	96	95	0.9	96	95	0.9
Zinc	109	109	0.7	109	109	0.7
Total Metals						
Aluminum	93	94	1.6	93	94	1.6
Arsenic	107	107	0.7	107	107	0.7
Cadmium	98	97	1.1	98	97	1.1
Chromium	106	104	1.3	106	104	1.3
Copper	111	105	5.1	111	105	5.1
Iron	90	96	6.5	94	89	5.5
Lead	96	96	0	96	96	0
Nickel	106	106	0.2	106	106	0.2
Selenium	106	102	4.0	106	102	4.0
Silver	93	93	0.2	93	93	0.2
Zinc	108	106	2.5	108	106	2.5

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
Chlorinated Pesticides						
2,4'-DDD	98	91	7.4	101	109	7.6
2,4'-DDE	95	87	8.8	93	100	7.3
2,4'-DDT	86	74	15.0	68	64	6.1
4,4'-DDD	101	96	5.1	110	110	0.0
4,4'-DDE	100	92	8.3	98	99	1.0
4,4'-DDT	58	54	7.1	33	38	14.1
Aldrin	96	86	11.0	94	97	3.1
Dieldrin	90	89	1.1	88	98	10.8
Endrin	98	87	11.9	104	104	0.0
Endrin aldehyde	-	-	-	-	-	-
Endrin ketone	77	83	7.5	76	76	0.0
alpha-BHC	99	97	2.0	88	93	5.5
beta-BHC	102	103	1.0	98	98	0.0
delta-BHC	101	99	2.0	99	101	2.0
gamma-BHC (Lindane)	99	97	2.0	89	97	8.6
Endosulfan I	99	95	4.1	103	100	3.0
Endosulfan II	94	83	12.4	92	94	2.2
Endosulfan sulfate	95	90	5.4	101	111	9.4
alpha-Chlordane	97	90	7.5	91	99	8.4
gamma-Chlordane	92	90	2.2	99	101	2.0
Heptachlor	101	99	2.0	99	107	7.8
Heptachlor epoxide	103	94	9.1	97	103	6.0
Oxychlordane	95	106	10.9	87	89	2.3
cis-Nonachlor	95	87	8.8	88	91	3.4
trans-Nonachlor	97	85	13.2	95	93	2.1
Methoxychlor	54	44	20.4	31	31	0.0
Mirex	99	80	21.2	76	81	6.4
Toxaphene	-	-	-	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
Organophosphates						
Bolstar (Sulprofos)	107	102	4.8	101	107	5.8
Chlorpyrifos	105	102	2.9	98	96	2.1
Demeton	80	73	9.2	93	93	0.0
Diazinon	101	96	5.1	99	93	6.3
Dichlorvos	101	93	8.2	102	100	2.0
Dimethoate	99	94	5.2	102	100	2.0
Disulfoton	83	80	3.7	91	89	2.2
Ethoprop	101	102	1.0	103	102	1.0
Fensulfothion	99	100	1.0	96	92	4.3
Fenthion	100	95	5.1	100	100	0.0
Malathion	74	76	2.7	127	119	6.5
Merphos	96	98	2.1	103	104	1.0
Methyl Parathion	102	96	6.1	98	97	1.0
Mevinphos	96	94	2.1	102	100	2.0
Phorate	92	88	4.4	102	99	3.0
Ronnel	103	97	6.0	100	102	2.0
Tetrachlorvinphos (Stirophos)	101	105	3.9	102	105	2.9
Tokuthion (Prothiofos)	99	98	1.0	103	101	2.0
Trichloronate	98	99	1.0	100	106	5.8
Triazines						
Ametryn	106	98	7.8	117	106	9.9
Atraton	104	102	1.9	110	115	4.4
Atrazine	102	95	7.1	109	107	1.9
Cyanazine	103	100	3.0	107	110	2.8
Prometon	115	100	14.0	119	114	4.3
Prometryn	106	98	7.8	111	107	3.7
Propazine	104	96	8.0	111	107	3.7
Secbumeton	108	100	7.7	113	107	5.5
Simazine	102	99	3.0	116	114	1.7
Simetryn	107	101	5.8	115	114	0.9
Terbutryn	108	100	7.7	114	111	2.7
Terbutylazine	107	94	12.9	110	106	3.7

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**	**MS**	**MSD**	**RPD**
PCB Congeners						
PCB018	87	90	3.4	85	94	10.1
PCB028	91	93	2.2	92	95	3.2
PCB031	90	94	4.3	89	96	7.6
PCB033	91	96	5.3	90	97	7.5
PCB037	99	100	1.0	103	106	2.9
PCB044	90	92	2.2	92	97	5.3
PCB049	90	93	3.3	92	96	4.3
PCB052	89	88	1.1	89	96	7.6
PCB066	93	92	1.1	96	101	5.1
PCB070	93	93	0.0	96	100	4.1
PCB074	97	99	2.0	100	105	4.9
PCB077	97	97	0.0	99	106	6.8
PCB081	96	98	2.1	97	105	7.9
PCB087	92	92	0.0	98	101	3.0
PCB095	86	87	1.2	84	91	8.0
PCB097	92	94	2.2	95	100	5.1
PCB099	87	93	6.7	94	103	9.1
PCB101	92	94	2.2	96	99	3.1
PCB105	88	85	3.5	93	99	6.3
PCB110	95	90	5.4	95	99	4.1
PCB114	99	103	4.0	102	107	4.8
PCB118	96	98	2.1	95	101	6.1
PCB119	95	93	2.1	96	99	3.1
PCB123	101	102	1.0	101	106	4.8
PCB126	101	95	6.1	104	109	4.7
PCB128+167	97	94	3.1	96	102	6.1
PCB138	95	92	3.2	95	104	9.0
PCB141	92	95	3.2	94	104	10.1
PCB149	89	86	3.4	89	96	7.6
PCB151	93	90	3.3	93	100	7.3
PCB153	98	87	11.9	93	101	8.2
PCB156	95	90	5.4	104	108	3.8
PCB157	92	95	3.2	94	101	7.2
PCB158	93	90	3.3	98	105	6.9
PCB168+132	88	87	1.1	91	98	7.4
PCB169	95	108	12.8	100	105	4.9
PCB170	94	91	3.2	100	98	2.0
PCB177	96	95	1.0	100	103	3.0
PCB180	98	93	5.2	99	102	3.0
PCB183	88	88	0.0	92	101	9.3
PCB187	96	97	1.0	94	99	5.2
PCB189	102	91	11.4	100	104	3.9
PCB194	90	102	12.5	100	107	6.8
PCB200	82	88	7.1	88	93	5.5
PCB201	94	103	9.1	94	100	6.2
PCB206	86	105	19.9	96	104	8.0

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Conventionals			
Conductivity	-	-	-
Alkalinity as CaCO3	-	-	-
Hardness as CaCO3	-	-	-
Biochemical Oxygen Demand	-	-	-
Chemical Oxygen Demand	-	-	-
Total Organic Carbon	93	94	1.7
Chloride	95	93	2.1
Fluoride	95	93	2.6
MBAS	-	-	-
Oil and Grease	-	-	-
Total Ammonia (as N)	107	101	5.0
Total Kjeldahl Nitrogen	109	107	1.9
Nitrate (as N)	111	116	4.7
Nitrite (as N)	99	96	3.4
Total Orthophosphate (as P)	105	101	3.9
Total Phosphorus	106	105	0.9
Total Recoverable Phenolics	94	90	3.9
Total Dissolved Solids	-	-	-
Total Suspended Solids	-	-	-
Total Volatile Solids	-	-	-
Turbidity	-	-	-
Dissolved Metals			
Aluminum	117	116	1.2
Arsenic	107	113	6.3
Cadmium	94	97	2.7
Chromium	104	107	3.0
Copper	97	104	6.1
Iron	96	93	3.2
Lead	96	95	1.7
Nickel	100	104	3.4
Selenium	109	107	1.8
Silver	88	90	2.8
Zinc	101	105	4.0
Total Metals			
Aluminum	101	99	2.0
Arsenic	106	106	0.0
Cadmium	93	93	0.8
Chromium	106	108	2.1
Copper	98	99	0.9
Iron	91	92	0.4
Lead	100	100	0.6
Nickel	101	102	1.3
Selenium	102	97	5.2
Silver	88	89	0.3
Zinc	98	98	0.2

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	94	86	8.9
2,4'-DDE	97	91	6.4
2,4'-DDT	87	85	2.3
4,4'-DDD	90	90	0.0
4,4'-DDE	96	90	6.5
4,4'-DDT	91	83	9.2
Aldrin	96	96	0.0
Dieldrin	99	90	9.5
Endrin	97	96	1.0
Endrin aldehyde	-	-	-
Endrin ketone	91	80	12.9
alpha-BHC	98	96	2.1
beta-BHC	91	93	2.2
delta-BHC	81	87	7.1
gamma-BHC (Lindane)	96	88	8.7
Endosulfan I	94	74	23.8
Endosulfan II	88	90	2.2
Endosulfan sulfate	79	83	4.9
alpha-Chlordane	98	95	3.1
gamma-Chlordane	112	104	7.4
Heptachlor	99	102	3.0
Heptachlor epoxide	95	103	8.1
Oxychlordane	100	98	2.0
cis-Nonachlor	100	96	4.1
trans-Nonachlor	96	94	2.1
Methoxychlor	95	90	5.4
Mirex	91	80	12.9
Toxaphene	-	-	-

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	89	95	6.5
Chlorpyrifos	96	102	6.1
Demeton	101	103	2.0
Diazinon	94	88	6.6
Dichlorvos	83	76	8.8
Dimethoate	94	86	8.9
Disulfoton	96	100	4.1
Ethoprop	99	99	0.0
Fensulfothion	83	95	13.5
Fenthion	99	99	0.0
Malathion	102	98	4.0
Merphos	92	94	2.2
Methyl Parathion	96	98	2.1
Mevinphos	93	91	2.2
Phorate	95	95	0.0
Ronnel	93	93	0.0
Tetrachlorvinphos (Stirophos)	99	102	3.0
Tokuthion (Prothiofos)	102	96	6.1
Trichloronate	95	94	1.1
Triazines			
Ametryn	91	91	0.0
Atraton	94	92	2.2
Atrazine	90	86	4.5
Cyanazine	101	100	1.0
Prometon	86	87	1.2
Prometryn	91	89	2.2
Propazine	90	88	2.2
Secbumeton	92	94	2.2
Simazine	85	88	3.5
Simetryn	89	92	3.3
Terbutryn	85	89	4.6
Terbutylazine	87	94	7.7

Table A-6 Matrix Spike Summary for All Sampling Events (Continued)

	Dry-02 11-May-2006		
Analytical Parameter	**MS**	**MSD**	**RPD**
PCB Congeners			
PCB018	91	95	4.3
PCB028	92	99	7.3
PCB031	85	108	23.8
PCB033	101	101	0.0
PCB037	91	78	15.4
PCB044	103	92	11.3
PCB049	98	89	9.6
PCB052	99	98	1.0
PCB066	87	86	1.2
PCB070	84	83	1.2
PCB074	84	84	0.0
PCB077	93	97	4.2
PCB081	85	93	9.0
PCB087	86	96	11.0
PCB095	96	87	9.8
PCB097	84	103	20.3
PCB099	92	82	11.5
PCB101	88	103	15.7
PCB105	81	93	13.8
PCB110	88	94	6.6
PCB114	104	102	1.9
PCB118	93	99	6.3
PCB119	89	73	19.8
PCB123	77	89	14.5
PCB126	71	84	16.8
PCB128+167	89	88	1.1
PCB138	94	76	21.2
PCB141	86	86	0.0
PCB149	101	96	5.1
PCB151	103	104	1.0
PCB153	103	109	5.7
PCB156	79	86	8.5
PCB157	85	86	1.2
PCB158	102	99	3.0
PCB168+132	95	81	15.9
PCB169	79	72	9.3
PCB170	96	103	7.0
PCB177	84	78	7.4
PCB180	105	100	4.9
PCB183	82	83	1.2
PCB187	104	106	1.9
PCB189	89	73	19.8
PCB194	66	60	9.5
PCB200	81	109	29.5
PCB201	96	85	12.2
PCB206	86	73	16.4

Table A-7 Laboratory Control Spike Summary for All Sampling Events

	Dry-01 18-Aug-2005			Storm-01 18-Oct-2005		
Analytical Parameter	**LCS**	**LCSD**	**RPD**	**LCS**	**LCSD**	**RPD**
Conventionals						
Conductivity	96	-	-	95	-	-
Alkalinity as CaCO3	98	-	-	101	-	-
Hardness as CaCO3	102	-	-	101	-	-
Biochemical Oxygen Demand	109	-	-	109	-	-
Chemical Oxygen Demand	98	-	-	101	-	-
Total Organic Carbon	104	-	-	102	-	-
Chloride	97	-	-	100	-	-
Fluoride	120	-	-	105	-	-
MBAS	88	-	-	89	-	-
Oil and Grease	95	-	-	102	-	-
Total Ammonia (as N)	98	-	-	102	-	-
Total Kjeldahl Nitrogen	107	-	-	106	-	-
Nitrate (as N)	109	-	-	98	-	-
Nitrite (as N)	98	-	-	92	-	-
Total Orthophosphate (as P)	102	-	-	94	-	-
Total Phosphorus	89	-	-	109	-	-
Total Recoverable Phenolics	96	-	-	92	-	-
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	97	-	-	96	-	-
Dissolved Metals						
Aluminum	105	104	1.2	-	-	-
Arsenic	100	99	0.4	-	-	-
Cadmium	102	102	0.4	-	-	-
Chromium	-	-	-	-	-	-
Copper	99	99	0.4	-	-	-
Iron	102	-	-	102	-	-
Lead	98	101	2.4	-	-	-
Nickel	101	102	0.4	-	-	-
Selenium	-	-	-	-	-	-
Silver	106	106	0.4	-	-	-
Zinc	102	102	0.8	-	-	-
Total Metals						
Aluminum	105	104	1.2	-	-	-
Arsenic	100	99	0.4	-	-	-
Cadmium	102	102	0.4	-	-	-
Chromium	97	95	2.1	-	-	-
Copper	99	99	0.4	-	-	-
Iron	101	-	-	99	-	-
Lead	98	101	2.4	-	-	-
Nickel	101	102	0.4	-	-	-
Selenium	-	-	-	-	-	-
Silver	106	106	0.4	-	-	-
Zinc	101	100	0.8	-	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-02 02-Jan-2006			Storm-03 19-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**	**LCS**	**LCSD**	**RPD**
Conventionals						
Conductivity	97	-	-	95	-	-
Alkalinity as CaCO3	101	-	-	99	-	-
Hardness as CaCO3	102	-	-	94	-	-
Biochemical Oxygen Demand	111	-	-	107	-	-
Chemical Oxygen Demand	104	-	-	98	-	-
Total Organic Carbon	99	-	-	108	-	-
Chloride	97	-	-	107	-	-
Fluoride	93	-	-	99	-	-
MBAS	88	-	-	104	-	-
Oil and Grease	95	-	-	-	-	-
Total Ammonia (as N)	116	-	-	119	-	-
Total Kjeldahl Nitrogen	93	-	-	99	-	-
Nitrate (as N)	110	-	-	110	-	-
Nitrite (as N)	107	-	-	115	-	-
Total Orthophosphate (as P)	98	-	-	100	-	-
Total Phosphorus	89	-	-	98	-	-
Total Recoverable Phenolics	91	-	-	89	-	-
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	96	-	-	96	-	-
Dissolved Metals						
Aluminum	100	-	-	114	-	-
Arsenic	85	-	-	106	-	-
Cadmium	99	-	-	93	-	-
Chromium	96	-	-	104	-	-
Copper	97	-	-	106	-	-
Iron	109	-	-	107	-	-
Lead	98	-	-	97	-	-
Nickel	97	-	-	108	-	-
Selenium	96	-	-	105	-	-
Silver	96	-	-	96	-	-
Zinc	102	-	-	109	-	-
Total Metals						
Aluminum	98	-	-	107	-	-
Arsenic	86	-	-	113	-	-
Cadmium	99	-	-	94	-	-
Chromium	96	-	-	112	-	-
Copper	96	-	-	112	-	-
Iron	109	-	-	105	-	-
Lead	99	-	-	96	-	-
Nickel	96	-	-	114	-	-
Selenium	102	-	-	106	-	-
Silver	96	-	-	99	-	-
Zinc	100	-	-	114	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-03 19-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	90	80	11.8
2,4'-DDE	95	86	9.9
2,4'-DDT	98	90	8.5
4,4'-DDD	89	78	13.2
4,4'-DDE	98	91	7.4
4,4'-DDT	97	79	20.5
Aldrin	101	93	8.2
Dieldrin	96	105	9.0
Endrin	97	94	3.1
Endrin aldehyde	-	-	-
Endrin ketone	77	84	8.7
alpha-BHC	102	82	21.7
beta-BHC	100	94	6.2
delta-BHC	95	92	3.2
gamma-BHC (Lindane)	96	92	4.3
Endosulfan I	104	91	13.3
Endosulfan II	92	86	6.7
Endosulfan sulfate	76	75	1.3
alpha-Chlordane	94	84	11.2
gamma-Chlordane	95	83	13.5
Heptachlor	102	94	8.2
Heptachlor epoxide	94	82	13.6
Oxychlordane	101	93	8.2
cis-Nonachlor	87	89	2.3
trans-Nonachlor	96	92	4.3
Methoxychlor	91	75	19.3
Mirex	89	77	14.5
Toxaphene	-	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-03 19-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	98	96	2.1
Chlorpyrifos	101	87	14.9
Demeton	78	60	26.1
Diazinon	101	82	20.8
Dichlorvos	92	88	4.4
Dimethoate	84	65	25.5
Disulfoton	45	46	2.2
Ethoprop	96	87	9.8
Fensulfothion	74	65	12.9
Fenthion	84	75	11.3
Malathion	98	85	14.2
Merphos	80	68	16.2
Methyl Parathion	81	60	29.8
Mevinphos	94	88	6.6
Phorate	87	75	14.8
Ronnel	93	85	9.0
Tetrachlorvinphos (Stirophos)	98	82	17.8
Tokuthion (Prothiofos)	91	70	26.1
Trichloronate	94	90	4.3
Triazines			
Ametryn	93	84	10.2
Atraton	91	79	14.1
Atrazine	96	87	9.8
Cyanazine	-	-	-
Prometon	88	78	12.0
Prometryn	98	85	14.2
Propazine	101	99	2.0
Secbumeton	88	80	9.5
Simazine	93	86	7.8
Simetryn	88	83	5.8
Terbutryn	92	87	5.6
Terbutylazine	101	96	5.1

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-03 19-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
PCB Congeners			
PCB018	106	87	19.7
PCB028	93	85	9.0
PCB031	101	96	5.1
PCB033	97	89	8.6
PCB037	90	80	11.8
PCB044	92	81	12.7
PCB049	106	92	14.1
PCB052	103	92	11.3
PCB066	99	82	18.8
PCB070	101	89	12.6
PCB074	103	87	16.8
PCB077	94	80	16.1
PCB081	90	78	14.3
PCB087	106	88	18.6
PCB095	97	85	13.2
PCB097	96	95	1.0
PCB099	100	91	9.4
PCB101	99	95	4.1
PCB105	93	85	9.0
PCB110	98	87	11.9
PCB114	93	82	12.6
PCB118	102	95	7.1
PCB119	102	88	14.7
PCB123	99	90	9.5
PCB126	91	95	4.3
PCB128+167	85	92	7.9
PCB138	91	74	20.6
PCB141	91	75	19.3
PCB149	104	87	17.8
PCB151	95	98	3.1
PCB153	99	79	22.5
PCB156	80	85	6.1
PCB157	97	88	9.7
PCB158	98	87	11.9
PCB168+132	102	87	15.9
PCB169	100	77	26.0
PCB170	74	79	6.5
PCB177	90	97	7.5
PCB180	86	85	1.2
PCB183	93	75	21.4
PCB187	100	85	16.2
PCB189	86	88	2.3
PCB194	100	80	22.2
PCB200	95	98	3.1
PCB201	75	87	14.8
PCB206	71	74	4.1

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006			Storm-05 03-Mar-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**	**LCS**	**LCSD**	**RPD**
Conventionals						
Conductivity	102	-	-	96.8	-	-
Alkalinity as CaCO3	100	-	-	100.5	-	-
Hardness as CaCO3	93.5	-	-	93.5	-	-
Biochemical Oxygen Demand	111	-	-	126.3	-	-
Chemical Oxygen Demand	97.6	-	-	97.6	-	-
Total Organic Carbon	107.6	-	-	107.6	-	-
Chloride	101	-	-	102.8	-	-
Fluoride	94	-	-	94.9	-	-
MBAS	86	-	-	90.7	-	-
Oil and Grease	103	-	-	103.7	-	-
Total Ammonia (as N)	112	-	-	119.3	-	-
Total Kjeldahl Nitrogen	104	-	-	94	-	-
Nitrate (as N)	111	-	-	105.6	-	-
Nitrite (as N)	112	-	-	107.2	-	-
Total Orthophosphate (as P)	94	-	-	103.3	-	-
Total Phosphorus	98	-	-	100.3	-	-
Total Recoverable Phenolics	88.9	-	-	88.9	-	-
Total Dissolved Solids	-	-	-	-	-	-
Total Suspended Solids	-	-	-	-	-	-
Total Volatile Solids	-	-	-	-	-	-
Turbidity	98	-	-	98.7	-	-
Dissolved Metals						
Aluminum	114.1	-	-	110.7	-	-
Arsenic	106.3	-	-	100.7	-	-
Cadmium	92.5	-	-	95.4	-	-
Chromium	103.9	-	-	102.8	-	-
Copper	106.1	-	-	102.8	-	-
Iron	106.9	-	-	106.9	-	-
Lead	96.7	-	-	97.8	-	-
Nickel	107.6	-	-	104.4	-	-
Selenium	104.9	-	-	99.5	-	-
Silver	96.4	-	-	92.2	-	-
Zinc	108.7	-	-	106.2	-	-
Total Metals						
Aluminum	107.3	-	-	108.1	-	-
Arsenic	112.6	-	-	98.2	-	-
Cadmium	94.2	-	-	95.4	-	-
Chromium	112	-	-	104.4	-	-
Copper	112	-	-	105.4	-	-
Iron	103.6	-	-	103.6	-	-
Lead	96.1	-	-	97.6	-	-
Nickel	114.1	-	-	105.9	-	-
Selenium	106.2	-	-	94.3	-	-
Silver	99.3	-	-	94	-	-
Zinc	114.1	-	-	107.3	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Chlorinated Pesticides			
2,4'-DDD	90	80	11.8
2,4'-DDE	95	86	9.9
2,4'-DDT	98	90	8.5
4,4'-DDD	89	78	13.2
4,4'-DDE	98	91	7.4
4,4'-DDT	97	79	20.5
Aldrin	101	93	8.2
Dieldrin	96	105	9.0
Endrin	97	94	3.1
Endrin aldehyde	-	-	-
Endrin ketone	77	84	8.7
alpha-BHC	102	82	21.7
beta-BHC	100	94	6.2
delta-BHC	95	92	3.2
gamma-BHC (Lindane)	96	92	4.3
Endosulfan I	104	91	13.3
Endosulfan II	92	86	6.7
Endosulfan sulfate	76	75	1.3
alpha-Chlordane	94	84	11.2
gamma-Chlordane	95	83	13.5
Heptachlor	102	94	8.2
Heptachlor epoxide	94	82	13.6
Oxychlordane	101	93	8.2
cis-Nonachlor	87	89	2.3
trans-Nonachlor	96	92	4.3
Methoxychlor	91	75	19.3
Mirex	89	77	14.5
Toxaphene	-	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Organophosphates			
Bolstar (Sulprofos)	98	96	2.1
Chlorpyrifos	101	87	14.9
Demeton	58	55	5.3
Diazinon	101	82	20.8
Dichlorvos	92	88	4.4
Dimethoate	84	65	25.5
Disulfoton	45	46	2.2
Ethoprop	96	87	9.8
Fensulfothion	74	65	12.9
Fenthion	84	75	11.3
Malathion	98	85	14.2
Merphos	80	68	16.2
Methyl Parathion	81	60	29.8
Mevinphos	94	88	6.6
Phorate	87	75	14.8
Ronnel	93	85	9.0
Tetrachlorvinphos (Stirophos)	98	82	17.8
Tokuthion (Prothiofos)	91	70	26.1
Trichloronate	94	90	4.3
Triazines			
Ametryn	93	84	10.2
Atraton	91	79	14.1
Atrazine	96	87	9.8
Cyanazine	-	-	-
Prometon	88	78	12.0
Prometryn	98	85	14.2
Propazine	101	99	2.0
Secbumeton	88	80	9.5
Simazine	93	86	7.8
Simetryn	88	83	5.8
Terbutryn	92	87	5.6
Terbutylazine	101	96	5.1

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-04 28-Feb-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**
PCB Congeners			
PCB018	106	87	19.7
PCB028	93	85	9.0
PCB031	101	96	5.1
PCB033	97	89	8.6
PCB037	90	80	11.8
PCB044	92	81	12.7
PCB049	106	92	14.1
PCB052	103	92	11.3
PCB066	99	82	18.8
PCB070	101	89	12.6
PCB074	103	87	16.8
PCB077	94	80	16.1
PCB081	90	78	14.3
PCB087	106	88	18.6
PCB095	97	85	13.2
PCB097	96	95	1.0
PCB099	100	91	9.4
PCB101	99	95	4.1
PCB105	93	85	9.0
PCB110	98	87	11.9
PCB114	93	82	12.6
PCB118	102	95	7.1
PCB119	102	88	14.7
PCB123	99	90	9.5
PCB126	95	91	4.3
PCB128+167	92	85	7.9
PCB138	91	74	20.6
PCB141	91	75	19.3
PCB149	104	87	17.8
PCB151	95	98	3.1
PCB153	99	79	22.5
PCB156	85	80	6.1
PCB157	97	88	9.7
PCB158	98	87	11.9
PCB168+132	102	87	15.9
PCB169	100	77	26.0
PCB170	79	74	6.5
PCB177	97	90	7.5
PCB180	86	85	1.2
PCB183	93	75	21.4
PCB187	100	85	16.2
PCB189	88	86	2.3
PCB194	100	80	22.2
PCB200	95	98	3.1
PCB201	87	75	14.8
PCB206	74	71	4.1

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Storm-06 29-Mar-2006			Storm-07 05-Apr-2006		
Analytical Parameter	**LCS**	**LCSD**	**RPD**	**LCS**	**LCSD**	**RPD**
Conventionals						
Conductivity	96	-	-	102	-	-
Alkalinity as CaCO3	102	-	-	102	-	-
Hardness as CaCO3	99	-	-	98	-	-
Biochemical Oxygen Demand	100	-	-	98	-	-
Chemical Oxygen Demand	109	-	-	93	-	-
Total Organic Carbon	98	-	-	116	-	-
Chloride	96	-	-	96	-	-
Fluoride	105	-	-	104	-	-
MBAS	94	-	-	98	-	-
Oil and Grease	98	-	-	98	-	-
Total Ammonia (as N)	99	-	-	101	-	-
Total Kjeldahl Nitrogen	87	-	-	102	-	-
Nitrate (as N)	90	-	-	102	-	-
Nitrite (as N)	103	-	-	110	-	-
Total Orthophosphate (as P)	101	-	-	84	-	-
Total Phosphorus	102	-	-	102	-	-
Total Recoverable Phenolics	95	-	-	95	-	-
Total Dissolved Solids	108	-	-	95	-	-
Total Suspended Solids	97	-	-	101	-	-
Total Volatile Solids	110	-	-	101	-	-
Turbidity	111	-	-	108	-	-
Dissolved Metals	112	-	-	108	-	-
Aluminum	97	-	-	97	-	-
Arsenic	89	-	-	89	-	-
Cadmium	-	-	-	-	-	-
Chromium	-	-	-	-	-	-
Copper	-	-	-	-	-	-
Iron	101	-	-	98	-	-
Lead	96	-	-	98	-	-
Nickel	-	-	-	-	-	-
Selenium	110.7	-	-	110.7	-	-
Silver	100.7	-	-	100.7	-	-
Zinc	95.4	-	-	95.4	-	-
Total Metals	102.8	-	-	102.8	-	-
Aluminum	102.8	-	-	102.8	-	-
Arsenic	105	-	-	104	-	-
Cadmium	97.8	-	-	97.8	-	-
Chromium	104.4	-	-	104.4	-	-
Copper	99.5	-	-	99.5	-	-
Iron	92.2	-	-	92.2	-	-
Lead	106.2	-	-	106.2	-	-
Nickel	-	-	-	-	-	-
Selenium	108.1	-	-	108.1	-	-
Silver	98.2	-	-	98.2	-	-
Zinc	95.4	-	-	95.4	-	-

Table A-7 Laboratory Control Spike Summary for All Sampling Events (Continued)

	Dry-02	11-May-2006	
Analytical Parameter	**LCS**	**LCSD**	**RPD**
Conventionals			
Conductivity	98	-	-
Alkalinity as CaCO3	100	-	-
Hardness as CaCO3	96	-	-
Biochemical Oxygen Demand	96	-	-
Chemical Oxygen Demand	99	-	-
Total Organic Carbon	110	-	-
Chloride	100	-	-
Fluoride	99	-	-
MBAS	103	-	-
Oil and Grease	-	-	-
Total Ammonia (as N)	97	-	-
Total Kjeldahl Nitrogen	103	-	-
Nitrate (as N)	108	-	-
Nitrite (as N)	103	-	-
Total Orthophosphate (as P)	101	-	-
Total Phosphorus	94	-	-
Total Recoverable Phenolics	88	-	-
Total Dissolved Solids	-	-	-
Total Suspended Solids	-	-	-
Total Volatile Solids	-	-	-
Turbidity	100	-	-
Dissolved Metals			
Aluminum	106	-	-
Arsenic	98	-	-
Cadmium	97	-	-
Chromium	101	-	-
Copper	101	-	-
Iron	99	-	-
Lead	98	-	-
Nickel	102	-	-
Selenium	95	-	-
Silver	95	-	-
Zinc	104	-	-
Total Metals			
Aluminum	120	-	-
Arsenic	101	-	-
Cadmium	96	-	-
Chromium	110	-	-
Copper	109	-	-
Iron	106	-	-
Lead	100	-	-
Nickel	112	-	-
Selenium	102	-	-
Silver	95	-	-
Zinc	109	-	-

Table A-8 Standard Reference Material Summary

	Dry-01		Storm-01	
	18-Aug-05		18-Oct-05	
Analytical Parameter	**SRM-1**	**SRM-2**	**SRM-1**	**SRM-2**
Dissolved Metals				
Aluminum	117	101	90	85
Arsenic	98	97	99	98
Cadmium	101	104	102	100
Chromium	-	-	95	93
Copper	99	96	94	92
Iron	-	-	-	-
Lead	101	103	99	100
Nickel	98	99	93	92
Selenium	96	-	101	113
Silver	105	107	100	98
Zinc	105	96	96	97
Total Metals				
Aluminum	101	117	96	112
Arsenic	97	93	100	100
Cadmium	104	101	92	97
Chromium	-	-	84	85
Copper	96	99	118	96
Iron	-	-	-	-
Lead	101	103	83	83
Nickel	99	98	94	95
Selenium	103	-	-	-
Silver	105	107	77	96
Zinc	105	105	100	84

Table A-9 Surrogate Summary for All Sampling Events

	Belmont Pump	Bouton Creek	Los Cerritos Channel	Dominguez Gap	BLK	DUP	MS	MSD
Dry-0 - 18-Aug-05								
Tetrachloro-m-xylene	71	72	67	-	57	65	78	76
PCB030	74	69	73	-	63	69	78	77
PCB112	93	91	83	-	91	83	93	90
PCB198	104	101	87	-	106	101	99	97
Storm-01 - 18-Oct-05								
Tetrachloro-m-xylene	88	-	90	-	76	-	-	-
PCB030	88	-	88	-	79	-	-	-
PCB112	92	-	89	-	89	-	-	-
PCB198	95	-	90	-	95	-	-	-
Storm-02 - 02-Jan-06								
Tetrachloro-m-xylene	96	94	89	-	103	-	-	-
PCB030	97	95	91	-	105	-	-	-
PCB112	89	91	91	-	104	-	-	-
PCB198	100	95	99	-	106	-	-	-
Storm-03 - 19-Feb-06								
Tetrachloro-m-xylene	81	-	-	-	91	-	-	-
PCB030	86	-	-	-	95	-	-	-
PCB112	83	-	-	-	98	-	-	-
PCB198	83	-	-	-	103	-	-	-
Storm-04 - 28-Feb-06								
Tetrachloro-m-xylene	83	79	81	-	91	-	-	-
PCB030	83	84	83	-	95	-	-	-
PCB112	82	82	85	-	98	-	-	-
PCB198	94	83	95	-	103	-	-	-
Storm-05 - 03-Mar-06								
Tetrachloro-m-xylene	-	69	73	-	89	83	77	76
PCB030	-	75	70	-	90	82	78	75
PCB112	-	81	75	-	95	87	87	83
PCB198	-	86	80	-	99	90	87	92
Storm-06 - 29-Mar-06								
Tetrachloro-m-xylene	83	84	-	84	59	87	87	88
PCB030	87	88	-	90	68	90	95	92
PCB112	87	92	-	89	85	89	94	91
PCB198	81	83	-	83	82	82	86	84
Storm-07 - 05-Apr-06								
Tetrachloro-m-xylene	-	-	-	93	93	93	89	90
PCB030	-	-	-	99	99	95	91	95
PCB112	-	-	-	101	101	95	95	97
PCB198	-	-	-	88	88	85	86	89
Dry-02 - 11-May-06								
Tetrachloro-m-xylene	96	96	88	-	97	84	79	70
PCB030	100	97	98	-	91	92	85	86
PCB112	96	97	83	-	98	92	86	88
PCB198	84	80	68	-	104	91	76	81

Table A-10 Long Beach Stormwater Toxicity Testing QA Exceptions.

Sample Date	Experiment	Species	Sample	Description
1/2/2006	601001	Water Flea	Bouton, Belmont,Cerritos	Control survival <80% in both sample and reference toxicant, control reproduction <15 neonates in Cerritos Channel sample. Results judged to provide valid toxicity assessments
3/3/2006	603003	Water Flea	Cerritos	Control reproduction <15 neonates per female in sample test. Results judged to provide valid toxicity asessment.
3/3/2006	603003	Sea Urchin	Bouton	Brine control < 70% fertilization. Results should be viewed with caution
5/11/2006	605007	Water Flea	Cerritos	Control reproduction < 15 neonates.Results judged to provide valid toxicity assessment

Table A-11 Sample Holding Times Long Beach Stormwater Samples, 2005/2006

Date Collected	Sample Location	Hours Held Before Testing	
		Water Flea	Sea Urchin
8/18/05	Belmont Pump	16	32
8/18/05	Bouton Creek	16	32
8/18/05	Cerritos Channel	16	31
10/8/05	Belmont Pump	26	30
10/8/05/	Cerritos Channel	26	30
1/2/06	Belmont Pump	34	48
1/2/06	Bouton Creek	34	48
1.2.06	Cerritos Channel	34	49
2/28/06	Belmont Pump	18	20
2/28/06	Bouton Creek	18	20
2/28/06	Cerritos Channel	18	20
3/3/06	Bouton Creek	45	49
3/3/06	Cerritos Channel	46	50
3/29/06	Belmont Pump	35	37
3/29/06	Bouton Creek	30	32
5/11/06	Belmont Pump	40	39
5/11/06	Bouton Creek	31	30
5/11/05	Cerritos Channel	28	27

Bold typeface: Test initiation exceeded 72 hour hold time

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Appendix B

Pilot Watershed Source Identification Program - Colorado Lagoon

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APPENDIX B: PILOT WATERSHED SOURCE IDENTIFICATION PROGRAM – COLORADO LAGOON

1.0 INTRODUCTION

One of the major gaps in stormwater research efforts in Southern California is the lack of effort towards addressing sources and impacts of Persistent Bioaccumulative and Toxic Compounds (PBTs) on receiving waters. Stormwater monitoring in Southern California have primarily used toxicity testing and chemical analysis of stormwater discharges as the tools for assessing impacts of these discharges. These methods have not addressed longer term issues associated with PBTs. Monitoring of these compounds in stormwater discharges has rarely been conducted in a useful manner. Conventional sampling and analysis methods have not yielded results of any use due to detection limit issues.

Although stormwater programs have rarely reported these PBTs above reporting limits in wet weather discharges, they are routinely among the primary constituents cited as the cause for listing of receiving water bodies in the Los Angeles/Long Beach area as well as other most other bays and estuaries in Southern California. PBTs encountered in sediments around stormwater outfalls typically consist of various organochlorine pesticides and PCBs.

A recent study conducted in the San Francisco Bay area has shown that storm drain systems still contain and are receiving levels of these contaminants that are cause for concern in the receiving water body (KLI/EOA 2002). Organochlorine pesticides and PCBs are often referred to as “legacy” pollutants, meaning there are relatively few current uses, but past uses have left large amounts in the environment. Widespread historic use of these compounds apparently resulted in releases to soils and storm drains in the Bay Area. Since these compounds are highly persistent and strongly associate with particulate matter, soils and accumulated storm drain sediments potentially contain PBTs released many years ago. Pathways for PBTs to have entered soils and storm drains include intentional or unintentional aboveground historic releases to storm drain lines. Since production of these compounds has ceased and/or uses are limited and strictly regulated, the potential for new releases to the environment has probably greatly diminished.

In 2004, a Draft Work Plan (Kinnetic Laboratories, Inc. 2004) was developed to provide a general approach that could be used to assist in the identification and ultimate reduction of significant sources of PBTs in urban watersheds. The plan outlined the goal, objectives, and approach to locate “hot spots” in the urban environment that may provide a disproportionate share of the total load to receiving waters. Identification of localized source areas provides an opportunity to make significant progress in reducing loads.

Colorado Lagoon was selected as an appropriate area to conduct an initial pilot investigation using the approach detailed in the Draft Work Plan (Kinnetic Laboratories, Inc. 2004). A recent survey of sediment quality in Colorado Lagoon (Kinnetic Laboratories, Inc./Moffatt & Nichol. 2004) identified a strong contamination gradient with high levels of certain contaminants in the western arm transitioning to much lower levels in the northern arm. The primary COCs identified in the lagoon were lead and the three groups of organochlorine pesticides (DDT compounds, chlordane and dieldrin). All of these compounds are not only present in the sediments but have been reported at high levels in tissues of in resident bivalves. This investigation focuses on the specific contaminants of interest in Colorado Lagoon sediments.

2.0 METHODS

The 2004 Draft Work Plan (Kinnetic Laboratories, Inc. 2004) served as the general model for tracking sources of PBTs in storm drain systems that discharge to Colorado Lagoon. Specific methods applied in this ongoing investigation are detailed below.

2.1 Study Design

The study design is premised on the assumption that measurement of residual sediments in storm drain systems can provide information valuable in the location and ultimate elimination of major sources of PBTs. Based upon previous investigations, most of these constituents are not found uniformly distributed in urban areas. Instead, a significant proportion of the inputs still come from a few areas where PBTs were manufactured, stored or spilled. In many cases, identification of these areas can enable remedial actions or implementation of focused BMPs that provide an opportunity to make meaningful reductions in loads to receiving water associated with stormwater runoff.

The study design is an adaptive sampling process. Initial sampling was conducted to first isolate the major potential sources of contaminants of concern. The major candidate sources of contaminants to Colorado Lagoon were considered to be the three storm drain systems that discharge to the western arm of the Lagoon. All are owned by the City of Long Beach. In addition, eroding soils from the former railroad right-of-way were also considered to have potential as a source of contaminants and were included in the initial sampling effort.

All initial sampling sites were located as close as possible to Colorado Lagoon while at the same time avoiding areas too heavily influenced by tide. Sampling sites are shown in Figure B.1. Site B was located in a manhole in the 63-inch round reinforced concrete pipe (RCP) that discharges at the northern most end of the western arm of the Lagoon. Site D was located in the northernmost of two storm drains run parallel down the former Pacific Electric Railroad right-of-way. This storm drain is a 48-inch semielliptical RCP. Site E was located in the southernmost of this pair of storm drains. This storm drain is a 42-inch round RCP at the point of discharge into Colorado Lagoon. Sediments at Site RR were collected from the former railroad right-of-way in areas were soil was being eroded and transported towards the storm drains. Site RR was in the vicinity of Site D.

2.2 Sampling Procedures

General procedures equipment cleaning, field sampling, chemical analysis and both field and laboratory QAQC are provided in the following sections. Sampling procedures recommended for the storm drain sediment sampling program are based on those in use by the USGS National Water Quality Assessment Program (NAWQA).

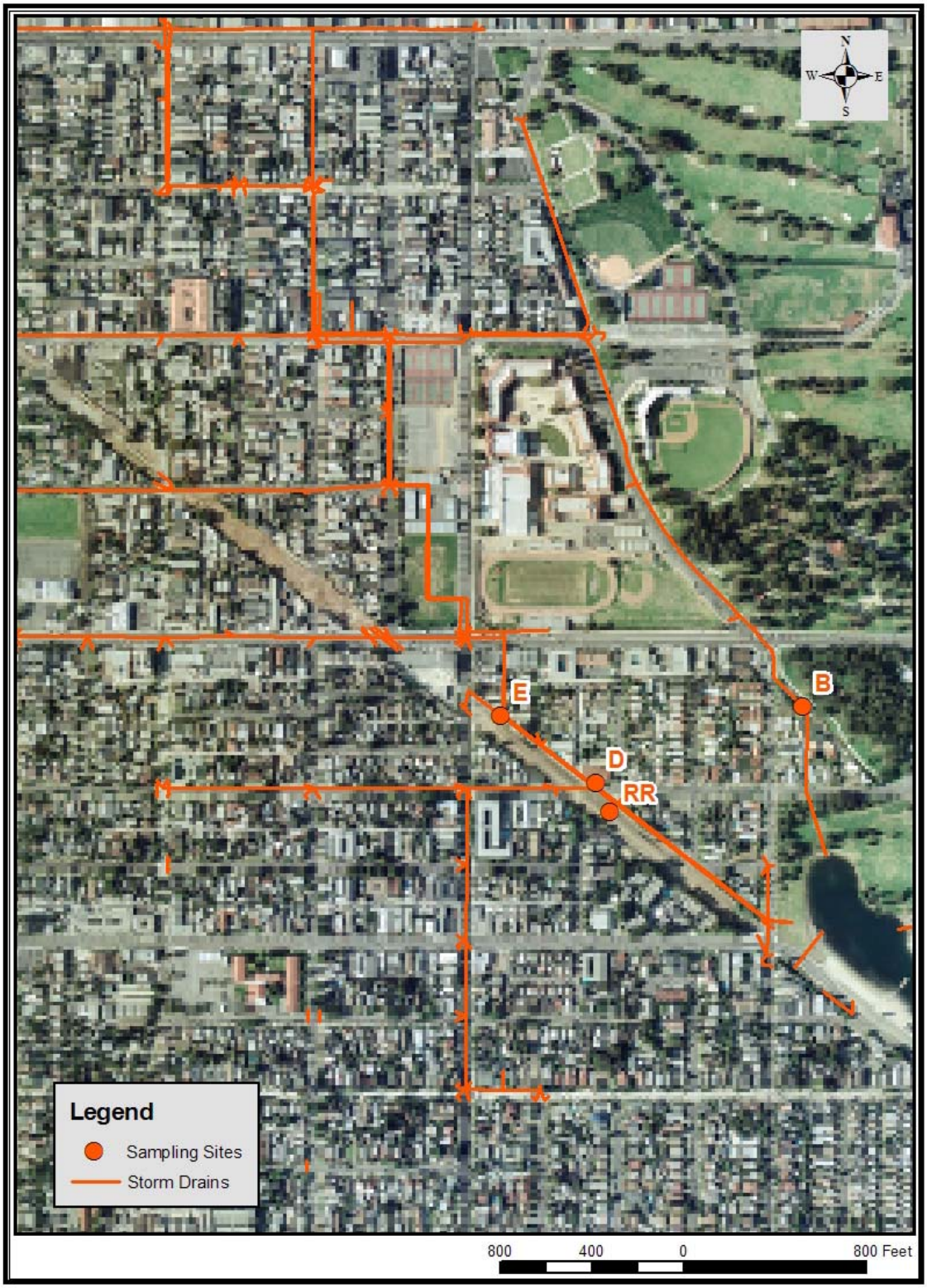

Figure B.1 Initial Sampling Points for the Pilot Watershed Source Identification Program.

2.2.1 Initial Sampling Equipment Decontamination

Sediment sampling equipment was prepared in the laboratory a minimum of four days prior to sampling. The sampling equipment included:

- Tefzel-coated sampling scoops and spoons
- Tefzel-coated compositing buckets
- Wash bottles and storage containers for deionized water
- Wash bottles for hydrochloric acid and methanol

Cleaning methods followed protocols adapted from the Shelton and Capel (1994). Prior to sampling, all equipment was thoroughly cleaned. Equipment was soaked (fully immersed) for three days in 2% Micro® solution and deionized water. Equipment was then be rinsed three times in deionized water and let dry in a clean place. After drying, equipment was rinsed with a 1.0% solution of hydrochloric acid, followed by a rinse with deionized water to eliminate the acid. A rinse was then conducted with methanol, followed by another set of three rinses with deionized water. After the final rinse, the field sampling equipment was allowed to dry in a clean place. The cleaned sampling devices and compositing buckets were then wrapped in aluminum foil until used in the field. All other equipment was stored in clean Ziploc™ bags until used in the field.

2.2.2 Field Sampling Procedures

To reduce variability within any sampling site, a minimum of three equal volume replicates was taken at each site. Sampling procedures were similar to those established for NAWQA (Shelton and Capel, 1994). The precleaned Tefzel-coated spoons/scoops were used to collect sediment samples at all sites. Spoon/scoops were used to collect sediments since they are capable of collecting small quantities of sediment adjacent to obstructions and other areas for which other sampling gear is inappropriate. Samples were placed directly into the compositing bucket.

The compositing bucket was covered with aluminum foil when not in use. At the conclusion of sample collection at each site, all sediment was composited in the buckets and subsampled for distribution to the appropriate laboratories. Disposable powder free nitrile gloves were worn while collecting and compositing samples to mitigate potential contamination. Gloves were changed between each sampling location to reduce the potential for cross-contamination.

All sampling equipment was rinsed with native water, when possible, or deionized water between uses at different depositional areas. All sampling equipment used at a particular sampling location was field cleaned prior to use at a different sampling location. The field-cleaning protocol involved 1) removal of sediments using a scrub brush and native water or deionized water; 2) scrubbing of sampling gear and compositing equipment with a 2% Micro® solution and deionized water; 3) rinsing with deionized water; 4) rinsing with a 1.0% solution of HCl; 5) rinsing with methanol; and 6) a final rinse with deionized water.

At the conclusion of sample processing at each sampling location, all samples were wrapped in protective material and stored on ice at 2-4 degrees centigrade in the field.

2.3 Analytical Methods and Reporting Limits

Larger debris and cobble were removed from the samples in the field using a Tefzel-coated spoon. Sieving was performed by the laboratory to remove excess cobble and debris prior to their analysis.

Samples were collected in a single, 1-liter, widemouth glass container for transfer to the laboratory where they were sieved through a 2 millimeter screen, homogenized, and then subsampled for each the appropriate target analytes in Tables B.1. All samples were maintained at 2-4 degrees centigrade while being stored and during the shipping process.

Table B.1 Analytes, methods, and holding times for analysis of sediments

Analyte	Units (dry wt.)	Method	Method Detection Limit	Method Reporting Limit	Holding Times
Trace Metals (Cd, Cu, Pb, Ag, Zn)	µg/g	EPA 6020m	0.025	0.05	6 months
Trace Metals (Hg)	µg/g	EPA 245.7m	0.01	0.02	28 days
Individual PCB Congeners	ng/g	EPA 8270m	1	5	14 days extract 40 days analysis
Organochlorine Pesticides	ng/g	EPA 8270m	1-10	1-50	14 days extract 40 days analysis
Particle Size (Puget Sound Protocol with hydrogen peroxide digestion)	%	ASTM D422M/PSEP	NS[1]	NS[1]	6 months[2]
Percent Moisture	%	EPA 160.3/PSEP	0.1	0.1	6 months[2]
TOC	%	ASTM D4129-82/PSEP	0.01	0.1	14 days

ASTM=American Society for Testing and Materials, PSEP=Puget Sound Estuary Project

1. NS indicates that the Target Detection Limit is not specified.
2. Maximum recommended limits if samples are sealed and refrigerated during storage.

3.0 RESULTS AND DISCUSSION

The results of the initial sampling effort are summarized in Table B.2. In the case of PCBs, only the six congeners detected during the survey are included in the data summary. Sediment data from Colorado Lagoon (KLI/M&N, 2004) are provided for comparison purposes.

Eroding sediments from the former railroad right-of-way (Site RR) contained the lowest levels of metals found at the four initial sampling sites. Similarly, sediments from this site contained the lowest concentrations of chlordane compounds but low levels of DDT were detected. No other organochlorine pesticides or PCB congeners were present in these sediments.

With the exception of dieldrin, all contaminants of concern in Colorado Lagoon were detected in one or more of the source areas. Matrix spikes of dieldrin were not recovered in the source sediments therefore the absence of dieldrin in the chemical analyses may have simply been due to matrix interferences. Sediments from Sites D and E were found to have substantial levels of metals, primarily copper, lead and zinc. Concentrations of lead in sediments from Site E were of major interest due to the fact that lead was one the primary constituents of concern in sediments within Colorado Lagoon. DDT compounds were below detection limits at Site B but were detected at concentrations of 10 to 24.6 ng/g dry at the other three sites. Chlordane compounds were detected at all four sites but were distinctly higher in sediments from Site B. No other organochlorine pesticides were detected at any of the sites. PCB congeners were only detected in sediments from Site D but concentrations were generally low with four of the six congeners being reported as estimates since they were detected between the Method Detection Limit (MDL) and the Method Reporting Limit (MRL). The remaining two congeners were detected at concentrations just above the MRL.

The physical characteristics of the sediments sampled from the three storm drains were substantially different (Table B.2). Sediments from Site B were very fluid (10.7 percent solids) and contained a large amount of organic material (24.3 % TOC).

The wide ranges of physical characteristics of the sediments make it difficult to just compare concentrations of contaminants in the bulk sediments without normalizing the data. Due to the large differences in sediment characteristics, data were compared based both on raw bulk sediment concentrations and concentrations normalized to the fine fractions. Data were normalized to the fine fraction (<0.063 mm) since most contaminants tend to associate with these smaller particles. Data from the four source areas were then ratioed to concentrations in the Colorado Lagoon sediments (KLI/M&N 2004) to assist in ranking areas for further upstream investigations (Table B.3).

Comparisons of both normalized and bulk sediment data from the source areas with Colorado Lagoon sediments (Table B.3) indicate that two of the areas may serve as significant sources of contaminants of concern. For simplification, storm drain systems are designated by the sampling site designations. Line E would appear to be the major source of lead based upon both bulk sediment concentrations and normalized concentrations. The normalized data suggests that Line E may also be a significant source of other metals, DDT and chlordane. Data from Site B suggests that Line B may contribute elevated levels of metals other than lead and chlordane compounds (particularly cis-nonachlor). Sediments from Site D indicate that this storm drain may contribute elevated levels of copper and zinc since ratios of both bulk sediment concentration and normalized concentrations are 4 to 5 times greater than those of Colorado Lagoon sediments.

Table B.2 Summary of Results from the Initial Storm Drain Sediment Survey and Comparison with a Composite Sediment Sample for the Western Arm of Colorado Lagoon.

		STORM DRAIN SEDIMENT				COLORADO LAGOON
ANALYTE NAME	**ML**	**B**	**D**	**RR**	**E**	**CL-1[1]**
Grain Analysis (% dry)						
Sand(>0.063 mm)		50.43	52.22	70.52	97.49	47.7
Silt (0.004 mm - 0.063 mm)		47.46	42.55	25.01	2.51	52.3[2]
Clay (<0.004 mm)		2.11	5.24	4.48	0	
Conventionals (%)						
Chemical Oxygen Demand		24.3	4.68	1.13	1.33	
Percent Solids		10.7	67.4	94.7	70.7	50.2
Total Organic Carbon	0.1	24.3	4.68	1.13	1.33	
Total Metals (µg/g dry)						
Cadmium	0.05	2.6	1.4	0.29	0.54	2.1
Copper	0.05	148	253	24	92J	55
Lead	0.05	97	133	33	1700	409
Mercury	0.02	0.521	0.122	0.062	0.138J	0.33
Silver	0.05	2.7	0.66	0.55	0.38	1.2
Zinc	0.05	877	1070	85	248	266
DDT Compounds (ng/g dry)						
2,4'-DDD	5	ND	ND	ND	ND	
2,4'-DDE	5	ND	ND	ND	ND	
2,4'-DDT	5	ND	ND	ND	ND	
4,4'-DDD	5	ND	ND	6.2	ND	ND
4,4'-DDE	5	ND	10	15	24.6	67
4,4'-DDT	5	ND	ND	ND	ND	14
Total DDT	-	ND	10	21	24.6	81
Chlordane Compounds (ng/g dry)						
alpha-Chlordane	5	46	11	3.2J	13.4	50
gamma-Chlordane	5	41	10	2.3J	16.2	55
Heptachlor	5	ND	ND	ND	ND	ND
Heptachlor epoxide	5	ND	ND	ND	ND	ND
cis-Nonachlor	5	19	3.1J	ND	2.80J	ND
trans-Nonachlor	5	24	6.8	4.2J	7.2	
Oxychlordane	5	ND	ND	ND	ND	ND
Total Chlordane	-	130	31	9.7	39.6	105

1. Results based upon a composite of three sediment cores taken in the western arm of Colorado Lagoon (KLI/M&N, 2004)
2. The earlier Colorado Lagoon study classified sediment as greater or less than 0.063 mm. In this case 47.7 percent of the particles were considered sand and 52.3 were considered fines (silt and clay).

Table B.2 Comparison of Storm Drain Sediments with a Composite Sediment Sample for the Western Arm of Colorado Lagoon. (continued)

		STORM DRAIN SEDIMENT				COLORADO LAGOON
ANALYTE NAME	**ML**	**B**	**D**	**RR**	**E**	**CL-1[1]**
Other Chlorinated Pesticides (ng/g dry))						
Aldrin	5	ND	ND	ND	ND	ND
Dieldrin	5	ND	ND	ND	ND	27
alpha-BHC	5	ND	ND	ND	ND	ND
beta-BHC	5	ND	ND	ND	ND	ND
delta-BHC	5	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	5	ND	ND	ND	ND	ND
Endosulfan I	5	ND	ND	ND	ND	ND
Endosulfan II	5	ND	ND	ND	ND	ND
Endosulfan sulfate	5	ND	ND	ND	ND	ND
Endrin	5	ND	ND	ND	ND	ND
Endrin aldehyde	5	ND	ND	ND	ND	ND
Endrin ketone	5	ND	ND	ND	ND	ND
Methoxychlor	5	ND	ND	ND	ND	ND
Mirex	5	ND	ND	ND	ND	ND
Toxaphene	50	ND	ND	ND	ND	ND
Detected PCB Congeners (µg/kg dry)						
PCB095	5	ND	3.0J	ND	ND	
PCB101	5	ND	5.6	ND	ND	
PCB110	5	ND	5.8	ND	ND	
PCB118	5	ND	3.5J	ND	ND	
PCB149	5	ND	2.4J	ND	ND	
PCB153	5	ND	2.3J	ND	ND	
Total PCBs	-	ND	22.6J	ND	ND	

1. Results based upon a composite of three sediment cores taken in the western arm of Colorado Lagoon (KLI/M&N, 2004)

Table B.3 Comparison of Contaminant Concentrations in Storm Drain Sediments and Colorado Lagoon based upon Data Normalized to the Fine Fraction and Raw Concentrations. Normalized and raw data ratios are based upon concentrations in the storm drain sediments divided by the concentration in sediments from the west arm of Colorado Lagoon (CL-1)

ANALYTE NAME	ML	NORMALIZED TO PERCENT FINES					RATIOS TO COLORADO LAGOON (CL-1)							
							NORMALIZED DATA				RAW DATA			
		B	D	RR	E	CL-1	B-ratio	D-ratio	RR-ratio	E-ratio	B-ratio	D-ratio	RR-ratio	E-ratio
Total Metals (mg/kg fines dry)														
Cadmium	0.05	5	3	1	22	4	1.3	0.7	0.2	5.4	1.2	0.7	0.1	0.3
Copper	0.05	299	529	81	3665	105	2.8	5.0	0.8	34.9	2.7	4.6	0.4	1.7
Lead	0.05	196	278	112	67729	782	0.3	0.4	0.1	86.6	0.2	0.3	0.1	4.2
Mercury	0.02	1	0.3	0.2	5	1	1.7	0.4	0.3	8.7	1.6	0.4	0.2	0.4
Silver	0.05	5	1	2	15	2	2.4	0.6	0.8	6.6	2.3	0.6	0.5	0.3
Zinc	0.05	1769	2239	288	9880	509	3.5	4.4	0.6	19.4	3.3	4.0	0.3	0.9
DDT Compounds (µg/kg fines dry)														
4,4'-DDE	5		21	51	980	128		0.2	0.4	7.7				
Total DDT	-		21	71	980	155		0.1	0.5	6.3		0.1	0.3	0.3
Chlordane Compounds (µg/kg fines dry														
alpha-Chlordane	5	93	23	11	534	96	1.0	0.2	0.1	5.6	0.9	0.2	0.1	0.3
gamma-Chlordane	5	83	21	8	645	105	0.8	0.2	0.1	6.1	0.7	0.2	0.0	0.3
Heptachlor	5													
Heptachlor epoxide	5													
cis-Nonachlor	5	38	6		112	7	5.9	1.0		17.2	5.6	0.9		0.8
trans-Nonachlor	5	48	14	14	287									
Oxychlordane	5													
Total Chlordane	-	262	65	33	1578	201	1.3	0.3	0.2	7.9	1.2	0.3	0.1	0.4

1-3 times Colorado Lagoon sediment
3-6 times Colorado Lagoon sediment
>6 times Colorado Lagoon sediment

4.0 CONCLUSIONS AND RECOMMENDATIONS

The extreme differences in the physical characteristics of sediments from Sites B and E warrant some precaution. Very low percentages of fine sediments from Site E and very high organic content of sediments from Site B can lead to biases even with normalization. Nevertheless, it is clear that further investigations are warranted due, in particular, to lead present in the sandy sediments at Site E. Secondarily, concentrations of chlordane compounds and some metals found in sediments from Site B should also be investigated.

Sites and strategies for the second iteration of testing in Lines E and B are summarized in Tables B.4 and B.5. The sampling strategy is to resample the two original sites while adding two to four additional sites at upstream locations where major branches diverge. In most cases, sampling sites are located in high traffic areas and will require both traffic control and confined space entry. Since sediments may be difficult to find in adequate volumes at these sites, provisions must be made for installing small dams to trap sediments and then revisit the sites either at the end of the dry season or after a small rainfall event.

The analytical list for this round of testing will be adjusted to eliminate analysis of PCBs since these constituents were not found at levels of concern during the first round of sampling. All other constituents including organochlorine pesticides will remain on the list. Due to the previous matrix problems encountered with dieldrin, the analytical method for these compounds will be modified to EPA 8270m (NCI-GCMS). This method eliminates most matrix interference issues and provides lower detection limits.

Table B.4 Proposed follow up investigations in Line E.

Location	Site	Description / Action	Traffic Control
Railroad & Alley (original Site E)	E1	Sample sediment from inside main stem Site E conveyance (63” R.C.P.) at lowest tide possible.	Yes-
Sixth St. & Quincy Ave.	E2	Sample sediment from inside 12” C.P. at connection with Site E conveyance (39” R.C.P.), or from either of the two manholes further up (west on Sixth St.) 12” C.P. Traffic control necessary only if manhole at Sixth St. & Ximeno Ave. is required. Install small sediment dam inside 12” C.P. near connection with Site E conveyance if no sediment deposits are found. Return at later date to sample accumulated sediment.	Maybe-
Seventh St. & Ximeno Ave.	E3	Sample sediment from inside 12” C.P. at connection with Site E conveyance, or from manholes further up (west on Seventh St.) 12” C.P. Install small sediment dam inside 12” C.P. near connection with Site E conveyance. if no sediment deposits are found. Return at later date to sample accumulated sediment.	Yes-
Eighth St. & Bennett Ave.	E4	Check 15” C.P. connection from west. If it connects to the Site E conveyance then sample sediment from inside 15” C.P. at connection, or from manholes further up (west on Eighth St.) 15” C.P. Install small sediment dam inside 15” C.P. near connection with 39” R.C.P. if no sediment deposits are found. Return at later date to sample accumulated sediment. If 15” C.P. does not connect to Site E conveyance, then ignore.	Yes-
Eighth St. & Bennett Ave.	E5	Sample sediment from main stem of Site E conveyance (33” R.C.P) just upstream from manhole, or upstream at manhole at Tenth St. & Bennett, or manhole at Tenth St. & Roswell. Check 18” CP connection from east at Tenth St & Bennett to verify it is abandoned and does not contribute flow to Site E conveyance. Install small sediment dam inside main stem of Site E conveyance if no sediment deposits are found. Return at later date to sample accumulated sediment.	Yes-

Table B.4 Proposed Follow-up Investigations in Line B.

Location	Site	Description / Action	Traffic Control
St. Joseph Alley near Park Ave. (original Site B location)	B1	Sample sediment from inside main stem Site B conveyance (63" R.C.P.) at lowest tide possible. If no sediment available, go upstream to alternative location.	No
Seventh St. & Park Drive	B1 (alt.)	Sample sediment from inside main stem Site B conveyance (63" R.C.P.) at lowest tide possible (this site barely sees tidal effect). Install small sediment dam inside main stem Site B conveyance if no sediment deposits are found. Return at later date to sample accumulated sediment.	Yes-
Roswell Ave. near Tenth St.	B2	Investigate connections here. If Site B conveyance (4'-3" x 5'-0" Double Reinforced Concrete Box) is accessible, then sample sediment if present. Install small sediment dam inside DRCB if no sediment deposits are found. Return at later date to sample accumulated sediment.	Yes-
Roswell Ave. near Eleventh St.	B2 (alt.)	Investigate connections here (maps are confusing). If Site B conveyance (4'-3" x 5'-0" DRCB) is accessible, then sample sediment if present. Install small sediment dam inside DRCB if no sediment deposits are found. Return at later date to sample accumulated sediment.	Yes-

5.0 REFERENCES

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