SAN FRANCISCO BAY AREA STORMWATER RUNOFF
MONITORING DATA ANALYSIS
1988-1995

Final Report
October 15, 1996

B A S M A A

Prepared by

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1.0 BACKGROUND

This document provides a summary of stormwater runoff data collected in the San Francisco Bay Area from 1988 to 1995. Runoff data has been collected by a number of Bay Area agencies for a variety of purposes including characterization of pollutant concentrations from different land-use areas, assessment of compliance with receiving water quality objectives, source identification of pollutants and toxicity, and evaluation of Best Management Practice (BMP) effectiveness. The focus of this data analysis project was to compile all Bay Area runoff data into a cohesive database and to perform analysis typically conducted by each agency. Combination of all data provides a greater understanding of the quality of runoff and increases the confidence in the conclusions drawn from statistical and regulatory comparisons.

The Bay Area Stormwater Management Agencies Association (BASMAA) is made up of seven stormwater management agencies in the San Francisco Bay Area, and facilitates the sharing of information and implementation of specific stormwater management activities which are best performed on a region-wide basis (such as public information and participation, new development control measures, and monitoring). BASMAA has several Committees, one being the Monitoring Committee which was formed to coordinate routine monitoring and special studies conducted in the Bay Area and to facilitate sharing of information generated within the region and state, and nationally.

Previously, the Monitoring Committee funded a project to develop and document standardized monitoring protocols and quality assurance/quality control procedures for routine stormwater quality and flow monitoring. The BASMAA Standardized Monitoring Protocols Report (BASMAA 1995) provides details of field and laboratory procedures used to collect runoff data for long-term monitoring. This report summarizes the data collected using procedures similar to those recommended in the Monitoring Protocols Report and provides information on pollutant concentrations at each monitoring station and how these concentrations compare to regulatory standards. In addition, this report also provides an analysis of the relationship of metals in runoff to land-use and summarizes the results of the toxicity monitoring.

2.0 STORMWATER MONITORING IN THE BAY AREA

2.1 MONITORING ACTIVITIES IN THE SAN FRANCISCO BAY AREA

2.1.1 Santa Clara Valley Nonpoint Source Pollution Control Program (SCVNPS)

Stormwater monitoring has been an ongoing effort in the Bay Area since 1987. The Santa Clara Valley Nonpoint Source Pollution Control Program (SCVNPS) began their monitoring program in 1987. The first two years of the SCVNPS monitoring program included wet-weather monitoring at seven stations that drained different land use areas, and wet- and dry-weather monitoring at four waterway stations. The primary goal of this monitoring was to characterize stormwater runoff water quality and to estimate annual metal loads to the Bay. Loads were estimated from the land use monitoring data and modeled runoff volumes.

In FY 89-90 monitoring was continued at the four waterway stations to evaluate long-term compliance with water quality objectives and at one industrial land use station which was being used as a pilot demonstration project for evaluating the effectiveness of an intensive industrial inspection program.

Monitoring activities during the first five-year permit period (started in FY 1990-91) included continued operation of automatic flow-weighted composite sampling at two of the four waterway stations as well as continued monitoring of the industrial pilot demonstration project. Three additional stations were added to evaluate runoff from transportation corridors and from a light industrial land use area.

2.1.2 Alameda Countywide Clean Water Program (ACCWP)

Monitoring in Alameda County began in 1988. Similar to the SCVNPS Program, the first two years of monitoring were focused on characterization of stormwater runoff water quality and estimation of annual metal loads to the Bay. Wet-weather monitoring was conducted at ten stations that drained different land use areas, and wet- and dry-weather monitoring was conducted at six waterway stations that drained mixed land uses. Monitoring has continued during the first five-year permit period at the waterway stations. The number of waterway stations had been reduced from six to two over the last four years. Similar to SCVNPS, monitoring has also been continued at one industrial land use station which is being used as a pilot demonstration project for evaluating the effectiveness of an intensive industrial outreach and inspection program.

2.1.3 Contra Costa Clean Water Program

Monitoring in Contra Costa County began in FY 1994-95. The Contra Costa County monitoring program includes monitoring at two waterway stations five times a year using automatic flow-weighted composite water samplers.

2.1.4 City Programs

The cities of Vallejo and Fairfield/Suisun also conduct stormwater monitoring. Monitoring results from these programs have not been incorporated into the database at this time. The results may be incorporated at a future date.

2.1.5 Special Studies

In addition to the flow weighted composite sampling described above, most of the BASMAA member-agencies have also conducted other monitoring for specific purposes. For example, SCVNPS has studied the effectiveness of modifications to a detention basin while ACCWP has used grab sampling to identify sources of pollutants in industrial and residential land use areas, as well other studies. A summary of these and other studies are currently being compiled by the BASMAA special studies workgroup of the Monitoring Committee. The current Special Studies Summary List is attached as Appendix G.

2.2 CURRENT BASMAA MONITORING PROGRAM

Specific goals for the current monitoring programs are found in the individual programs Storm Water Management Plan. As a part of the re-focusing of monitoring resources the Regional Water Quality Control Board staff agreed to scaling back the monitoring efforts conducted by the Santa Clara, Contra Costa, and Alameda programs to involve monitoring of two waterways stations by each Program. The goals of the waterway monitoring currently being conducted include the following:

I. Determine trends in water quality and augment the long-term database to include a range of hydrological and water quality conditions for representative waterways in the Bay Area.

II. Determine how receiving water quality during storm events compares with available water quality and toxicity objectives.

Each Program incorporated the typical station design described below to collect flow-weighted composite samples with the sampler intake located a few centimeters off the bottom of the waterway. Storm runoff samples collected using this method have been found to contain significant amounts of settleable solids which can comprise a significant fraction of the total metals (an average of 34%-58% of the total copper, lead and zinc were found to be associated with the settleable solids in two waterways in Alameda County (WCC 1995). Therefore, comparisons of these data with water quality objectives for total metals that were primarily designed for assessing compliance with effluents that contain low amounts of solids (such as sewage treatment plants) may not be appropriate.

2.3 STATION DESIGN

The typical monitoring station contains a calibrated flow measurement device (weir and pressure transducer to measure water height) and a semi-automated water sampler programmed to collect a sample aliquot after a given amount of flow has been recorded. For most parameters, aliquots of water are collected and combined by the sampler by means of a peristaltic pump which discharges into a common container (composite bottle). Samples collected in this manner are called flow-weighted composites and provide data appropriate for estimating pollutant loads from a given storm event.

Typically, land use monitoring stations are located within stormwater sewer systems and are accessed via manholes in the street. Sampler intakes for the waterway stations are located a few centimeters above the channel floor.

Transportation Corridor Stations (T) receive drainage from major highways, expressways or freeways. Detention Basin (DB) Stations were located at the inlet or outlet to a detention basin. Reservoir Release Stations (R) were located in the reservoir spillway and monitor releases necessary to maintain flood capacity in the reservoirs.

Table 2-1 provides some of the watershed characteristics for each of the monitoring stations. Stations are identified first by County Code (AL=Alameda, SC=Santa Clara, CC=Contra Costa) then by Type (L=Land Use, S=Waterway, T=Transportation Corridor, DB=Detention Basin, R=Reservoir Release) then by identification number. Figure 2-1 shows the current and historical sampling locations.

2.4 LABORATORY ANALYSIS PARAMETERS AND METHODS

Laboratory analysis parameters included in this report include metals (total recoverable and in some cases dissolved) and physical parameters (TSS, TDS, hardness, TOC, total oil and grease). Analysis for organic priority pollutants (volatile organic compounds, semi-volatile organic compounds, polynuclear aromatic hydrocarbons, organochlorine pesticides, chlorinated herbicides) was conducted in the characterization phase of the Alameda and Santa Clara programs. In general, the organic data indicated that most parameters were not present at concentrations above the method detection limits in stormwater. However, standard EPA detection limits were used for most sample analysis, precluding comparison with risk-based water quality objectives contained in the Federal Register.

Some detections of banned pesticides and herbicides (DDT and metabolites, chlordane) were occasionally observed in sediments from stream beds. Recently, the Programs have initiated monitoring for organophosphate pesticides (diazinon and chlorpyrifos) due to Toxicity Identification Evaluation results which indicated these compounds are causing toxicity in laboratory toxicity tests (see Chapter 6) (Hansen 1994). Results from the organophosporous analysis will be reported as a part of BASMAA's Diazinon Workgroup and are not included in this report.

Table 2-2 presents a list of the laboratory analysis typically conducted on stormwater runoff samples. The methods and detection limits shown are currently recommended by the BASMAA member-agencies conducting monitoring. Actual laboratory methods used to analyze samples in this report are included in the database along with the detection limit for each sample.

Table 2-1
LAND USE CLASSIFICATIONS FOR STATION WATERSHEDS (page 1 of 2)

County	Station	Location	Drainage Area (Acres)	< *Land Use Classification (%)* Open/ Open Forest	Light Industrial	Heavy Industrial	Residential	Commercial	Transportation >
AL	L1	Strawberry Creek	167	100					
AL	L2	Ettie Street	954		26.7	2.1	48	18.1	5.1
AL	L3	24th and Wood Streets	169		60.1		40		0.1
AL	L4	Alice & 4th Street	20			2.6	60	19.6	17.9
AL	L5	Elmhurst Creek	755			0.1	88.4	9.2	2.4
AL	L6	Zone 9, Line D (Merced and Wick's	693			64.6	25.3	6.9	3.0
AL	L7	Cotter Way	78				32.9	67.1	
AL	L8	Dry Creek	6042	98.7			1.3		
AL	L9	Pacific Street	259		94.6		0.6		4.9
AL	L10	37th Street	144		45.6		22.8	23.3	8.3
AL	S1	Codornices Creek	180			3.8	88.1	8.1	
AL	S2	San Lorenzo Creek	27,209	81.8		0.1	17	0.8	0.7
AL	S3	Castro Valley Creek	3,489	17.2			74.3	6.4	2.0
AL	S4	Zone 4, Line A (Chabot Avenue)	1,052	4.1	17.4	9.6	41.7	21.7	5.6
AL	S5	Alameda Creek	405,250				*mixed*		
AL	S6	Zone 5, Line D	1,658	9.1			67.8	21.4	1.8
CC	S1	Rheem Creek	954	17			78	5	
CC	S2	Walnut Creek	54,530	54			42	4	

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Table 2-1
LAND USE CLASSIFICATIONS FOR STATION WATERSHEDS (page 2 of 2)

				Land Use Classification (%)					
County	**Station**	**Location**	**Drainage Area (Acres)**	**Open/ Open Forest**	**Light Industrial**	**Heavy Industrial**	**Residential**	**Commercial**	**Transportation**
SC	L1	Junction Avenue	22		100				
SC	L2	Walsh Avenue	28			100			
SC	L3	Frances and Beamer	265				58	42	
SC	L4	Hale Creek	1,633	20			80		
SC	L5	Sunnyvale East, at Fremont Avenue	2,080				79	21	
SC	L6	Passetta and Williams	85				100		
SC	L7	Stevens Creek, at Camp Castanoan	8,410	100					
SC	L8	Packwood Creek	6,464	100					
SC	L9	West San Carlos Avenue	40			100			
SC	T1	Montague Expressway	12						100
SC	T2	I-280	35						100
SC	S1	Calabazas Creek	9,216	21			71	7	
SC	S2	Sunnyvale East at Bayshore	3,437				68	32	
SC	S3	Guadalupe River	55,904	30	3	1	61	5	
SC	S4	Coyote Creek	79,552	64	4	1	30	1	

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Table 2-2
CHEMICAL ANALYSIS PARAMETERS AND QUALITY ASSURANCE GOALS (page 1 of 2)

ID	Parameter	Methodology	Method	Reference	Units	Target Detection Limi	Dup RPD Limit %	Matrix Spike % Recovery	MS RPD Limit %	Preservation	Container Type	Maximum Holding Time	Volume (ml)	Collection Method
	General													
TH	Hardness	Titrimetric EDTA	2340 C	b	mg/L	1	15	N/A	N/A	pH<2 HNO3	P, G	6 months	200	Comp
TSS	Total Suspended Solids	Gravimetric	2540 D	b	mg/L	4	15	N/A	N/A	4°C	P, G	7 days	200	Comp
TDS	Total Dissolved Solids	Gravimetric	2540 C	b	mg/L	10	15	N/A	N/A	4°C	P, G	7 days	100	Comp
COD	Chemical Oxygen Deman	Assay	5220 C	b	mg/L	4	15	N/A	N/A	4°C pH<2 H2SO4	P, G	28 days	200	Comp
Anions	Chloride, Nitrate, Nitrite, Sulfate, Phosphate	IC	300	a	mg/L	0.1 - 0.5	15	N/A	N/A	4°C	P, G	48 hours	200	Comp
	Nutrients													
TKN	Total Kjeldahl Nitrogen	Spectrometric	4500-Norg B	a	mg/L	0.1	30	70 - 130	30	4°C pH<2 H2SO4	P, G	28 days	500	Comp
NH3	Ammonia	Spectrometric/ISE	350	a	mg/L	1	30	70 - 130	30	4°C pH<2 H2SO4	P, G	28 days	500	Comp
	Bacteria													
Total-C	Total Coliform	Assay	SM 9222B	b	CFU/100ml	100	30	N/A	N/A	4°C	P (Sterile)	6 hours	100	Grab
Fecal-C	Fecal Coliform	Assay	SM 9222D	b	CFU/100ml	100	30	N/A	N/A	4°C	P (Sterile)	6 hours	100	Grab
Fecal-S	Fecal-Streptococcus	Assay	SM 9230C	b	CFU/100ml	100	30	N/A	N/A	4°C	P (Sterile)	6 hours	100	Grab
	Metals & Cations -Total Recoverable													
	Total Recoverable Digestion		200.2	c							P, G		500	Comp
T-Al	Aluminum	Flame-AA/ICP	200.7	c	ug/L	20	25	70 - 130	35	pH <2 HNO3		6 months		
T-As	Arsenic	Furnace-AA	200.9	c	ug/L	1	25	70 - 130	35	pH <2 HNO3		6 months		
T-Ba	Barium	Furnace-AA	200.9	c	ug/L	5	25	70 - 130	35	pH <2 HNO3		6 months		
T-B	Boron	Flame-AA	200.7	c	ug/L	5	25	70 - 130	35	pH <2 HNO3		6 months		
T-Cd	Cadmium	Furnace-AA	200.9	c	ug/L	0.2	25	70 - 130	35	pH <2 HNO3		6 months		
T-Cr	Chromium (Total)	Furnace-AA	200.9	c	ug/L	1	25	70 - 130	35	pH <2 HNO3		6 months		
T-Cu	Copper	Furnace-AA	200.9	c	ug/L	1	25	70 - 130	35	pH <2 HNO3		6 months		
T-Pb	Lead	Furnace-AA	200.9	c	ug/L	1	25	70 - 130	35	pH <2 HNO3		6 months		
T-Hg	Mercury	Cold Vapor - AA	245.1	c	ug/L	0.2	25	70 - 130	35	pH <2 HNO3		28 days		
T-K	Potassium	Flame-AA/ICP	200.7	c	ug/L	25	25	70 - 130	35	pH <2 HNO3		6 months		
T-Ni	Nickel	Furnace-AA	200.9	c	ug/L	2	25	70 - 130	35	pH <2 HNO3		6 months		
T-Se	Selenium	Hydride - AA	270.3	c	ug/L	0.2	25	70 - 130	35	pH <2 HNO3		6 months		
T-Na	Sodium	Flame-AA/ICP	200.7	c	ug/L	50	25	70 - 130	35	pH <2 HNO3		6 months		
T-Ag	Silver	Furnace-AA	200.9	c	ug/L	0.2	25	70 - 130	35	pH <2 HNO3		6 months		
T-Zn	Zinc	Furnace-AA	200.9	c	ug/L	1	25	70 - 130	35	pH <2 HNO3		6 months		

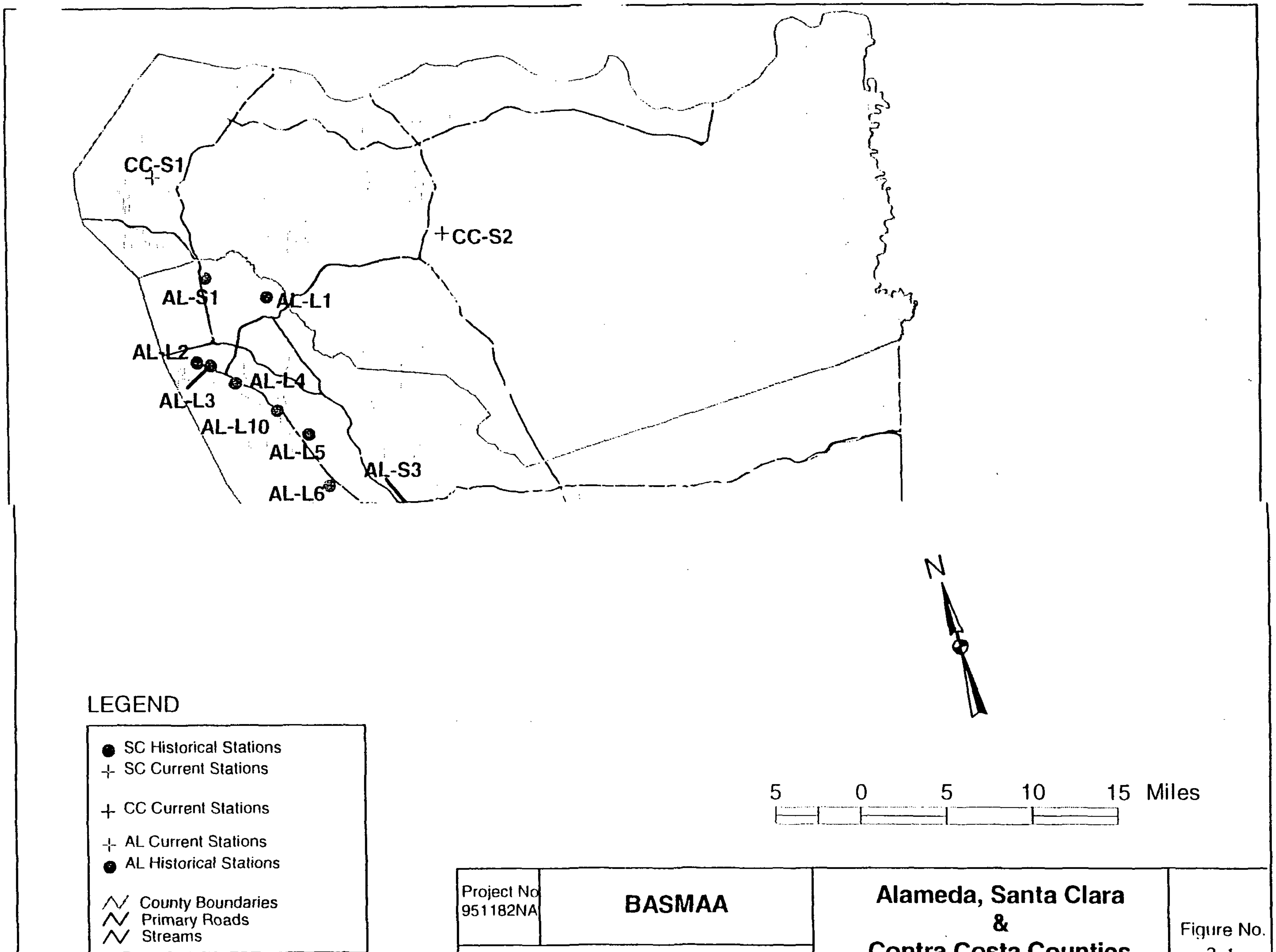
Table 2-2
CHEMICAL ANALYSIS PARAMETERS AND QUALITY ASSURANCE GOALS (page 2 of 2)

ID	Parameter	Methodology	Method	Reference	Units	Target Detection Limi	Dup RPD Limit %	Matrix Spike % Recovery	MS RPD Limit %	Preservation	Container Type	Maximum Holding Time	Volume (ml)	Collection Method
	Metals - Dissolved													
F	Filtration/ Digestion		3030B	b						4°C	P, G	Immediately	500	Comp
D-Cd	Cadmium	Furnace-AA	200.9	c	ug/L	0.2	25	70 - 130	35	pH <2 HNO3		6 months		
D-Cu	Copper	Furnace-AA	200.9	c	ug/L	1	25	70 - 130	35	pH <2 HNO3		6 months		
D-Pb	Lead	Furnace-AA	200.9	c	ug/L	1	25	70 - 130	35	pH <2 HNO3		6 months		
D-Ni	Nickel	Furnace-AA	200.9	c	ug/L	2	25	70 - 130	35	pH <2 HNO3		6 months		
D-Zn	Zinc	Furnace-AA	200.9	c	ug/L	1	25	70 - 130	35	pH <2 HNO3		6 months		
	Organics													
PAH	Polynuclear aromatic hydrocarbons	GCMS	625 (mod)	e	ng/L	0.5	30	40 - 140	40	4°C	G	day (extraction 40 day (extract)	2000	Comp
TPH	TPH	IR	418.1/SiO2		mg/L	0.1	30	40 - 140	40	4°C	G	day (extraction 40 day (extract)	2000	Grab
TOC	Total Organic Carbon	Combustion	9060	d	mg/L	1	30	40 - 135	50	°C pH < 2 H2SO	P, G	28 days	100	Comp
OC-Pest	Organochlorine Pest.	GC/ECD	8080	d	µg/L	0.05 - 0.5	30	50 - 140	40	4°C	G	day (extraction 40 day (extract)	2000	Comp
OP-Pest	Organophosphate Pest.	HPLC/MS	8140	d	µg/L	0.05	30	50 - 140	40	4°C	G	day (extraction 40 day (extract)	2000	Comp
Cl-Herb	Chlorinated Herbicides	GC/ECD	8150	d	µg/L	0.5 - 2	30	50 - 140	40	4°C	G	day (extraction 40 day (extract)	2000	Comp

(a) Methods for Chemical Analysis of Water and Wastes (1983) EPA-600/ 4-79-020
(b) Standard Methods for the Examination of Water and Wastewater, 18th Ed., APHA, AWWA ,WEF, 1992
(c) Methods for the Determination of Metals in Environmental Samples (1991) EPA/600/4-91/010
(d) SW 846 3rd ed. 1992, EPA Office of Solid Waste
(e) Texas A&M GERG Method (HLPC/GCMS/SIM)

Approximate Volume Needed in Composite (ml) 11000

Abbreviations:
EDTA = Ethylenediaminetetraacetic acid; IC = Ion Chromatography; AA = Atomic Absorption; HPLC = High Performance Liquid Chromatography;
IR = infrared spectroscopy; GC = Gas Chromatography; MS = Mass Spectroscopy; ECD = Electron Capture Detection; FPD = Flame Photometric Detection
SIM = Selected Ion Monitoring; ISE = Ion Specific Electrode; N/A = Not Applicable; Comp = Flow-weighted Composite Sample; Grab = Grab Collected During First Hour Of Sampling



Project No 951182NA	BASMAA	Alameda, Santa Clara & Contra Costa Counties Sampling Locations	Figure No. 2-1
WOODWARD-CLYDE CONSULTANTS			

3.0 QA/QC AND DATA MANAGEMENT

Data quality objectives for stormwater monitoring have been evolving over the years as more information on the problems in the bay and waterways become available. Currently recommended QA/QC procedures including equipment blanking, laboratory and field quality control samples, and data validation procedures are presented in the BASMAA monitoring protocols standardization project report (BASMAA 1995). All data included in this report were collected using the recommended field and laboratory quality control procedures. Modified EPA data validation procedures were used to assign a data qualifier to data that may fall below the data quality objectives due to problems with field or laboratory procedures. In general, only a small percentage of the sample results were qualified as estimated. However, all data qualified as estimated values due to known or suspected problems with accuracy or precision or due to suspected equipment contamination was used to generate the summary statistics. Rejected data was not included in the database.

3.1 DESCRIPTION OF QA/QC PROGRAM

The quality assurance/quality control (QA/QC) review process is used to evaluate the quality of the sample collection and handling procedures as well as overall analytical data quality and usability. Data quality and usability may be quantified in terms of accuracy, precision, potential sample contamination and representativeness. These parameters are evaluated by reviewing method holding times, blanks, spike recoveries, duplicates and detection limits.

Following are summaries of the QA/QC review processes. Detailed descriptions of the individual data quality reviews are located in the annual monitoring reports.

3.1.1 Method Holding Time Review

The analytical methods used in this study have prescribed holding times. Holding time is defined as the maximum amount of time after collection that a sample may be held prior to extraction and/or analysis. Sample integrity becomes questionable for samples extracted and/or analyzed outside of the prescribed holding times due to degradation and/or volatilization of constituents in the sample. The analytical results of such samples analyzed outside the prescribed method holding are generally thought to be less accurate and used as estimated values.

3.1.2 Blank Review

Blank samples are analyzed by the analytical laboratory in order to check for potential sample contamination. Information regarding the potential source of accidental sample contamination may also be gained by analyzing a variety of blanks prepared at several points during sample collection and analysis. The blanks analyzed for this study included the following:

Method Blank - a blank prepared in the laboratory from deionized, distilled water that is extracted and/or analyzed as a sample. Analysis of the method blank indicates potential sources of contamination from laboratory procedures (e.g. contaminated reagents, improperly cleaned laboratory equipment, or persistent contamination due to presence of certain compounds in the ambient laboratory air). A method blank is analyzed at least once each day when a particular analytical method is used.

Equipment Blank - deionized, distilled water that is poured or pumped through the sampling equipment to evaluate whether samples are contaminated from improperly decontaminated sampling equipment. Equipment blanks are analyzed prior to conducting sampling at the beginning of the season for metals and once or twice during the season to ensure stored equipment and subsampling bottles remain free of contamination.

3.1.3 Spike Review

Matrix spikes (MS), matrix spike duplicates (MSD), laboratory control samples (LCS), laboratory control sample duplicates (LCSDs), and Standard Reference Materials (SRM) are analyzed by the analytical laboratory to evaluate the accuracy and precision of the sample extraction and analysis procedures and potential matrix interference. Matrix interference is the term used to describe the effect of the sample matrix on the analysis, which partially or completely masks the response of the analytical instrumentation to the target analyte(s). Matrix interference may have a varying impact on the accuracy and precision of the extraction and/or analysis procedures.

The matrix spike is prepared by adding known quantities of target compounds to a sample. The sample is then extracted and/or analyzed as a typical environmental sample and the results are reported as percent recovery. The spike recovery is defined in equation 3-1.

Matrix spike recoveries are reviewed for compliance with laboratory-established or EPA control limits to evaluate the accuracy of the extraction and/or analysis procedures.

LCSs are prepared exactly like matrix spikes, except a clean control matrix is used. Typical control matrices are Reagent Grade Type II water or clean sand. LCSs are used to evaluate laboratory accuracy and precision, independent of matrix effects.

SRM is supplied by a commercial vendor and is certified to contain analytes within a given range of concentrations. SRMs are analyzed along with each batch of samples as a secondary check of the accuracy of the analytical procedures.

Precision of analytical procedures is evaluated as discussed below for duplicate analyses.

3.1.4 Duplicate Analyses

Analysis of duplicates provides an evaluation of sampling and analytical precision. Laboratory duplicates (duplicate analyses performed on two aliquots of the same sample) measure analytical precision. The laboratory duplicates are usually spike/spike duplicate analyses. Field duplicates (two complete samples collected at the same time and the same station in the field) reflect both sampling and analytical precision as well as heterogeneity of environmental samples. Field duplicates are generally submitted to the laboratory "blind" (under a fictitious name so that the laboratory does not know they are duplicates).

$$\%\ Recovery = \frac{spike\ analysis\ result\ -\ original\ sample\ concentration}{concentration\ of\ spike\ addition} \times 100\% \quad (Eq.\ 3\text{-}1)$$

$$RPD = \frac{\textit{Spike Concentration} - \textit{Spike Duplicate Concentration}}{\frac{1}{2}\left(\textit{Spike Concentration} + \textit{Spike Duplicate Concentration}\right)} \times 100\% \qquad (Eq.\ 3\text{-}2)$$

Precision is evaluated through calculation of relative percent differences (RPD) using equation 3-2.

Calculated RPDs are compared to laboratory-established control limits to evaluate analytical precision and sample heterogeneity.

3.1.5 Elevated Detection Limits

Analytical equipment used for the analysis of environmental samples may respond strongly to components of the sample matrix (matrix interference). Matrix interference may cause difficulty and unacceptable uncertainty in the quantification of target compounds. Therefore, in the analysis of environmental samples it is sometimes necessary to dilute a sample prior to analysis to minimize matrix interference or to lower concentrations of target compounds detected at high concentrations. However, a dilution may also mask the presence of low level target compounds because detection limits are raised when the sample is diluted. A diluted sample may contain undetected levels of target compounds that would otherwise be detected if the sample was not diluted. Results of analyses of diluted samples must therefore be interpreted with caution. Insufficient sample volume may also elevate detection limits. The QA/QC review identifies those samples with elevated detection limits.

3.1.6 Representativeness

Representativeness qualitatively measures the degree to which the data accurately and precisely represent variations at a sampling point. Specific field sample collection and handling procedures (as detailed in the sampling and analysis plan) are followed to ensure data representativeness. In addition, proper log-in, storage, preparation and analysis procedures are followed by the analytical laboratory to ensure representativeness.

Data quality and usability are evaluated by reviewing the QA/QC categories as described above, according to EPA guidelines (EPA 1994).

One measure of sample representativeness for flow-composite samples is the percentage of the storm event that is sampled (percent capture). Values less than 100 percent capture indicate that there were periods during which the sampler was not operational. This may have been because full sample bottles were not changed in time or because the equipment malfunctioned. These risks are unavoidable and considerable professional judgement is involved in setting up and adjusting the programming instructions to the automatic sampler to maximize storm coverage.

Samples which had low percent capture were not excluded from the data analysis in this report. It was necessary to include all data because a large proportion of the land use specific monitoring was conducted during the first two years of monitoring and prior to installation of telemetry (for remote station status monitoring). As a result much of the land use data contained storms with low percentage capture.

3.2 DATA REPORTING/MANAGEMENT

Data is reported in hardcopy and electronic spreadsheet format by the analytical laboratory. The electronic data are checked against the hardcopy report for any differences and the files are modified to include station identification, event number, and data qualifiers. These modified data files were loaded into and Oracle database system developed at Woodward-Clyde (Site Manager) which uses a Powerbuilder windows interface. Once in the database the data are queried for specific parameters and stations and the output is exported to Excel. These master spreadsheets are used to generate water quality comparison tables and other statistical reports which are included in the appendices. Duplicate samples reported as individual analysis are averaged prior to generating event and station statistics. Non-detect data are treated as one half the detection limit in the statistical summaries.

4.0 COMPARISON OF POLLUTANT CONCENTRATIONS IN WATERWAY STATIONS WITH WATER QUALITY STANDARDS

Metals concentrations are compared to existing water quality objectives and standards to provide an indication of the potential for runoff to cause impairment of aquatic habitat. Existing water quality objectives and standards were developed based on laboratory exposures of sensitive species to different metal concentrations in laboratory control waters. Because the chemical composition of laboratory control waters are often much different than those encountered in the environment, and the effects of these differences are not well known, these comparisons are provided as a guide rather than an indication of a problem.

As noted in Section 2.1 flow-weighted composite stormwater samples have been found to contain a significant fraction of the total metals associated with suspended and settleable solids. Therefore, comparison of total metals concentrations measured in runoff with water quality objectives designed for effluents with restricted amounts of solids (such as a sewage treatment plant effluent) may not be appropriate.

Municipal stormwater programs comply with water quality objectives "through the timely implementation of control measures and other actions to reduce pollutants in the discharge in accordance with the Stormwater Management Plan." A water quality objective exceedance is not a permit violation.

4.1 WATER QUALITY STANDARDS

Stormwater runoff data are compared to two different water quality standards: Water Quality Objectives and Water Quality Criteria. The Basin Plan Water Quality Objectives (WQOs) are the current regulatory objectives for the San Francisco Bay Basin (RWQCB 1995). These objectives are to be compared with the total metal concentrations. Two different exposure durations are included in the Basin Plan Objectives: acute objectives, based on a minimum 1-hour exposure duration; and chronic objectives, based on a minimum 4-day exposure duration. Stormwater runoff flow durations are variable and depend on the size of the storm event, size of the watershed, and antecedent conditions. Event flow durations are generally greater than one hour but less than four days. Therefore, comparison with these two objectives serves to bracket the actual exposure duration.

Many stormwater runoff samples contain settleable solids as well as suspended and dissolved solids. Recently, in recognition of the fact that the dissolved metal fraction is a better representation of the bioavailable metal concentrations, EPA adopted Interim Final Water Quality Criteria (WQC) which are to be compared to the dissolved metals fraction for most metals (CFR Part 131). Both acute and chronic metals criteria were adopted.

4.2 WATER QUALITY OF SAMPLES COMPARED TO WATER QUALITY STANDARDS

Table 4-1 provides a summary of the comparison of the number of samples which had metal concentrations higher than the acute or chronic WQC and WQO. No samples had concentrations of dissolved arsenic, cadmium, chromium, nickel, and silver higher than the dissolved WQC. Dissolved copper, lead and zinc rarely exceeded the acute and chronic WQC, with only a few samples from the most urbanized watersheds having concentrations higher than the criteria. Total mercury consistently exceeded the chronic WQC and WQO. However, the chronic criteria is based on preventing fish from accumulating levels of mercury which could be hazardous to human health if consumed. It is not clear that the concentrations which exist in the waterways during storm events persist long enough to allow accumulation in fish. It is recommended that water samples from dry weather or after storm events be collected and analyzed for low-level mercury. Alternatively, fish tissues could be analyzed from streams to directly determine if they pose a potential human health hazard.

Tables 4-2 and 4-3 contain the number of samples with concentrations greater than the objectives or criteria for each individual station. In general, watersheds which contain a high percentage of urban land use have more samples with concentrations higher than the water quality criteria than watersheds with large percentage of open space.

4.3 EFFECTS OF URBANIZATION

Figure 4-1 shows the relationship between the amount of urbanization in all watersheds and the percentage of samples exceeding the dissolved copper criteria. It should be noted that not all watersheds were sampled with the same frequency or during the same time periods. Consequently, for some of the watersheds the percentages are based on very few monitored events. In watersheds with less than 40% urbanization neither dissolved copper objective (acute nor chronic) was exceeded. It should be noted that the watersheds which had the highest percentage of samples above the criteria also had the least number of samples. It is likely if more data were collected in these watersheds the percentages would decrease.

Figure 4-2 presents the same data after excluding watersheds with fewer than ten samples. The data show only watersheds that are greater than 70% urbanized have samples that are higher than copper criteria and the maximum percentage of samples higher in any one watershed is 24% for the chronic criteria and 7% for the acute criteria.

These observations indicate that dissolved copper in streams is not likely a recurrent toxicity problem for all except possibly the most highly urbanized watersheds of the Bay Area. These observations also indicate that drainage from open space helps to limit the number of samples exceeding the copper criteria by increasing the water hardness (which raises the criteria) and increasing the amount of suspended solids (due to erosion) which can scavenge dissolved copper.

If a similar comparison is attempted using the total copper WQO in the Basin Plan, the relationship between urban development and exceedance of the objective is much less apparent. This is because the WQOs are based on the total metal which includes copper derived from hillside and bank erosion which is common in open space.

Table 4-1
BASMAA MONITORING RESULTS

NUMBER OF EXCEEDANCES OF ACUTE AND CHRONIC BASIN PLAN WATER QUALITY OBJECTIVES*

Total All Waterways

Exposure Type	Arsenic Total	Cadmium Total	Copper Total	Chromium Total	Lead Total	Mercury Total	Nickel Total	Selenium Total	Silver Total	Zinc Total
ACUTE	0/157 0%	7/176 4%	115/177 65%	0/165 0%	30/178 17%	3/161 2%	0/178 0%	0/180 0%	0/156 0%	95/178 53%
CHRONIC	0/157 0%	30/176 17%	136/177 77%	0/165 0%	155/178 87%	40/41 98%	7/178 4%	3/180 2%	0/156 0%	98/178 55%

Water Quality Objectives for the protection of aquatic life are based on total hardness (TH) and are calculated as:
exp(A*ln(TH)+B), from EPA Federal Register 40 CFR Part 131 (d)(10)(ii), Tuesday Dec 22, 1992 as referenced in Basin Plan
Shading indicates an exceedance
0/5 Number of exceedances/Total Number of Events
* Note: Samples contain suspended and settleable solids which contribute to total metals concentrations.

NUMBER OF EXCEEDANCES OF ACUTE AND CHRONIC EPA WATER QUALITY CRITERIA

Total All Waterways

Exposure Type	Arsenic Dissolved	Cadmium Dissolved	Copper Dissolved	Chromium Dissolved	Lead Dissolved	Mercury Dissolved/ Total	Nickel Dissolved	Selenium Total	Silver Dissolved	Zinc Dissolved
ACUTE	0/155 0%	0/154 0%	8/153 10%	0/38 0%	1/157 1%	0/54 0%	0/35 0%	0/180 0%	0/139 0%	7/155 5%
CHRONIC	0/155 0%	0/154 0%	23/153 15%	0/38 0%	19/156 12%	40/41 98%	0/35 0%	3/180 3%	0/139 0%	8/155 5%

Water Quality Objectives for the protection of aquatic life are based on total hardness (TH) and are calculated as:
exp(A*ln(TH)+B), from EPA Federal Register 40 CFR Part 131 (d)(10)(ii), May 4, 1995
Shading indicates an exceedance
0/5 Number of exceedances/Total Number of Events

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Table 4-2
BASMAA MONITORING RESULTS: NUMBER OF EXCEEDANCES OF ACUTE AND CHRONIC BASIN PLAN WATER QUALITY OBJECTIVES

Station ID	Name	Arsenic Total	Cadmium Total	Copper Total	Chromium Total	Lead Total	Mercury Total	Nickel Total	Selenium Total	Silver Total	Zinc Total
ACUTE											
AL-S1	Codornices Creek	0/10	0/10	7/10	0/9	3/10	0/10	0/10	0/10	0/10	6/10
AL-S2	San Lorenzo Creek	0/9	0/12	6/13	0/14	2/14	0/8	0/13	0/14	0/9	6/14
AL-S3	Castro Valley Creek	0/21	0/26	21/25	0/26	9/25	0/19	0/25	0/25	0/15	23/26
AL-S4	Zone 4, Line A (Cabot Avenue)	0/5	3/4	4/4	0/4	3/4	0/4	0/4	0/4	0/5	3/4
AL-S5	Alameda Creek	0/17	0/22	10/21	0/20	0/22	0/15	0/21	0/23	0/12	2/22
AL-S6	Zone 5, Line D	0/5	0/5	1/5	0/5	1/5	0/5	0/5	0/4	0/5	1/5
CC-S1	Rheem Creek	0/6	0/6	3/6	NO	0/6	0/6	0/6	0/6	NS	4/6
CC-S2	Walnut Creek	0/6	0/5	2/5	NO	0/5	0/5	0/5	0/5	NS	1/5
SC-S1	Calabazas Creek	0/19	1/18	17/18	0/16	4/18	0/19	0/19	0/19	0/19	17/19
SC-S2	Sunnyvale East at Bayshore	0/19	2/19	18/19	0/17	5/19	1/19	0/19	0/19	0/19	18/19
SC-S3	Guadalupe River	0/24	1/24	13/24	0/22	3/24	1/24	0/24	0/24	0/24	11/24
SC-S4	Coyote Creek	0/27	0/28	14/27	0/24	1/27	1/27	0/27	0/29	0/27	10/27
Total All Waterways		0/157	7/176	115/177	0/165	30/178	3/161	0/178	0/180	0/156	95/178
CHRONIC											
AL-S1	Codornices Creek	0/10	3/10	8/10	0/9	10/10	4/4	0/10	0/10	0/10	7/10
AL-S2	San Lorenzo Creek	0/9	2/13	9/13	0/14	14/14	3/3	0/13	1/14	0/9	8/14
AL-S3	Castro Valley Creek	0/21	5/26	23/25	0/26	25/25	5/5	0/25	0/25	0/15	23/26
AL-S4	Zone 4, Line A (Cabot Avenue)	0/5	3/4	4/4	0/4	4/4	2/2	0/4	0/4	0/5	3/4
AL-S5	Alameda Creek	0/17	0/22	11/21	0/20	13/22	1/2	0/21	1/23	0/12	2/22
AL-S6	Zone 5, Line D	0/5	0/5	1/5	0/5	1/5	1/1	0/5	1/4	0/5	1/5
CC-S1	Rheem Creek	0/6	0/6	4/6	NO	6/6	NC	0/6	0/6	NS	4/6
CC-S2	Walnut Creek	0/5	1/5	3/5	NO	3/5	2/2	0/5	0/5	NS	1/5
SC-S1	Calabazas Creek	0/19	7/19	17/18	1/17	18/19	9/9	4/19	0/19	0/19	18/19
SC-S2	Sunnyvale East at Bayshore	0/19	6/19	18/19	0/17	18/19	3/3	0/19	0/19	0/19	18/19
SC-S3	Guadalupe River	0/24	3/24	17/24	0/22	22/24	5/5	2/24	0/24	0/24	11/24
SC-S4	Coyote Creek	0/27	5/28	23/27	0/24	25/27	5/5	1/27	0/29	0/27	12/27
Total All Waterways		0/157	30/176	136/177	1/165	155/178	40/41	7/178	3/180	0/156	98/178

Water Quality Objectives for the protection of aquatic life are based on total hardness (TH) and are calculated as:
exp(A*ln(TH)+B), from EPA Federal Register 40 CFR Part 131 (d)(10)(ii), Tuesday Dec 22, 1992 as referenced in Basin Plan

Shading indicates an exceedance

0/5 Number of exceedances/Total Number of Events

NO No objectives for Chromium in San Francisco Bay Basin Region (2), Water Quality Control Plan, December 1986 so no comparisons were made

NS No Samples

//oak5/watqual/WQSUM.XLS

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Table 4-3
BASMAA MONITORING RESULTS: NUMBER OF EXCEEDANCES OF ACUTE AND CHRONIC EPA WATER QUALITY CRITERIA

Station ID	Name	Arsenic Dissolved	Cadmium Dissolved	Copper Dissolved	Chromium Dissolved	Lead Dissolved	Mercury Dissolved	Nickel Dissolved	Selenium Total	Silver Dissolved	Zinc Dissolved
ACUTE											
AL-S1	Codornices Creek	0/10	0/10	0/10	0/5	0/10	0/5	0/5	0/10	0/10	0/10
AL-S2	San Lorenzo Creek	0/9	0/12	0/13	0/4	0/13	0/5	0/4	0/14	0/9	0/13
AL-S3	Castro Valley Creek	0/15	0/25	1/25	0/6	0/24	0/7	0/5	0/25	0/15	2/25
AL-S4	Zone 4, Line A (Cabot Avenue)	0/4	0/4	2/4	0/4	0/4	0/4	0/4	0/4	0/4	3/4
AL-S5	Alameda Creek	0/12	0/21	0/21	0/6	0/21	0/6	0/5	0/22	0/12	0/21
AL-S6	Zone 5, Line D	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5
CC-S1	Rheem Creek	NS	0/6	2/6	NS	0/6	NS	NS	0/6	NS	1/6
CC-S2	Walnut Creek	NS	0/5	1/5	NS	0/5	NS	NS	0/5	NS	0/5
SC-S1	Calabazas Creek	0/19	0/14	0/14	0/2	1/14	0/5	0/2	0/19	0/19	1/14
SC-S2	Sunnyvale East at Bayshore	0/19	0/14	1/14	0/2	0/14	0/6	0/2	0/19	0/19	0/14
SC-S3	Guadalupe River	0/19	0/19	1/19	0/1	0/19	0/5	0/1	0/24	0/19	0/19
SC-S4	Coyote Creek	0/27	0/23	0/20	0/3	0/21	0/6	0/2	0/27	0/27	0/21
	All Waterways	0/155	0/154	8/153	0/38	1/157	0/54	0/35	0/180	0/139	7/155
CHRONIC		Arsenic Dissolved	Cadmium Dissolved	Copper Dissolved	Chromium Dissolved	Lead Dissolved	Mercury Total	Nickel Dissolved	Selenium Total	Silver Dissolved	Zinc Dissolved
AL-S1	Codornices Creek	0/10	0/10	2/10	0/5	5/10	4/4	0/5	0/10	0/10	0/10
AL-S2	San Lorenzo Creek	0/9	0/12	0/13	0/4	2/13	3/3	0/4	1/14	0/9	0/13
AL-S3	Castro Valley Creek	0/15	0/25	6/25	0/6	6/24	5/5	0/5	0/25	0/15	2/25
AL-S4	Zone 4, Line A (Cabot Avenue)	0/4	0/4	3/4	0/4	2/3	2/2	0/4	0/4	0/4	3/4
AL-S5	Alameda Creek	0/12	0/21	0/21	0/6	0/21	1/2	0/5	1/22	0/12	0/21
AL-S6	Zone 5, Line D	0/5	0/5	0/5	0/5	0/5	1/1	0/5	1/5	0/5	0/5
CC-S1	Rheem Creek	NS	0/6	2/6	NS	2/6	NC	NS	0/6	0/6	1/6
CC-S2	Walnut Creek	NS	0/5	2/5	NS	0/5	2/2	NS	0/5	0/5	0/5
SC-S1	Calabazas Creek	0/19	0/14	3/14	0/2	1/14	9/9	0/2	0/20	0/14	1/14
SC-S2	Sunnyvale East at Bayshore	0/19	0/14	4/13	0/2	1/14	3/3	0/2	0/19	0/14	1/14
SC-S3	Guadalupe River	0/19	0/19	1/19	0/1	0/19	5/5	0/1	0/24	0/19	0/19
SC-S4	Coyote Creek	0/27	0/23	0/21	0/3	0/21	5/5	0/2	0/27	0/27	0/21
Total All Waterways		0/155	0/154	23/153	0/38	19/156	40/41	0/35	3/180	0/139	8/155

Water Quality Objectives for the protection of aquatic life are based on total hardness (TH) and are calculated as:
exp(A*ln(TH)+B), from EPA Federal Register 40 CFR Part 131 (d)(10)(ii), May 4, 1995

Shading indicates an exceedance

0/5 Number of exceedances/Total Number of Events

'amples

Figure 4-1
PERCENTAGE OF SAMPLES HIGHER THAN DISSOVLED COPPER CRITERIA VERSUS PERCENTAGE OF URBAN LAND USE IN WATERSHED
(all watersheds)

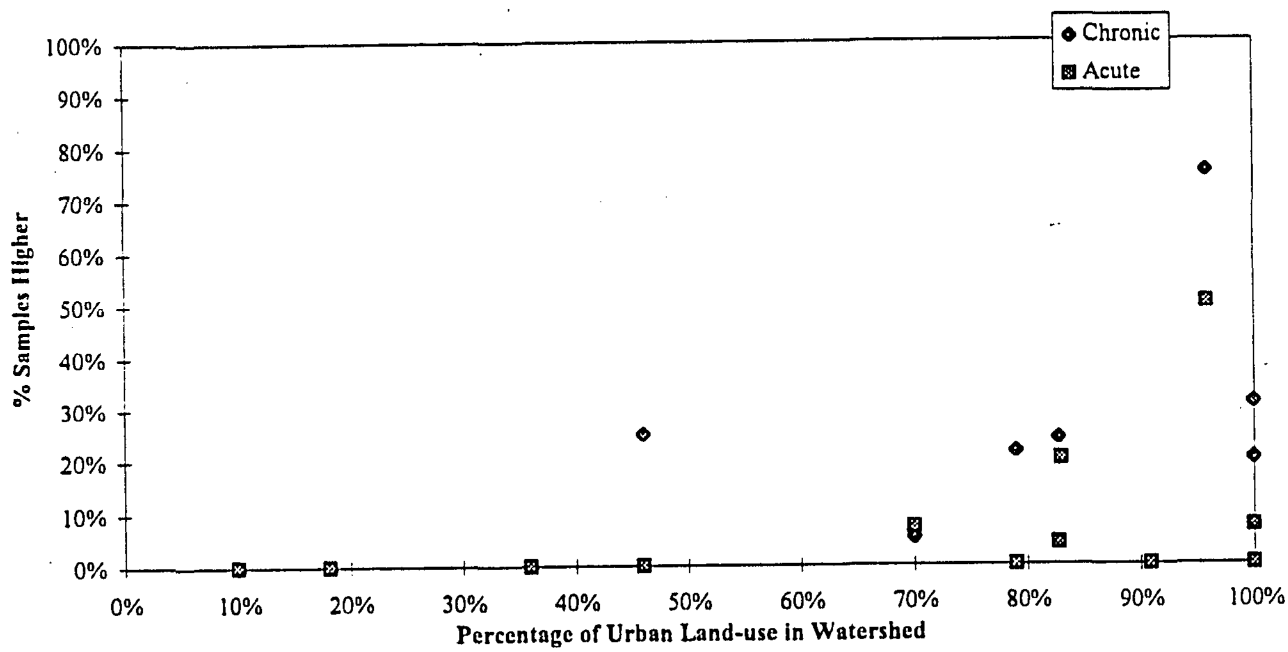
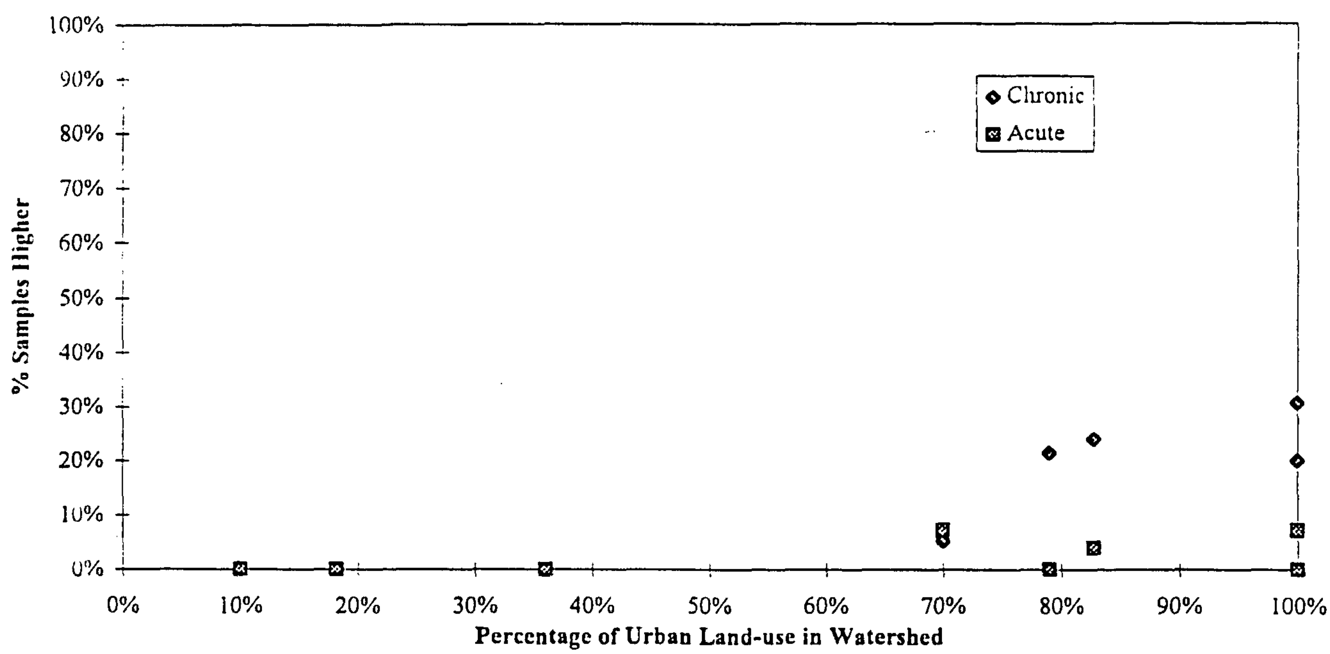


Figure 4-2
PERCENTAGE OF SAMPLES HIGHER THAN DISSOLVED COPPER CRITERIA VERSUS PERCENTAGE OF URBAN LAND USE IN WATERSHED
(watersheds with greater than 10 monitored events)



5.0 COMPARISON OF POLLUTANT CONCENTRATIONS AND LOADS FROM VARIOUS LAND USES

5.1 THE DATA

The data contained in the database were used to estimate land use specific concentrations of copper, lead, zinc, nickel, cadmium, chromium and total suspended solids in urban runoff. The estimates were made using multiple linear regressions to "disaggregate" the measured concentrations into their component parts (assumed to be the land use specific concentrations). An important assumption in this analysis is that the contaminant concentrations measured at each land use station are strongly influenced by the fraction of each land use category found in the station's drainage. If other factors (such as meteorology or non-land use specific activities) are the dominant factors in determining the concentrations in runoff then this analysis will not produce significant results.

The concentration data were divided into two groups, data collected from land use stations and data collected from stream stations. Except for the open space stations, the land use stations drain predominately urbanized areas and are located in hard storm drains, i.e., concrete or metal storm drains and channels. The stream stations were located in natural stream channels. The stream stations were not used in the analysis for two reasons: 1) stream bank and bed erosion contribute an unknown amount of metals to the measured concentration, and 2) these stations are predominately (over 90%) open space and residential so they do not provide enough variability to disaggregate the other land uses.

The measured concentrations at the land use stations were assumed to be equal to:

$$C_{lu} = \Sigma\,(r_i\, x_i\, C_i) \qquad (Eq.\ 5\text{-}1)$$

where:

- C_{lu} = Measured concentration at land use station
- Σ = Summation over all land uses
- r_i = Runoff coefficient for land use category i
- x_i = Fraction of land use category i in watershed
- C_i = Concentration of contaminant contributed by land use i
- i = Represents land use categories contained in database

In other words, the measured concentration is the weighted average concentration contributed by each land use category where each category is weighted by the fraction of area it occupies in the drainage area and by the amount of runoff it contributes (represented by a runoff coefficient). C_i is unknown in equation 5-1. Table 5-1 shows the runoff coefficients used in the analysis. These coefficients were derived from standard hydrology reference handbooks (Maidment, Handbook of Hydrology) using professional judgment to assign a single annual average coefficient to those given for 5- to 10-year events.

Table 5-1
RUNOFF COEFFICIENTS FOR DIFFERENT LAND USE CATEGORIES

Land Use	Runoff Coefficient
Open/Open Forest	0.10
Light Industrial	0.70
Heavy Industrial	0.90
Commercial	0.90
Residential	0.35
Transportation	0.95

Depending upon the contaminant, there are about 350-360 individual station events (a station event is one storm event at one station) in the database for land use stations, therefore, equation 5-1 will produce 350-360 equations for each constituent. If land use was the only factor affecting concentration then each storm event would produce the same concentration at a given station. Therefore, the variability observed at each station provides an indication of the variability in concentration due to factors other than land use. To reduce the effect of this variability on the analysis, all the concentration data collected at each station was averaged for each station. If the land use categories identified in the database are not significant indicators of concentration and there is not another station-specific factor (such as a different set of land use categories) that are significant indicators of concentration, then the station average concentrations would be the same. If the averages are different, then there is some factor associated with the stations that causes it to have a different concentration than other stations. We assume that this factor is the land use categories identified in the database.

5.2 PURPOSE OF ANALYSIS

The purpose of this analysis was to generate a table showing the unit loads by land use (Table 5-2) with which BASMAA's member-agencies could easily calculate pollutant loads for specific watersheds. To generate this table, land use-specific concentrations for each metal were ~~was~~ calculated using a linear regression. The concentration results (discussed below) were used to calculate the loads per unit acre per inch of rainfall. The runoff coefficients shown in Table 5-1 were then used to convert rainfall to runoff.

5.3 RESULTS OF LAND USE-SPECIFIC METAL CONCENTRATIONS

Tables 5-3 through 5-9 present the results of the linear regression for each constituent analyzed. Each table is each divided into two tiers. The top tier presents statistics for each metal. The R^2 value is the fraction of the variability in the data that are explained by the relationship. For example an R^2 value of 0.43 for copper means that 43% of the data variability are explained by the relationship to land use.

Table 5-2
UNIT LOADS BY LAND USE

Land Use	Load Per Acre Per Inch of Rainfall (lbs/acre/in)						
	Copper	Lead	Zinc	Chromium	Cadmium	Nickel	TSS
Open/Open Forest	.00025	0.00016	0.0102	0.00029	0.0000098	0.00034	NA
Light Industry	0.0071	0.023	0.0566	0.0036	0.00027	0.0054	18.0
Heavy Industry	0.0091	0.020	0.075	0.0046	0.00062	0.0083	32.0
Commercial	0.0091	0.011	0.038	0.0046	0.00039	0.0069	20.0
Residential	0.0036	0.012	0.031	0.0018	0.00013	0.0028	06.8
Transportation	0.011	0.032	0.066	0.0053	0.00063	0.018	NA

NA - open space and transportation are site specific.

Table 5-3
LAND USE SPECIFIC CONCENTRATIONS OF COPPER

Statistics	
R^2	0.43
F Value	1.51
Significance of F	<80%

Land Use	Concentration (ug/L)	P-Value	Value from Alameda Loads Assessment (ug/L)	Value from Santa Clara Loads Assessment (ug/L)
Open/Open Forest	NS	--	3.4	9.0
Light Industrial	NS	--	44	52.9
Heavy Industrial	NS	--	44	52.9
Residential	NS	--	31	50.5
Commercial	NS	--	31	50.5
Transportation	NS	--	31	NA
Urban	46.6			

NS - not significant

Table 5-4
LAND USE SPECIFIC CONCENTRATIONS OF LEAD

Statistics	
R^2	0.65
No. of Observations	19
F Value	4.02
Significance of F	>95%

Land Use	Concentration (ug/L)	P-Value	Value from Alameda Loads Assessment (ug/L)	Value from Santa Clara Loads Assessment (ug/L)
Open/Open Forest		not significant	3.5	4.0
Light Industrial	143	>99%	77	133.5
Heavy Industrial	96.8	>99%	77	133.5
Residential	51.7	>90%	73	60.8
Commercial	151	>99%	73	60.8
Transportation	137	>99%	73	NA
Urban	108			

Table 5-5
LAND USE SPECIFIC CONCENTRATIONS OF ZINC

(Stations AL-L2 and AL-L3 in Alameda and Station SC-L2 in Santa Clara not included)

Statistics	
R^2	0.89
No. of Observations	18
F Value	13.4
Significance of F	99%

Land Use	Concentration (ug/L)	P-Value	Value from Alameda Loads Assessment (ug/L)	Value from Santa Clara Loads Assessment (ug/L)
Open/Open Forest		not significant	34	10
Light Industrial	315	>99%	367	1471
Heavy Industrial	345	>99%	367	1471
Residential		not significant	246	251
Commercial	1109	>99%	246	251
Transportation	245	99%	246	NA

Table 5-5b
LAND USE SPECIFIC CONCENTRATIONS OF ZINC

(Stations AL-L2 and AL-L3 in Alameda and Station SC-L2 in Santa Clara and high value at Cotter Way in Alameda not included)

Statistics	
R^2	0.66
No. of Observations	16
F Value	3.20
Significance of F	>90%

Land Use	Concentration (ug/L)	P-Value
Open/Open Forest		not significant
Light Industrial	358	>99%
Heavy Industrial	371	>99%
Residential	188	>95%
Commercial	397	>99%
Transportation	279	99%
Urban	284	

Table 5-6
LAND USE SPECIFIC CONCENTRATIONS OF CHROMIUM

Statistics	
R^2	0.31
No. of Observations	21
F Value	1.13
Significance of F	not significant

Land Use	Concentration (ug/L)	P-Value	Value from Alameda Loads Assessment (ug/L)	Value from Santa Clara Loads Assessment (ug/L)
Open/Open Forest	12.6	>90%	1.8	10
Light Industrial	21.1	99%	20	39.1
Heavy Industrial	24.9	99%	20	39.1
Residential	24.2	99%	14	21.1
Commercial	NS	not significant	14	21.1
Transportation	35.4	99%	14	NA
Urban	22.5			

Table 5-7
LAND USE SPECIFIC CONCENTRATIONS OF CADMIUM

Statistics	
R^2	0.52
No. of Observations	20
F Value	2.49
Significance of F	>90%

Land Use	Concentration (ug/L)	P-Value	Value from Alameda Loads Assessment (ug/L)	Value from Santa Clara Loads Assessment (ug/L)
Open/Open Forest		not significant	0.15	0.6
Light Industrial	1.72	99%	1.4	5.9
Heavy Industrial	3.07	>99%	1.4	5.9
Residential	1.66	99%	0.85	1.7
Commercial		not significant	0.85	1.7
Transportation	2.66	99%	0.85	NA
Urban	1.94			

Table 5-8
LAND USE SPECIFIC CONCENTRATIONS OF NICKEL

Statistics	
R^2	0.45
No. of Observations	20
F Value	1.94
Significance of F	85%

Land Use	Concentration (ug/L)	P-Value	Value from Alameda Loads Assessment (ug/L)	Value from Santa Clara Loads Assessment (ug/L)
Open/Open Forest		not significant	0.65	18.4
Light Industrial		not significant	13	54
Heavy Industrial	40.8	>95%	13	54
Residential	35.5	>95%	20	40.9
Commercial		not significant	20	40.9
Transportation	77.3	99%	20	NA
Urban	34.1			

Table 5-9
LAND USE SPECIFIC CONCENTRATIONS OF TOTAL SUSPENDED SOLIDS

(open space and transportation only stations not included)

Statistics	
R^2	0.55
No. of Observations	16
F Value	2.66
Significance of F	85%

Land Use	Concentration (mg/L)	P-Value	Value from Alameda Loads Assessment (mg/L)	Value from Santa Clara Loads Assessment (mg/L)
Open/Open Forest		variable[2]	11[1]	85
Light Industrial	113	99%	114	152
Heavy Industrial	157	99%%	114	152
Residential	85.9	99%	192	76
Commercial	97.5	>95%	192	76
Transportation		variable[2]	192	NA

1. Strawberry Creek not included in the data set used for the Alameda County loads assessment
2. TSS from open space was highly variable probably due to differences in the amount of erosion occurring in the drainage. Two transportation stations were analyzed. One included a detention facility as a part of the freeway design the other did not. Both were very different from each other.

The F Value and Significance of F indicate the degree of confidence that the relationship is significant and not due to chance alone. A confidence level greater than 90% is generally indicative of a significant relationship. Confidence levels less than 80% indicate the data are not very well described by the relationship.

The lower tier shows a concentration and a significance value for each land use category, along with values used in the Alameda and Santa Clara loads assessments studies (WCC 1991a, 1991b). (Note, that in the Alameda study a similar method was used to estimate the land use-specific concentrations.) For constituents where the concentration estimates had low confidence (< 80%), no land use specific concentration estimate is given. Rather, a concentration value is recommended based on station average concentrations.

Following is a discussion of results for each metal which was analyzed. The concentrations of metals from open space could not be estimated for any of the constituents analyzed due to high variability between the different open space stations.

5.3.1 Copper

The results for copper (Table 5-3) suggest that land use is not a significant factor in determining the concentration in stormwater runoff. The same conclusion was found in the Santa Clara Loads Assessment. Based on station average concentrations, a value of 45 ug/L for urban areas and 11 ug/L for open space is recommended.

5.3.2 Lead

Table 5-4 lists the results for lead. A value of 7.0 ug/L based on station averages for the three open space stations is recommended. Also, because of the large standard error on the mean values of the coefficients, the concentrations for each land use are not significantly different from each other.

5.3.3 Zinc

Table 5-5 presents the results of the zinc analysis. Zinc data is the most variable data with most of the variability due to a few very high concentrations measured at a few stations. Zinc concentrations measured at the 24th and Wood station in Oakland (AL-L3) (and the downstream station, Ettie Street AL-L2) and the Walsh Avenue Station in Santa Clara (SC-L2) were significantly higher than concentrations measured at other stations. If they were included in the analysis the significance of the results is greatly reduced because of the large increase in variability introduced by these stations, therefore they were excluded. Residential and open space had much lower concentrations than the other land uses. Light and heavy industry and transportation were not significantly different from each other. Commercial was significantly higher. If the single value of 4600 ug/L measured for one storm at Cotter Way (33% residential, 67% commercial) is removed form the analysis, the predicted values are those shown in Table 5-5b. It is recommended that these values be used. In this case the concentrations for each land use are not significantly different from each other.

5.3.4 Chromium

Chromium results are shown in Table 5-6. The F value for the regression indicates that the regression does not explain any of the variability observed in the data with any significant confidence. This suggests that for chromium, land use is not a significant factor in determining the concentration in stormwater runoff. Based on station average concentrations, a value of 22 ug/L for urban areas and 13 ug/L for open space is recommended.

5.3.5 Cadmium

Table 5-7 lists the results for cadmium. The results for commercial land use were not significant. We recommend a value of 0.43 ug/L for open space based on station averages for the three open space stations and 1.94 ug/L for commercial based on the average for the remainder of the stations. Because of the large standard error on the mean values of the coefficients, the concentrations for each land use are not significantly different from each other.

5.3.6 Nickel

Table 5-8 lists the results for nickel. The results were not significant for light industrial and commercial land uses. A value of 15 ug/L for open space based on station averages for the three open space stations and 34 ug/L for commercial based on the average for the remainder of the stations is recommended. Because of the large standard error on the mean values of the coefficients, the concentrations for each land use are not significantly different from each other.

5.3.7 Total Suspended Solids (TSS)

Table 5-9 presents the results for TSS. The data from the open space and transportation only stations were highly variable so were not included in the analysis. For example, Strawberry Creek had an average TSS concentration of 478 mg/L and Dry Creek had an average of 13.4 mg/L. These result were consistent between storm events. For open space the TSS value may be influenced by the amount of erosion (which is a function of soil type, slope, ground cover, etc.) so there may not be a typical value. The two transportation stations were also quite different from each other with I-280 having a concentration only one-third as large as the Montague Expressway (126 vs. 389 mg/L, respectively). This was consistent between storm events. It should be noted the I-280 station was sampled at the outlet of a detention basin built into the highway design. These data suggest that different highway designs may exhibit different runoff characteristics.

6.0 SUMMARY OF EXISTING TOXICITY MONITORING (FREQUENCY, TYPE, AND CAUSE OF TOXICITY)

Toxicity monitoring was initiated in 1989 by the Santa Clara Valley Non-Point Source Pollution Control Program and in 1990 by the Alameda Countywide Clean Water Program, as stipulated by the San Francisco Bay Regional Water Quality Control Board. The Contra Costa Clean Water Program started toxicity monitoring in 1994. By the end of 1995, more than 190 stormwater samples had been tested for toxicity. This section delineates the approach used in toxicity monitoring, describes the methods used, presents the results, draws conclusions, and examines the implications of the findings.

6.1 APPROACH

Toxicity testing is the most cost-effective tool available for assessment of the potential impact of complex mixtures of unknown pollutants, such as urban runoff, on receiving waters. Rather than analyzing a sample for a host of compounds known to be toxic to aquatic life, this approach utilizes laboratory test species to determine if the sample is toxic. If toxicity is detected, toxicity identification evaluations (TIE) may be performed to identify the substance(s) causing toxicity, which can be subsequently quantified by various chemical methods. Toxicity testing can provide information both on short term impact (lethal effects) as measured in the "acute" toxicity test design, and on long term impacts (lethal and sublethal effects) when the "chronic" toxicity test design is used.

Various test organisms have been successfully used for toxicity testing. For freshwater samples such as urban runoff, EPA provides detailed guidance for chronic tests using the water flea *Ceriodaphnia dubia*, the fish Fathead minnow (*Pimephales promelas*), the unicellular green algae *Selenastrum capricornutum*, and other species. The user may first characterize the watershed runoff toxicity to all three species, then if toxicity is recurrent, the user may select the most responsive species for further studies. These may include comparative assessments of toxicity intensity during a storm event (at different points in the hydrograph) or along different reaches in the watershed (to track the source), TIE to identify the toxicant(s) so that source controls may be applied, assessment of effectiveness of treatment facilities and BMPs, long-term monitoring, etc.

6.2 METHODS

Urban runoff samples were tested for toxicity according to the EPA protocol (EPA/600/4-89/001), using the water flea *Ceriodaphnia dubia*, the fish Fathead minnow (*Pimephales promelas*), and the unicellular green algae (*Selenastrum capricornutum*). This protocol was developed for testing point-source discharges for which the effluent is diluted considerably in the receiving waters. Essentially, laboratory test organisms are placed in small containers of sample liquids and their response is monitored over time and compared to the response of organisms placed in non-toxic solutions ("control" water). To determine the intensity of the toxicity, the sample is diluted (in non-toxic water) to several known concentrations before the test, and test organisms are added to each concentration. After a set period of time (e.g., 48 hours) the number of dead organisms is recorded for each concentration, and the concentration that caused mortality of 50% of the organisms (the median lethal concentration, or LC50) is calculated from the data. For effluent samples, LC50 values are expressed as "percent sample;" a lower percentage means that the sample is more toxic. "Acute" toxicity tests are usually 48 or 96 hours long, while "chronic" tests are proportional to the life-span of the test organism and may last between 4 and 28 days. In chronic tests the test solutions are renewed periodically, with the exception of the algal tests. In the water flea chronic test, single females are placed in individual test chambers and the number of offspring produced is recorded each day on days 3-7 of the test. In the fish test, 10 young fish share a test chamber, and the dry weight of the survivors is determined at the end of the test (after an exposure of 7 days). Cell density (cells/ml), as counted under the microscope after an exposure of 4 days is the endpoint measured in the algae test. In the EPA protocol, the intensity of "sublethal toxicity", i.e. impaired growth or reproduction, is measured by the significant effective concentration, or EC50, and is also expressed as "percent sample."

For the purpose of toxicity characterization, the Regional Board deemed it sufficient to expose test organisms to the original sample at 100% concentration without a dilution series. This mode, used with a chronic test design, is called "screening mode" and costs about one fifth of a full test with dilution series. The data obtained in this mode cannot provide a measure of toxicity in LC50 or EC50 values, however, for many toxic stormwater samples the duration of exposure to a 100% concentration of a sample that causes mortality, namely the median time to lethality, or LT50, is a valid measure of the intensity of toxicity. The LT50 is easily derived from observation records collected during the test, and may be expressed in "hours" or "days" of exposure. Here too, shorter LT50 values mean higher intensity of toxicity.

Another result parameter that was found useful in the characterization of toxicity is related to reproduction assessment in the *C. dubia* test. The EPA protocol calls for calculation of the total number of offspring per female (TOF) at the end of the test, if no significant mortality was observed. In the analysis of stormwater toxicity results, the number of offspring per female per reproductive day (OFRD) was calculated to allow separation of mortality effects from reproductive effects in *C. dubia*. In this approach, the OFRD of females that succumbed to the toxic substance on day 5 or day 6 of the test (but had offspring before they died) was compared to the control OFRD for the same test day. These comparisons helped to characterize two distinct types of stormwater samples: those that did not inhibit reproduction (even if they were toxic enough to cause mortality), and those that impaired reproduction.

There are no clear EPA instructions on how stormwater toxicity data is to be reported. Early reporting formats required toxicological expertise to validate and interpret the test results. With the objectives of organizing the data in an accessible database structure and providing easy access to toxicity monitoring results, the Alameda and Santa Clara programs supported the creation of data management tools specifically tailored for stormwater toxicity monitoring. These tools include three database tables, one for results of *C. dubia* toxicity tests (CERIO), a second table for results of toxicity tests with fish (*P. promelas*) and algae (*S. capricornutum*) (FIALG), and a third table for environmental monitoring data obtained during testing of all three species (ENVWQ). The tables are compatible among themselves and with all other database tables of the stormwater monitoring programs. All database tables may be queried together in a relational database platform, to detect correlations between toxicity and other factors. The two toxicity database tables include all relevant toxicity endpoints, results of statistical testing, codes for irregularities, and test qualifiers (e.g., performance of control organisms and results of corresponding reference toxicant tests). The regional database tables (R2-CERIO, R2-FIALG, and R2-ENVWQ) are attached in Appendix F. Other tools were developed for *C. dubia* test results as recommended in the Monitoring Protocol Standardization Project (BASMAA 1995) to meet the following goals:

- **Maintain records in electronic formats:** Three spreadsheets were developed for data entry by the laboratory. The data management spreadsheet (DMS) holds the raw mortality and reproduction data and calculates the total dead, the total offspring per female (TOF) and the OFRD values. The environmental monitoring spreadsheet (ENV) summarizes water chemistry and temperature data. The test summary table (TST) shows the values of all relevant parameters and the results of statistical comparisons in a clear format. These three spreadsheets are delivered by the laboratory under descriptive file names for each storm event.

- **Provide linkage between laboratory reports and toxicity database:** Both the TST and the ENV spreadsheets (above) are structured identically to the corresponding database table and can be imported directly into the database.

- **Formalize data validation and QA/QC:** A checklist has been developed to facilitate the data validation process. The checklist assures attention to sample holding time, custody documents, water chemistry, test qualifiers, etc. A document listing and explaining the elements of quality assurance in stormwater toxicity testing and the criteria for acceptability of toxicity tests for the various test organisms has been developed.

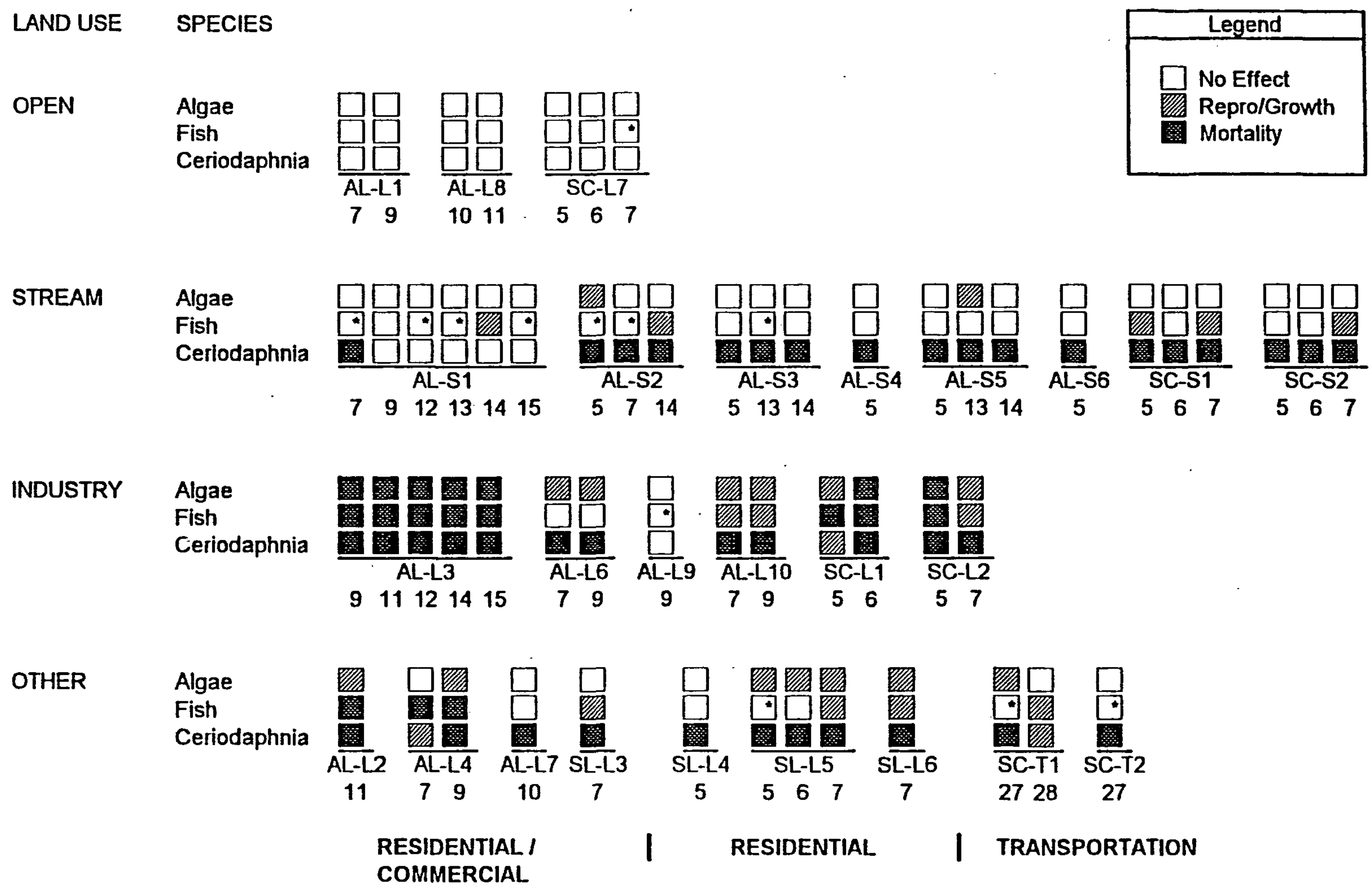
- **Provide guidance for the laboratory:** An assembly of data management tools and guidance for processing and reporting results of chronic toxicity tests with *C. dubia*, as performed with stormwater samples in the screening mode, was prepared. The package includes three spreadsheet templates, the probit program, detailed instructions for use of the templates and program, and a comprehensive guidance document for the processing and reporting of stormwater toxicity data. This package is used by the toxicity laboratory performing the long-term toxicity testing in stream stations in the San Francisco Bay Area.

6.3 RESULTS

6.3.1 Species Response

The results of three species toxicity testing are summarized in Figure 6-1. Each triad in the figure represents one composite stormwater sample collected at the station and during the storm event indicated. When all the data were evaluated, it became apparent that some sample results could not be easily interpreted. The test organisms exposed to these samples had survived and exhibited healthy growth or reproduction, but the values were found significantly lower than the control. The results of the fish tests with these samples, shown in Figure 6-1 as a blank square with a dot, indicate that the sample value was above 70% of control and the actual weight values were higher than the test validation criteria (0.25 mg/larvae for *Pimephales promelas*). A similar criterion was

Figure 6-1
TOXICITY OF STORM WATER RUNOFF SAMPLES



Each triad represents one composite storm water sample collected at the station indicated during the storm event (number) indicated below. Algae (*Selenastrum capricornutum*) "mortality" was designated for samples in which the final cell density was lower than the inoculum density.

- • Although statistically different from control, growth in the sample was above 70% of control and the actual weight values were higher than the test validation criteria (0.25 mg/larvae).

used for *Ceriodaphnia dubia* test results, i.e. sample reproduction value was above 70% of control and the actual reproduction values were higher than the test validation criteria (15 offspring/female). These are preliminary criteria suggested for the purpose of this presentation (Figures 6-1 and 6-2), because there are no criteria for distinguishing between statistically-significant differences and ecologically-significant difference. The relevance of statistically-significant differences in test results to potential ecological impacts is currently being reviewed by EPA and statistically-based criteria are under development. Another preliminary distinction suggests the concept of algae (*S. capricornutum*) "mortality"; this category was designated for samples in which the final cell density was lower than the inoculum density.

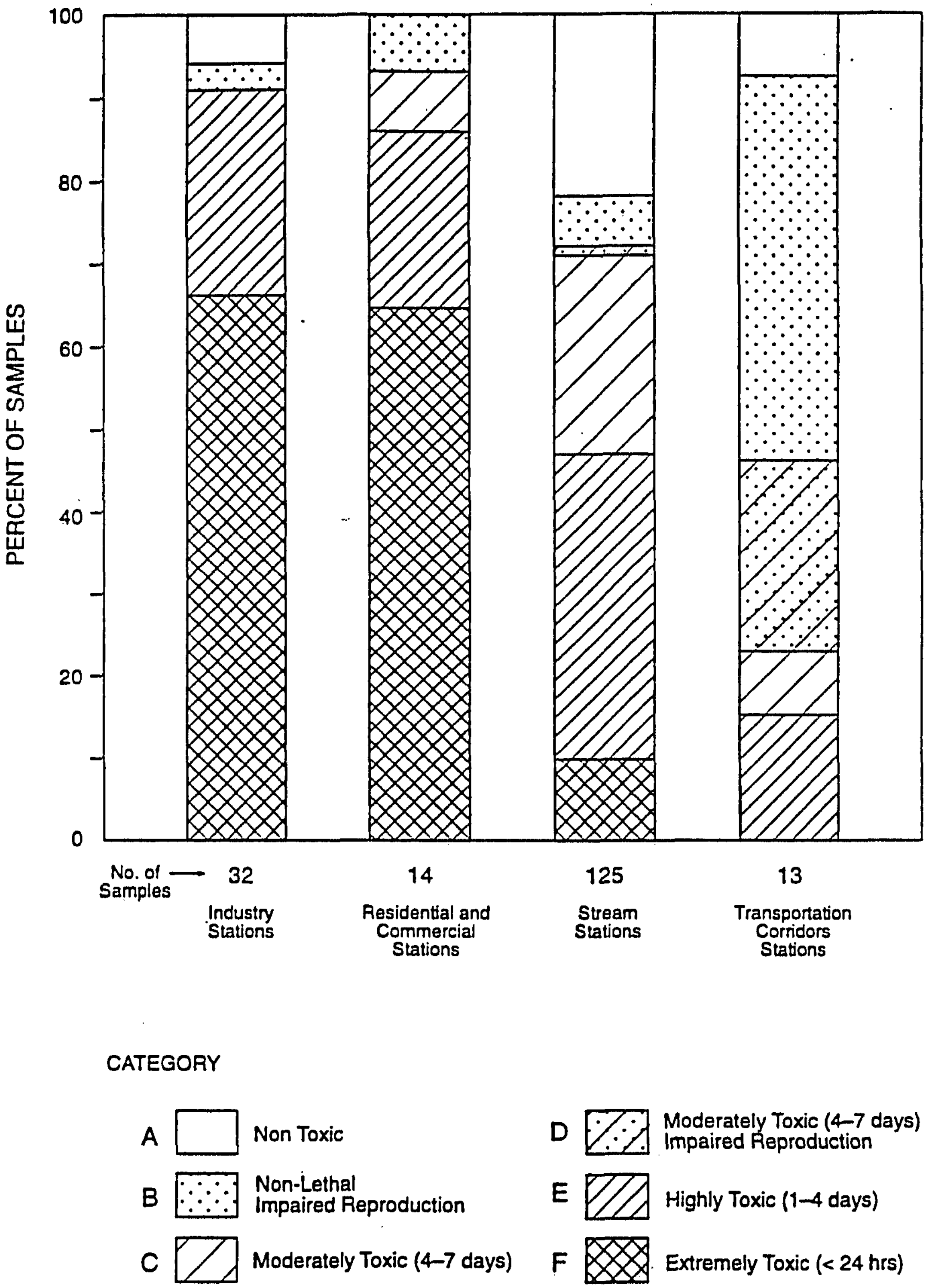
The pattern of species response (Figure 6-1) indicates that *C. dubia* is the most responsive species. The open space samples were non-toxic to all three species. In general, the most consistent toxic effects were associated with the industrial stations.

6.3.2 Land Use Response

The results of chronic *C. dubia* toxicity tests are presented in Figure 6-2 arranged by toxicity intensity category. The legend lists the categories in ascending order of toxicity and explains the range of each category. Samples were assigned to one of four groups based on the LT50 calculated: extremely toxic (F, mortality within less than 24 hours), highly toxic (E, 1-4 days), moderately toxic (C and D, 4-7 days), or non-toxic (A, more than 7 days). Impaired reproduction was assessed for all samples that did not cause mortality within 4-5 days, using the average number of offspring per female per reproductive day as compared to the control OFRD. Moderately toxic samples were assigned to category C if reproduction was not impaired and to category D if reproduction was impaired. Samples which did not kill the organisms but impaired reproduction were defined as non-lethal (category B), and samples that did not have any measurable deleterious effect to *C. dubia* were declared non-toxic (category A). Generally, the term "acute toxicity" for *C. dubia* refers to toxic effects delineated in categories E and F (mortality within four days), while the term "chronic toxicity" refers to situations encountered in categories B, C, and D.

Samples from various land use stations revealed distinctly different distribution among toxicity categories (Figure 6-2). The majority (66%) of the industry station samples were extremely toxic (category F) while 91% of them exhibited acute toxicity. Acute toxicity was found in 85% of the residential and commercial samples. The majority (72%) of the stream stations samples collected were lethal to *C. dubia* (categories C, D, E, and F), but only 10% were extremely toxic. It is important to emphasize that the majority of moderately toxic and non-lethal samples from residential, commercial, and mixed land use catchments did not inhibit reproduction of *C. dubia*. On the other hand, most of the transportation stations samples that were categorized either as moderately toxic (category D) or non-lethal (category B) inhibited reproduction. Thus, stormwater toxicity may be manifested in two distinct effects, lethality and reproductive impairment. The results suggest that the stream samples may have contained primarily toxicants which are lethal to the organisms but do not affect their capability to reproduce, while runoff from transportation corridors may frequently contain substances which specifically inhibit reproduction but do not cause death.

Figure 6-2
CATEGORIES OF *CERIODAPHNIA DUBIA* TOXICITY OBSERVED AT DIFFERENT LAND USE STATIONS IN THE SAN FRANCISCO BAY AREA (1989-1995)



951267NA-3000/052196/gos

Due to variability in toxicity results it is difficult to see a long-term trend, however, toxicity was detected in autumn and spring storms more often and at higher intensity than during mid-winter storms.

6.3.3 Cause of Toxicity

TIE testing in industrial stations showed that dissolved metals accounted for a substantial portion of the toxicity observed, while in stream and transportation stations the major causes of toxicity were non-polar organics (e.g., pesticides and/or hydrocarbons), or metallo-organic complexes. Diazinon was identified as the major cause of runoff toxicity in the Castro Valley Creek watershed (Hansen 1994) and in the Crandall Creek watershed (WCC 1994b). The relationship between diazinon concentrations and the intensity of toxicity, studied in laboratory tests with *C. dubia*, showed that high concentrations of diazinon kill the test organism faster than lower concentrations. Moreover, the median time to lethality (LT50) was related to diazinon concentrations in a linear way, at least for the LT50 range of 24-120 hours (WCC 1994b, 1996). Results of the three species toxicity tests also support the finding that diazinon is the major cause of toxicity in streams as it is known that *P. promelas* and *S. capricornutum* are less sensitive to diazinon than *C. dubia*.

6.4 CONCLUSIONS AND IMPLICATIONS

The EPA protocol was developed for testing the chronic toxicity of point-source discharges for which the effluent is diluted considerably in the receiving waters; however, urban runoff that flows in a stream during a storm event, is itself the receiving water. The information derived from sample dilutions is not necessarily relevant for the prediction of toxic effects. Therefore, the use of a screening mode in which only full strength sample is used to determine toxicity is appropriate. On the other hand, stormwater flows are transient by nature, so the exposure duration required to detect measurable toxic effects is relevant and theoretically predictive. The median time to lethality, or LT50, in the full strength is easily determined from the observation records collected during the test. The LT50 value is expressed in "hours" or "days" of exposure. Smaller LT50 values mean the sample is more toxic. Several years of monitoring stormwater toxicity in the San Francisco Bay Area have shown that LT50 is a valid measure of the intensity of toxicity. The LT50, determined by toxicity testing, in conjunction with the stormwater flow duration measured in the stream channels, might be useful in predicting the ecological impact of urban stormwater runoff to receiving waters.

6.5 SUMMARY

Toxicity testing was successfully implemented for characterization of urban runoff in numerous watersheds and land-use catchments in Alameda, Contra Costa and Santa Clara counties. The test design followed EPA guidance for chronic tests in the screening mode. Studies were initiated with three freshwater test species, and *C. dubia*, as the most responsive test organism, was chosen for ongoing study. There were several important applications and findings:

- The chronic test design in the screening mode was suitable for the range of toxicity intensity found in urban runoff from all land use areas, except for heavy industrial catchments which discharge extremely toxic runoff (Cooke et al, 1994, WCC 1992, 1993a).

- *C. dubia* was the most responsive test organism.

- Heavy metals were implicated as contributing to toxicity in industrial catchments, while non polar organics were responsible for toxicity in stream stations (WCC 1992).

- Toxicity to *C. dubia* was manifested by two distinct effects, lethality and reproductive impairment. Some samples, particularly from residential areas, caused mortality after several days of exposure but did not inhibit reproduction of the organisms before they died. Other samples, particularly those collected in transportation-corridor stations, severely inhibited reproduction without causing mortality. These results provided valuable information on the possible causes of toxicity in the different watersheds (Cooke et al. 1994).

- Advanced TIE procedures (Phase II and III) identified the organophosphate pesticide diazinon as the cause of toxicity in some residential watersheds. Diazinon does not seem to inhibit reproduction in *C. dubia*. (Hansen 1994, WCC 1994b).

7.0 SUMMARY AND RECOMMENDATIONS

7.1 BAY AREA MONITORING DATA: FINDINGS

Review of existing stormwater quality monitoring data collected in the San Francisco Bay Area has yielded the following findings:

- Concentrations of metals in runoff from urban areas are generally lower than EPA's dissolved water quality criteria for the protection of aquatic life.

- Concentrations of total cadmium, copper, lead, nickel, and zinc are sometimes higher than the Basin Plan water quality objectives for the protection of aquatic life. However, results from toxicity identification evaluations indicate that when toxicity is found in waterways it is generally attributable to nonpolar organics and not due to particulates or dissolved metal ions.

- Stormwater runoff is often toxic to the laboratory test organism *C. dubia* (water flea). For most waterways, the organisms die between 1 to 7 days of exposure to runoff. The commonly used organophosphate insecticide diazinon has been identified as the cause of the observed toxicity in some residential watersheds.

- Concentrations of total mercury are generally higher than the chronic EPA WQC and Basin Plan WQOs. However, these standards are designed to prevent accumulation of mercury in fish tissues to levels that are hazardous to eat. It is unclear if the duration of storm flows in creeks is long enough to permit accumulation to hazardous levels. A similar objective for the Bay is based on a 30-day averaging period.

- Concentrations of metals in runoff from different types of urban land uses (residential, commercial, industrial, transportation) are generally not statistically different from one another. Within any one monitoring station, variations in storm characteristics, timing, and specific urban activities cause the concentrations to vary over a wide range, hampering our ability to observe differences between watersheds caused by differing land use.

- Runoff from developed urban areas generally contains higher concentrations of metals than runoff from undeveloped areas. However, total metal concentrations in runoff from open space can be higher than metals in runoff from heavy industrial areas due to elevated concentrations of suspended and settleable solids associated with erosion.

7.2 EFFECTIVENESS OF MONITORING

The effectiveness of the current monitoring program in meeting the goals of the monitoring described in section 2.0 is discussed below. The two primary goals to the long-term stream monitoring are:

I. Determine trends in water quality and augment the long-term database to include a range of hydrological and water quality conditions for representative waterways in the Bay Area.

II. Determine how receiving water quality during storm events compares with available water quality and toxicity objectives.

The ability to determine trends in water quality due to implementation of BMPs in the four to six monitored watersheds is limited by our understanding of the influence of variations in hydrology on water quality. At selected stations, enough monitoring data has been collected to allow establishing relationships between event and antecedent conditions and water quality. At one watershed such an analysis has been conducted and shown that much of the variability can be explained by changes in hydrologic factors (WCC 1995a and WCC 1996). These observations indicate that if detection of trends is a desired goal many (greater than 15) storm events need to be monitored over several years to encompass the range of hydrologic conditions. Therefore, at stations with few storms sampled, such as those in Contra Costa County trend detection will be difficult until an adequate database has been established.

Existing monitoring results are adequate to provide a general understanding of how water quality compared with available water quality objectives and criteria and toxicity objectives for most trace metals. Data on organic compounds at detection levels that are adequate to compare with Federal Criteria are more sparse. Specifically, low-level monitoring for PAH compounds has been conducted for a few events at four waterway stations in Santa Clara County and three waterway stations in Alameda County. Few waterway stations have been monitored for low-level diazinon/chlorpyrifos and none have been monitored for low-level PCBs. However, the utility of monitoring for PCBs is questionable as these compounds have been banned since the 1970s and few, if any, active source control efforts could be enacted by stormwater agencies. Additionally, diazinon/chlorpyrifos control is currently the focus of an intensive BASMAA special study and workgroup funded in part through an EPA grant. Therefore, it is not clear that additional long-term monitoring by BASMAA agencies is necessary at this time.

PAH compound data are adequate to show certain compounds exceed the Federal Water Quality Criteria designed to prevent food fish from accumulating hazardous levels of PAHs. However, it is unclear if PAH concentrations in runoff persist long enough to allow accumulation in fish. Also fish tissue quality in the Bay is currently the focus of an extensive Regional Monitoring Program Special Study. It is recommended that the RMP study explore the possibility of sampling fish from streams with significant fisheries as well as the Bay.

7.3 RECOMMENDATIONS FOR CHANGES TO MONITORING

Five changes to monitoring programs in the San Francisco Bay Area are recommended:

- Dissolved metal concentrations are rarely found to be higher than the EPA WQC. However, total metals often exceed the WQO in the San Francisco Bay Basin Plan. To determine if the particulate metals in stormwater are causing a potential impact to sediment dwelling organisms, it is recommended that a pilot sediment assessment program be initiated. This pilot program should use sediment toxicity testing, and chemical characterization, as well as biological assessment techniques to evaluate potential impacts. Because most of these techniques are in the development stage the program should be initiated on a trial basis in one watershed to allow refinement of these tools for urban waterways.

- Duration and variability of dissolved metal concentrations during and after storm events has not been investigated for most urban waterways. Because sediment/water interaction is complex, it is not known if dissolved metal concentrations increase or decrease following storm events. It is recommended that a special study be conducted using in-field filtration to determine how dissolved metal concentrations vary within and following storm events.

- Few reliable measurements of stream quality during dry weather have been conducted. It is recommended that some effort be spent to determine metals and diazinon concentrations in waterways with significant dry weather flows.

- Few reliable measurements of Chromium (VI) have been performed. As Chromium (VI) is the predicted form of chromium in fresh water it is recommended that grab samples be collected and analyzed for dissolved chromium (VI) using improved low-level methods appropriate to environmental surface water monitoring. These results can be used to confirm previous results which used older EPA methods.

- Hydrologic factors are responsible for a large portion of the observed variability in individual watersheds. If the goal of the monitoring program is to detect changes in water quality due to BMP implementation, the variability due to hydrology should be accounted for in order to detect a trend. It is recommended for those watersheds where trend detection is desired that a range of storms should be sampled which reflect the distribution of antecedent and event-specific hydrologic parameters. Additionally, records should be kept of rainfall and flow in the monitored watershed to allow calculation of appropriate hydrologic statistics.

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SUMMARY OF ENVIRONMENTAL .T WEATHER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
otal Arsenic	# EVENTS	5	9	19	5	5	9	5	5	9	8	10	9	9	5	7	5
	MEAN CONC	5.1	1.6	3.7	1.4	1.7	1.3	1.6	0.7	2.3	2.4	4.2	2.5	2.8	1.2	10.5	0.6
	STD ERROR (MEAN)	2.9	0.7	1.7	0.9	0.8	0.8	1.4	0.3	0.8	1.2	2.1	1.5	1.1	0.6	8.4	0.2
	STD DEVIATION	3.5	0.7	2.7	1.0	0.9	0.9	1.7	0.4	1.0	1.4	3.1	1.9	1.7	0.7	11.6	0.2
	CV	0.7	0.5	0.7	0.7	0.5	0.7	1.1	0.6	0.5	0.6	0.7	0.7	0.6	0.6	1.1	0.3
	10th PERCENTILE	2.0	0.9	1.8	0.5	0.7	0.5	0.5	0.5	1.7	1.0	2.0	0.5	1.7	0.5	3.2	0.5
	25th PERCENTILE	2.0	1.0	2.3	0.5	1.0	0.5	0.5	0.5	2.0	1.0	2.5	1.0	2.0	0.5	4.0	0.5
	50th PERCENTILE	4.0	2.0	3.0	1.0	2.0	1.0	1.0	0.5	2.0	2.0	3.0	2.0	2.9	1.0	6.0	0.5
	75th PERCENTILE	6.0	2.0	4.5	2.0	2.0	2.0	1.0	0.5	2.0	3.3	4.6	4.0	3.0	2.0	9.8	0.5
	90th PERCENTILE	9.3	2.2	5.1	2.6	2.6	2.2	3.4	1.1	4.0	4.3	5.9	4.5	3.8	2.0	22.7	0.8
	%ND	0.0	11.1	0.0	40.0	20.0	44.4	40.0	80.0	11.1	0.0	0.0	22.2	11.1	40.0	0.0	80.0
issolved Arsenic	# EVENTS	5	8	8	5	5	9	5	5	9	7	5	5	5	5	5	5
	MEAN CONC	0.7	0.6	0.6	0.6	0.5	0.6	0.5	0.6	0.6	1.6	1.7	1.2	0.7	0.5	1.4	0.5
	STD ERROR (MEAN)	0.2	0.1	0.1	0.2	0.0	0.2	0.0	0.1	0.1	0.8	0.9	0.6	0.2	0.0	0.7	0.0
	STD DEVIATION	0.2	0.2	0.2	0.2	0.0	0.2	0.0	0.1	0.2	0.9	1.2	0.7	0.2	0.0	0.7	0.0
	CV	0.3	0.3	0.3	0.3	0.0	0.3	0.0	0.2	0.3	0.5	0.8	0.6	0.3	0.0	0.5	0.0
	10th PERCENTILE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5
	25th PERCENTILE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.5	0.5	0.5	0.5	0.5
	50th PERCENTILE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.0	1.5	1.0	0.5	0.5	2.0	0.5
	75th PERCENTILE	0.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.0	1.5	2.0	1.0	0.5	2.0	0.5
	90th PERCENTILE	0.9	0.7	0.7	0.8	0.5	1.0	0.5	0.7	0.6	2.4	3.0	2.0	1.0	0.5	2.0	0.5
	%ND	80.0	87.5	87.5	80.0	100.0	77.8	100.0	80.0	88.9	28.6	20.0	0.0	20.0	100.0	0.0	80.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENTAL WET WEATHER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
Total Cadmium	# EVENTS	5	9	19	5	5	9	5	5	9	8	10	15	20	5	17	5
	MEAN CONC	0.5	1.9	2.9	1.6	1.1	1.3	0.9	0.2	1.1	1.7	0.6	0.6	0.6	1.1	0.4	0.3
	STD ERROR (MEAN)	0.1	0.8	1.4	0.6	0.2	0.3	0.6	0.1	0.4	0.5	0.3	0.2	0.2	0.2	0.2	0.1
	STD DEVIATION	0.2	0.9	2.0	0.8	0.3	0.4	0.8	0.1	0.5	0.5	0.4	0.2	0.3	0.3	0.3	0.2
	CV	0.3	0.5	0.7	0.5	0.2	0.3	0.9	0.5	0.5	0.3	0.6	0.4	0.5	0.2	0.8	0.7
	10th PERCENTILE	0.3	1.0	1.4	0.9	0.9	0.9	0.3	0.1	0.5	1.1	0.2	0.3	0.3	0.8	0.1	0.1
	25th PERCENTILE	0.4	1.2	1.6	1.0	0.9	1.1	0.4	0.1	0.8	1.2	0.3	0.5	0.4	1.0	0.2	0.2
	50th PERCENTILE	0.5	2.0	2.0	1.5	0.9	1.2	0.5	0.1	1.1	1.9	0.5	0.6	0.5	1.1	0.3	0.2
	75th PERCENTILE	0.6	2.7	3.6	1.6	1.3	1.4	0.7	0.2	1.1	2.1	0.9	0.7	0.6	1.1	0.4	0.3
	90th PERCENTILE	0.6	2.9	4.6	2.6	1.4	1.7	1.7	0.3	1.8	2.2	1.0	0.9	1.1	1.3	0.7	0.5
	%ND	0.0	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	17.6	20.0
Dissolved Cadmium	# EVENTS	5	9	18	5	5	9	5	5	9	7	10	14	19	5	16	5
	MEAN CONC	0.1	0.3	0.7	0.2	0.3	0.4	0.2	0.1	0.2	0.3	0.1	0.1	0.1	0.2	0.1	0.1
	STD ERROR (MEAN)	0.0	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0
	STD DEVIATION	0.1	0.2	0.4	0.1	0.3	0.3	0.1	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1
	CV	0.8	0.6	0.5	0.5	1.1	0.7	0.8	1.0	0.8	0.4	0.5	0.6	0.7	0.4	0.9	0.5
	10th PERCENTILE	0.1	0.1	0.4	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.2	0.6	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1
	50th PERCENTILE	0.1	0.2	0.7	0.2	0.2	0.4	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.2	0.1	0.1
	75th PERCENTILE	0.1	0.4	0.8	0.3	0.2	0.5	0.2	0.1	0.3	0.4	0.1	0.1	0.1	0.2	0.1	0.1
	90th PERCENTILE	0.1	0.5	0.9	0.4	0.6	0.7	0.3	0.3	0.4	0.4	0.1	0.1	0.2	0.3	0.1	0.2
	%ND	80.0	22.2	5.6	20.0	40.0	11.1	40.0	60.0	22.2	14.3	90.0	85.7	84.2	20.0	87.5	40.0

NOTE: (0. VAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENT. S ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENTAL .. ET WEATHER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
Total Chromium	# EVENTS	5	9	19	5	5	9	5	5	9	8	10	15	20	5	17	5
	MEAN CONC	24.1	1.9	30.9	39.6	10.4	10.6	13.2	1.7	34.2	12.6	19.3	18.8	9.9	22.6	24.9	8.4
	STD ERROR (MEAN)	11.3	0.8	28.8	44.2	1.3	2.6	8.3	0.7	29.0	3.4	12.7	12.7	5.2	9.5	14.6	4.5
	STD DEVIATION	13.1	0.9	53.6	55.2	1.6	2.9	10.4	0.9	42.4	4.0	17.2	18.4	6.6	10.2	16.9	5.6
	CV	0.5	0.5	1.7	1.4	0.2	0.3	0.8	0.5	1.2	0.3	0.9	1.0	0.7	0.5	0.7	0.7
	10th PERCENTILE	10.4	1.0	7.0	9.8	8.8	7.8	7.0	0.7	9.2	7.7	6.5	5.8	2.5	13.8	2.9	4.0
	25th PERCENTILE	14.0	1.2	9.0	11.0	10.0	8.0	7.0	1.0	15.0	9.5	8.6	9.2	5.3	15.0	11.0	4.0
	50th PERCENTILE	22.0	2.0	13.0	13.0	10.0	10.0	9.0	1.9	18.5	12.5	11.5	13.0	8.0	16.0	26.0	6.0
	75th PERCENTILE	31.5	2.7	22.0	15.0	11.0	12.0	9.0	2.0	22.0	15.5	18.8	16.0	13.0	30.0	38.0	9.0
	90th PERCENTILE	39.6	2.9	51.4	96.0	12.2	14.4	24.0	2.6	69.2	17.6	41.4	45.6	19.0	35.4	45.2	15.0
	%ND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dissolved Chromium	# EVENTS	5	9	8	5	5	9	5	5	9	7	5	5	6	5	6	5
	MEAN CONC	3.1	0.3	1.7	2.4	1.6	1.9	1.6	1.3	2.6	1.8	1.5	2.5	1.1	2.2	1.0	2.6
	STD ERROR (MEAN)	3.1	0.1	1.5	1.8	0.5	0.5	0.5	0.6	0.7	0.4	0.5	1.8	0.6	0.6	0.5	0.7
	STD DEVIATION	3.7	0.2	2.1	2.4	0.5	0.8	0.5	0.7	0.9	0.5	0.6	2.3	0.6	0.7	0.6	0.8
	CV	1.2	0.6	1.2	1.0	0.3	0.4	0.3	0.5	0.4	0.3	0.4	0.9	0.6	0.3	0.6	0.3
	10th PERCENTILE	0.5	0.1	0.5	0.5	1.0	0.9	1.0	0.5	2.0	1.4	0.8	0.7	0.5	1.4	0.5	2.0
	25th PERCENTILE	0.5	0.2	0.5	0.5	1.0	2.0	1.0	0.5	2.0	2.0	1.1	0.9	0.5	1.8	0.5	2.0
	50th PERCENTILE	0.5	0.2	0.6	2.0	2.0	2.0	2.0	1.3	2.0	2.0	1.5	2.0	0.9	2.0	0.8	2.0
	75th PERCENTILE	4.0	0.4	2.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0	2.0	2.0	1.8	3.0	1.4	3.0
	90th PERCENTILE	7.6	0.5	3.5	5.0	2.0	3.0	2.0	2.0	3.4	2.0	2.0	5.0	2.0	3.0	1.8	3.6
	%ND	60.0	22.2	50.0	40.0	0.0	11.1	0.0	40.0	0.0	14.3	40.0	20.0	50.0	0.0	50.0	0.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRATIONS ARE REPORTED IN [illegible]

SUMMARY OF ENVIRONMENTAL WET WEATHER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
Total Copper	# EVENTS	5	9	18	5	5	9	5	5	9	8	10	14	19	5	16	5
	MEAN CONC	20.1	53.3	48.8	47.4	28.6	28.0	45.2	4.0	51.1	55.9	30.0	20.4	19.4	42.2	36.2	13.6
	STD ERROR (MEAN)	8.9	19.0	24.1	12.1	5.9	4.9	37.9	1.6	28.0	18.1	16.6	6.7	6.2	10.2	20.6	3.5
	STD DEVIATION	10.3	23.2	28.9	12.9	6.4	5.7	47.9	1.9	35.3	20.5	19.6	8.3	7.9	10.9	26.9	4.1
	CV	0.5	0.4	0.6	0.3	0.2	0.2	1.1	0.5	0.7	0.4	0.7	0.4	0.4	0.3	0.7	0.3
	10th PERCENTILE	8.6	26.8	17.0	34.2	22.8	21.2	14.2	1.8	24.8	30.2	11.9	8.6	10.1	29.4	5.8	9.2
	25th PERCENTILE	11.0	35.0	30.5	39.0	24.0	25.0	16.0	3.0	32.0	37.3	16.9	15.0	13.5	30.0	8.8	11.0
	50th PERCENTILE	23.0	51.0	39.0	42.0	25.0	27.0	24.0	4.0	35.5	59.5	19.8	21.5	21.0	47.0	34.0	13.0
	75th PERCENTILE	23.5	68.0	67.8	60.0	33.0	32.0	33.0	6.0	49.0	69.5	39.0	24.5	23.0	48.0	43.9	16.0
	90th PERCENTILE	31.0	81.6	92.4	63.0	36.6	35.2	97.2	6.0	105.6	80.0	59.3	31.4	28.0	53.4	71.8	18.4
	%ND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dissolved Copper	# EVENTS	5	9	18	5	5	9	5	5	9	7	10	14	19	5	15	5
	MEAN CONC	10.4	10.1	6.9	5.6	9.2	8.6	5.0	2.7	6.4	9.4	5.9	4.9	5.8	11.8	4.1	3.8
	STD ERROR (MEAN)	14.3	8.4	3.1	1.7	2.7	3.7	1.6	1.6	1.7	3.2	1.8	1.3	1.5	6.6	1.0	1.0
	STD DEVIATION	17.9	13.6	4.2	2.1	3.5	4.1	1.9	1.9	1.9	3.7	2.0	1.4	2.1	7.1	1.4	1.2
	CV	1.7	1.3	0.6	0.4	0.4	0.5	0.4	0.7	0.3	0.4	0.3	0.3	0.4	0.6	0.3	0.3
	10th PERCENTILE	0.5	2.8	3.8	3.2	6.4	4.0	2.8	0.7	4.0	4.6	3.9	3.1	3.8	4.8	2.6	2.4
	25th PERCENTILE	0.5	4.0	4.0	5.0	7.0	5.0	4.0	1.0	5.0	6.5	4.1	3.6	4.4	6.0	3.1	3.0
	50th PERCENTILE	0.8	5.0	5.8	6.0	8.0	8.0	5.0	3.0	7.0	11.0	5.8	4.8	5.6	9.0	4.0	4.0
	75th PERCENTILE	4.0	9.0	7.3	7.0	9.0	13.0	7.0	3.0	8.0	11.5	6.9	6.0	6.4	17.0	4.9	5.0
	90th PERCENTILE	29.2	17.6	15.0	7.6	13.2	14.0	7.0	4.8	9.0	13.2	8.2	6.9	7.8	20.6	5.9	5.0
	%ND	40.0	0.0	5.3	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NOTE: (0.[illegible] [illegible]AS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENT[illegible] ARE REPORTED IN ug/L.

SUMMARY OF ENVIRONMENTAL [illegible]ET WEATHER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
Total Lead	# EVENTS	5	9	19	5	5	9	5	5	9	8	10	15	20	5	17	5
	MEAN CONC	11.2	120.3	159.4	109.8	85.6	53.2	121.0	5.3	46.3	182.8	58.4	41.0	36.0	56.0	15.6	19.6
	STD ERROR (MEAN)	4.6	49.0	71.1	16.2	23.5	10.9	127.6	1.5	20.7	77.3	37.5	18.1	12.2	14.4	10.5	16.6
	STD DEVIATION	5.5	54.6	82.5	19.8	28.1	12.5	160.3	2.0	29.4	92.2	47.1	21.2	18.4	15.6	13.1	21.0
	CV	0.5	0.5	0.5	0.2	0.3	0.2	1.3	0.4	0.6	0.5	0.8	0.5	0.5	0.3	0.8	1.1
	10th PERCENTILE	5.2	61.2	73.6	88.0	54.8	39.4	24.2	3.2	18.4	87.4	20.4	12.6	19.0	39.2	3.2	5.8
	25th PERCENTILE	7.0	81.0	93.0	97.0	77.0	40.0	26.0	5.0	29.0	106.8	27.8	24.5	26.0	44.0	5.1	7.0
	50th PERCENTILE	12.0	132.0	130.0	110.0	81.0	54.0	50.0	5.0	41.0	170.0	33.3	38.0	34.3	52.0	14.0	10.0
	75th PERCENTILE	13.0	180.0	240.0	120.0	110.0	60.0	66.0	6.0	44.0	232.5	65.5	59.0	38.3	72.0	19.0	15.0
	90th PERCENTILE	17.2	182.0	268.0	132.0	116.0	68.0	290.4	7.4	76.8	297.0	129.1	68.0	57.2	74.4	34.4	42.6
	%ND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dissolved Lead	# EVENTS	5	9	18	5	5	9	5	5	9	7	10	14	19	5	15	5
	MEAN CONC	0.8	4.2	6.7	3.3	8.9	2.9	3.5	1.1	1.5	5.6	1.9	2.0	1.7	0.6	4.1	0.5
	STD ERROR (MEAN)	0.5	2.1	4.6	1.2	10.4	2.0	2.6	0.7	1.0	1.9	0.8	2.1	1.4	0.2	1.0	0.0
	STD DEVIATION	0.6	2.6	7.6	1.5	13.1	3.1	3.3	0.7	1.4	2.1	1.0	3.2	2.4	0.2	1.4	0.0
	CV	0.8	0.6	1.1	0.5	1.5	1.0	1.0	0.7	0.9	0.4	0.5	1.6	1.4	0.3	0.3	0.0
	10th PERCENTILE	0.5	0.5	0.7	1.5	1.1	0.5	1.1	0.5	0.5	2.6	0.5	0.5	0.5	0.5	2.6	0.5
	25th PERCENTILE	0.5	3.0	3.0	3.0	2.0	0.5	2.0	0.5	0.5	4.0	1.3	0.5	0.5	0.5	3.1	0.5
	50th PERCENTILE	0.5	4.0	5.0	4.0	3.0	2.0	2.0	0.5	1.0	7.0	2.0	0.5	0.8	0.5	4.0	0.5
	75th PERCENTILE	0.5	6.0	7.5	4.0	4.0	3.0	3.0	2.0	2.0	7.0	2.5	1.2	1.8	0.5	4.9	0.5
	90th PERCENTILE	1.4	7.4	10.6	4.6	22.6	5.4	7.2	2.0	2.6	7.4	2.7	5.5	2.6	0.8	5.9	0.5
	%ND	80.0	22.2	11.1	20.0	20.0	33.3	20.0	60.0	44.4	0.0	20.0	64.3	47.4	60.0	93.8	100.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENTAL WET WEATHER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
Total Mercury	# EVENTS	5	9	19	5	5	9	5	5	9	8	10	9	11	5	9	5
	MEAN CONC	0.1	0.3	0.2	0.4	0.2	0.5	0.1	0.1	0.1	0.2	0.3	0.2	0.1	0.2	0.1	0.2
	STD ERROR (MEAN)	0.0	0.2	0.1	0.2	0.1	0.3	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	STD DEVIATION	0.0	0.2	0.1	0.3	0.1	0.4	0.0	0.0	0.1	0.2	0.3	0.1	0.1	0.2	0.1	0.1
	CV	0.0	0.7	0.8	0.6	0.6	0.9	0.3	0.3	0.5	0.7	0.9	0.6	0.6	0.7	1.1	0.8
	10th PERCENTILE	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.2	0.1	0.3	0.1	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.4	0.1	0.5	0.2	0.6	0.1	0.1	0.1	0.3	0.4	0.3	0.2	0.3	0.1	0.1
	90th PERCENTILE	0.1	0.5	0.3	0.7	0.3	0.9	0.2	0.2	0.1	0.4	0.7	0.4	0.2	0.4	0.2	0.3
	%ND	100.0	44.4	78.9	20.0	60.0	33.3	80.0	80.0	88.9	37.5	60.0	66.7	42.9	60.0	57.1	80.0
Dissolved Mercury	# EVENTS	5	9	8	5	5	9	5	5	9	7	5	5	6	5	7	5
	MEAN CONC	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	1.1	0.1	0.2	0.1
	STD ERROR (MEAN)	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.6	0.0	0.2	0.0
	STD DEVIATION	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.6	0.0	0.3	0.0
	CV	0.0	0.5	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.6	0.0	0.6	0.0	1.6	0.0
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.0	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.9	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	1.8	0.1	0.1	0.1
	90th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.6	0.1	0.1	0.1	0.1	0.2	0.1	2.0	0.1	0.5	0.1
	%ND	100.0	88.9	100.0	100.0	100.0	55.6	100.0	100.0	100.0	100.0	80.0	100.0	54.5	100.0	66.7	100.0

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ENVIRONMENTAL WET . _ATHER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
Total Nickel	# EVENTS	5	9	18	5	5	9	5	5	9	8	10	14	19	5	16	5
	MEAN CONC	29.6	13.3	23.8	23.0	14.4	9.6	25.8	1.1	17.3	17.8	33.7	18.1	12.8	15.6	39.8	8.2
	STD ERROR (MEAN)	8.1	4.1	10.1	10.8	4.1	2.0	23.3	0.4	5.3	4.3	20.7	7.6	6.9	4.3	31.6	5.1
	STD DEVIATION	8.9	4.6	13.0	13.6	4.7	2.5	29.4	0.5	5.9	4.8	24.3	10.3	8.2	5.0	37.1	6.7
	CV	0.3	0.3	0.5	0.6	0.3	0.3	1.1	0.5	0.3	0.3	0.7	0.6	0.6	0.3	0.9	0.8
	10th PERCENTILE	18.8	7.8	10.7	10.8	9.2	8.0	8.0	0.6	11.6	11.7	12.0	9.0	4.1	10.2	5.4	3.2
	25th PERCENTILE	23.0	10.0	12.5	18.0	11.0	8.0	8.0	0.8	13.5	12.8	14.0	12.3	6.3	12.0	12.8	5.0
	50th PERCENTILE	32.0	14.0	21.0	18.0	14.0	8.0	10.0	1.0	14.0	19.0	22.5	15.5	10.0	15.0	22.0	5.0
	75th PERCENTILE	37.0	17.0	30.0	26.0	18.0	9.0	19.0	1.0	21.0	21.5	50.8	22.0	17.5	19.0	63.0	8.0
	90th PERCENTILE	38.8	18.6	41.2	38.6	19.8	13.4	58.0	1.6	24.2	23.3	60.6	28.2	21.4	21.4	100.3	15.8
	%ND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dissolved Nickel	# EVENTS	5	9	8	5	5	9	5	5	9	7	5	5	5	5	5	5
	MEAN CONC	9.2	5.2	7.9	10.6	4.6	2.2	3.0	2.0	2.8	4.3	4.0	2.1	2.5	2.3	2.5	1.8
	STD ERROR (MEAN)	9.1	3.0	3.4	5.5	1.5	1.4	2.0	2.4	1.5	1.5	2.0	0.7	1.4	1.2	0.6	0.3
	STD DEVIATION	11.5	4.4	3.8	7.3	1.7	1.5	2.4	3.0	2.1	1.7	2.6	0.9	1.5	1.3	0.6	0.4
	CV	1.3	0.8	0.5	0.7	0.4	0.7	0.8	1.5	0.7	0.4	0.7	0.4	0.6	0.6	0.3	0.2
	10th PERCENTILE	2.0	2.8	4.0	4.0	2.8	0.5	0.5	0.5	1.3	2.6	1.5	1.1	0.7	0.7	2.0	1.4
	25th PERCENTILE	2.0	3.0	4.8	7.0	4.0	0.5	0.5	0.5	2.0	3.0	3.0	2.0	1.0	1.0	2.0	2.0
	50th PERCENTILE	3.0	3.0	7.0	9.0	4.0	2.0	3.0	0.5	2.0	4.0	3.5	2.0	3.0	3.0	2.0	2.0
	75th PERCENTILE	7.0	5.0	10.5	11.0	6.0	4.0	4.0	0.5	3.0	5.5	4.5	3.0	4.0	3.0	3.0	2.0
	90th PERCENTILE	22.0	9.0	12.8	18.8	6.6	4.0	5.8	5.0	4.8	6.4	6.9	3.0	4.0	3.6	3.3	2.0
	%ND	0.0	0.0	0.0	0.0	0.0	33.3	40.0	80.0	11.1	0.0	20.0	20.0	20.0	20.0	0.0	0.0

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ENVIRONMENTAL WET WEATHER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
Total Selenium	# EVENTS	5	9	19	5	5	9	5	5	9	8	10	15	20	5	17	5
	MEAN CONC	0.1	0.1	0.5	0.7	1.6	0.9	0.1	1.2	0.5	0.6	1.1	0.6	0.4	0.4	1.0	1.2
	STD ERROR (MEAN)	0.0	0.0	0.6	1.0	2.4	1.2	0.0	1.8	0.7	0.9	1.5	0.7	0.3	0.5	1.0	1.7
	STD DEVIATION	0.0	0.0	1.4	1.2	3.0	1.6	0.0	2.2	1.1	1.3	2.5	1.5	0.8	0.6	2.2	2.1
	CV	0.0	0.0	3.0	1.7	1.9	1.8	0.0	1.8	2.2	2.2	2.4	2.4	2.1	1.5	2.3	1.8
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.1	0.5	0.1
	75th PERCENTILE	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.3	0.3	0.1	0.6	0.1
	90th PERCENTILE	0.1	0.1	0.3	2.0	4.6	2.8	0.1	3.5	0.8	1.3	1.6	0.4	0.3	1.1	0.9	3.3
	%ND	100.0	100.0	52.6	80.0	80.0	77.8	100.0	80.0	88.9	87.5	70.0	40.0	30.0	80.0	17.6	80.0
Dissolved Selenium	# EVENTS	5	9	8	5	5	9	5	5	9	7	5	5	5	5	5	5
	MEAN CONC	0.1	0.1	0.6	0.5	1.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1
	STD ERROR (MEAN)	0.0	0.0	0.9	0.7	1.9	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0
	STD DEVIATION	0.0	0.0	1.3	0.8	2.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.0
	CV	0.0	0.0	2.2	1.6	1.8	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	1.0	0.0
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	90th PERCENTILE	0.1	0.1	1.3	1.4	3.6	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.4	0.1
	%ND	100.0	100.0	87.5	80.0	80.0	100.0	100.0	100.0	88.9	100.0	100.0	100.0	100.0	100.0	80.0	100.0

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ENVIRONMENTAL WET .THER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
Total Silver	# EVENTS	5	9	19	5	5	9	5	5	9	8	10	9	9	5	7	5
	MEAN CONC	0.2	0.4	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.2	0.1
	STD ERROR (MEAN)	0.0	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.1	0.0
	STD DEVIATION	0.0	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.1	0.0
	CV	0.3	1.1	0.6	0.8	0.0	0.0	0.0	0.0	0.0	0.3	0.9	0.7	0.7	0.0	0.8	0.0
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.2	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.2	0.1
	90th PERCENTILE	0.2	0.7	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.8	0.2	0.2	0.1	0.3	0.1
	%ND	40.0	44.4	78.9	80.0	100.0	100.0	100.0	100.0	88.9	87.5	50.0	77.8	88.9	100.0	71.4	100.0
Dissolved Silver	# EVENTS	5	9	18	5	5	9	5	5	9	7	10	9	9	5	7	5
	MEAN CONC	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	STD ERROR (MEAN)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	STD DEVIATION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	CV	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.7	0.0	0.0	0.0
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	90th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1
	%ND	100.0	88.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	88.9	100.0	100.0	100.0

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ENVIRONMENTAL WET WEATHER MONITORING DATA
Alameda County

	STATION	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	S1	S2	S3	S4	S5	S6
Total Zinc	# EVENTS	5	9	19	5	5	9	5	5	9	8	10	15	20	5	17	5
	MEAN CONC	91.4	1057.8	6845.3	468.0	236.0	324.4	1062.0	37.2	355.0	556.3	153.2	145.2	132.3	234.0	70.5	90.4
	STD ERROR (MEAN)	46.3	494.8	4031.4	101.6	40.8	71.6	1415.2	6.2	124.4	138.8	88.4	65.1	39.7	35.2	40.8	39.7
	STD DEVIATION	50.2	584.4	5326.8	110.2	47.6	82.6	1769.5	7.4	152.0	158.2	110.2	89.8	53.9	41.3	52.5	44.8
	CV	0.5	0.6	0.8	0.2	0.2	0.3	1.7	0.2	0.4	0.3	0.7	0.6	0.4	0.2	0.7	0.5
	10th PERCENTILE	33.2	574.0	2740.0	372.0	184.0	244.0	134.0	30.0	208.0	367.0	54.7	46.6	82.0	186.0	18.6	55.2
	25th PERCENTILE	35.0	660.0	3395.0	390.0	190.0	260.0	140.0	30.0	260.0	407.5	82.0	86.8	91.1	210.0	27.0	60.0
	50th PERCENTILE	110.0	780.0	4900.0	400.0	240.0	300.0	200.0	36.0	280.0	565.0	106.3	130.0	132.5	240.0	67.0	60.0
	75th PERCENTILE	120.0	1300.0	8950.0	540.0	260.0	360.0	240.0	40.0	410.0	662.5	177.5	170.0	160.0	260.0	100.0	110.0
	90th PERCENTILE	144.0	1900.0	12400.0	606.0	290.0	440.0	2856.0	46.0	516.0	721.0	314.5	230.0	163.0	278.0	135.0	146.0
	%ND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dissolved Zinc	# EVENTS	5	9	18	5	5	9	5	5	9	7	10	14	19	5	16	5
	MEAN CONC	15.2	403.9	3797.9	131.0	103.6	154.8	52.0	33.8	84.3	172.9	19.9	25.6	37.4	61.2	10.8	34.6
	STD ERROR (MEAN)	20.3	279.6	2041.5	50.8	50.6	67.9	39.2	11.8	35.5	43.3	9.4	13.7	19.5	19.4	8.7	8.3
	STD DEVIATION	25.4	411.2	3065.5	53.9	65.7	80.4	49.8	12.4	42.1	54.2	12.8	19.1	30.3	20.7	14.0	9.8
	CV	1.7	1.0	0.8	0.4	0.6	0.5	1.0	0.4	0.5	0.3	0.6	0.7	0.8	0.3	1.3	0.3
	10th PERCENTILE	2.5	131.0	1482.0	64.0	52.0	56.8	18.6	18.8	38.0	130.0	6.6	9.3	18.8	35.6	1.9	24.6
	25th PERCENTILE	2.5	160.0	1800.0	85.0	70.0	93.0	27.0	20.0	44.0	130.0	11.5	11.8	21.8	44.0	2.5	30.0
	50th PERCENTILE	2.5	230.0	3150.0	160.0	88.0	150.0	30.0	40.0	81.0	150.0	19.5	21.0	26.0	70.0	6.5	32.0
	75th PERCENTILE	2.5	470.0	4300.0	170.0	90.0	220.0	40.0	43.0	120.0	190.0	23.4	27.5	40.0	80.0	11.6	40.0
	90th PERCENTILE	40.6	700.0	6388.9	182.0	174.0	272.0	106.0	46.0	136.0	236.0	31.2	47.0	57.6	81.2	19.0	46.0
	%ND	80.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	37.5	0.0

NOTE: (,WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCEN NS ARE REPORTED IN ug/L.

B.1.2 CONTRA COSTA

SUMMARY OF ENVIRONMENT... WET WEATHER MONITORING DATA
Contra Costa County

	STATION	S1	S2
Total Arsenic	# EVENTS	6	5
	MEAN CONC	3.4	5.2
	STD ERROR (MEAN)	1.2	2.5
	STD DEVIATION	1.5	3.0
	CV	0.4	0.6
	10th PERCENTILE	1.7	3.0
	25th PERCENTILE	2.4	3.3
	50th PERCENTILE	3.0	3.4
	75th PERCENTILE	3.9	5.7
	90th PERCENTILE	5.0	8.9
	%ND	0.0	0.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l

SUMMARY OF ENVIRONMENTAL WET WEATHER MONITORING DATA
Contra Costa County

	STATION	S1	S2
Total Cadmium	# EVENTS	6	5
	MEAN CONC	0.6	0.6
	STD ERROR (MEAN)	0.3	0.5
	STD DEVIATION	0.3	0.6
	CV	0.5	1.1
	10th PERCENTILE	0.2	0.2
	25th PERCENTILE	0.3	0.3
	50th PERCENTILE	0.6	0.3
	75th PERCENTILE	0.8	0.4
	90th PERCENTILE	0.9	1.3
	%ND	33.3	50.0
Dissolved Cadmium	# EVENTS	6	5
	MEAN CONC	0.2	0.2
	STD ERROR (MEAN)	0.1	0.1
	STD DEVIATION	0.1	0.1
	CV	0.4	0.5
	10th PERCENTILE	0.1	0.1
	25th PERCENTILE	0.1	0.1
	50th PERCENTILE	0.2	0.1
	75th PERCENTILE	0.3	0.3
	90th PERCENTILE	0.3	0.3
	%ND	100.0	100.0

NOTE ... L) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC... ONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENT[illegible] WET WEATHER MONITORING DATA
Contra Costa County

	STATION	S1	S2
Total Chromium	# EVENTS	6	5
	MEAN CONC	13.0	31.2
	STD ERROR (MEAN)	7.4	29.1
	STD DEVIATION	9.0	36.2
	CV	0.7	1.2
	10th PERCENTILE	4.2	4.8
	25th PERCENTILE	7.4	5.7
	50th PERCENTILE	10.7	11.0
	75th PERCENTILE	17.5	35.0
	90th PERCENTILE	24.0	74.0
	%ND	0.0	0.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN [illegible]

SUMMARY OF ENVIRONMENTAL WET WEATHER MONITORING DATA
Contra Costa County

	STATION	S1	S2
Total Copper	# EVENTS	6	5
	MEAN CONC	18.6	30.9
	STD ERROR (MEAN)	8.1	19.7
	STD DEVIATION	9.0	25.3
	CV	0.5	0.8
	10th PERCENTILE	8.8	11.1
	25th PERCENTILE	14.0	15.0
	50th PERCENTILE	19.0	20.0
	75th PERCENTILE	25.5	32.0
	90th PERCENTILE	28.0	60.2
	%ND	0.0	0.0
Dissolved Copper	# EVENTS	5	5
	MEAN CONC	8.1	11.7
	STD ERROR (MEAN)	4.2	7.4
	STD DEVIATION	5.5	8.1
	CV	0.7	0.7
	10th PERCENTILE	3.0	3.7
	25th PERCENTILE	3.6	5.0
	50th PERCENTILE	7.6	8.7
	75th PERCENTILE	8.6	18.0
	90th PERCENTILE	14.2	21.6
	%ND	0.0	0.0

NOT. DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC. .IONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENTAL WET WEATHER MONITORING DATA
Contra Costa County

	STATION	S1	S2
Total Mercury	# EVENTS	6	5
	MEAN CONC	0.1	0.2
	STD ERROR (MEAN)	0.0	0.1
	STD DEVIATION	0.0	0.1
	CV	0.0	0.5
	10th PERCENTILE	0.1	0.1
	25th PERCENTILE	0.1	0.1
	50th PERCENTILE	0.1	0.1
	75th PERCENTILE	0.1	0.3
	90th PERCENTILE	0.1	0.3
	%ND	100.0	60.0

NOT: DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC. .IONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENT... WET WEATHER MONITORING DATA
Contra Costa County

	STATION	S1	S2
Total Lead	# EVENTS	6	5
	MEAN CONC	43.1	26.5
	STD ERROR (MEAN)	24.3	21.8
	STD DEVIATION	27.6	27.6
	CV	0.6	1.0
	10th PERCENTILE	13.2	8.2
	25th PERCENTILE	25.5	8.8
	50th PERCENTILE	42.5	14.0
	75th PERCENTILE	58.8	21.0
	90th PERCENTILE	73.5	57.0
	%ND	0.0	0.0
Dissolved Lead	# EVENTS	6	5
	MEAN CONC	1.8	2.1
	STD ERROR (MEAN)	1.4	2.1
	STD DEVIATION	1.7	2.6
	CV	0.9	1.2
	10th PERCENTILE	0.5	0.5
	25th PERCENTILE	0.5	0.5
	50th PERCENTILE	0.9	1.0
	75th PERCENTILE	2.5	1.4
	90th PERCENTILE	4.0	4.9
	%ND	50.0	40.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.

SUMMARY OF ENVIRONMENT,.._ WET WEATHER MONITORING DATA
Contra Costa County

Total Nickel

STATION	S1	S2
# EVENTS	6	5
MEAN CONC	21.8	47.1
STD ERROR (MEAN)	8.9	41.5
STD DEVIATION	11.3	49.8
CV	0.5	1.1
10th PERCENTILE	8.9	9.1
25th PERCENTILE	15.8	10.0
50th PERCENTILE	21.5	19.0
75th PERCENTILE	28.8	58.0
90th PERCENTILE	35.0	107.2
%ND	0.0	0.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENTAL WET WEATHER MONITORING DATA
Contra Costa County

	STATION	S1	S2
Total Selenium	# EVENTS	6	5
	MEAN CONC	0.3	0.4
	STD ERROR (MEAN)	0.1	0.2
	STD DEVIATION	0.1	0.3
	CV	0.5	0.6
	10th PERCENTILE	0.2	0.2
	25th PERCENTILE	0.2	0.3
	50th PERCENTILE	0.3	0.4
	75th PERCENTILE	0.4	0.6
	90th PERCENTILE	0.5	0.7
	%ND	0.0	0.0

NOTE [illegible] DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC[illegible]IONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENT. WET WEATHER MONITORING DATA
Contra Costa County

	STATION	S1	S2
Total Silver	# EVENTS	6	5
	MEAN CONC	0.3	0.3
	STD ERROR (MEAN)	0.2	0.2
	STD DEVIATION	0.2	0.2
	CV	0.8	0.6
	10th PERCENTILE	0.1	0.1
	25th PERCENTILE	0.1	0.1
	50th PERCENTILE	0.3	0.3
	75th PERCENTILE	0.3	0.5
	90th PERCENTILE	0.6	0.5
	%ND	66.7	60.0
Dissolved Silver	# EVENTS	6	5
	MEAN CONC	0.2	0.2
	STD ERROR (MEAN)	0.1	0.1
	STD DEVIATION	0.1	0.1
	CV	0.4	0.5
	10th PERCENTILE	0.1	0.1
	25th PERCENTILE	0.1	0.1
	50th PERCENTILE	0.2	0.1
	75th PERCENTILE	0.3	0.3
	90th PERCENTILE	0.3	0.3
	%ND	100.0	100.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENTAL WET WEATHER MONITORING DATA
Contra Costa County

	STATION	S1	S2
Total Zinc	# EVENTS	6	5
	MEAN CONC	233.8	118.0
	STD ERROR (MEAN)	165.4	65.6
	STD DEVIATION	227.9	86.3
	CV	1.0	0.7
	10th PERCENTILE	86.3	44.4
	25th PERCENTILE	152.5	48.0
	50th PERCENTILE	160.0	100.0
	75th PERCENTILE	175.0	120.0
	90th PERCENTILE	455.0	216.0
	%ND	0.0	0.0
Dissolved Zinc	# EVENTS	6	5
	MEAN CONC	70.1	23.2
	STD ERROR (MEAN)	52.9	6.6
	STD DEVIATION	69.7	7.4
	CV	1.0	0.3
	10th PERCENTILE	23.9	14.6
	25th PERCENTILE	28.8	17.0
	50th PERCENTILE	37.0	25.0
	75th PERCENTILE	70.0	27.0
	90th PERCENTILE	149.5	31.2
	%ND	0.0	0.0

NOT: DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC .ONS ARE REPORTED IN ug/L

B.1.3 SANTA CLARA

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Arsenic	# EVENTS	4	23	5	2	5	5	4	12	19	20	27	33
	MEAN CONC	0.6	1.9	0.6	0.5	0.5	1.6	1.4	2.2	2.4	1.9	2.2	3.3
	STD ERROR (MEAN)	0.2	1.0	0.2	0.0	0.0	0.9	1.3	1.4	1.6	0.9	1.1	1.2
	STD DEVIATION	0.2	1.5	0.2	0.0	0.0	1.0	1.5	1.9	2.4	1.1	1.4	1.6
	CV	0.3	0.8	0.3	0.0	0.0	0.6	1.1	0.8	1.0	0.6	0.6	0.5
	10th PERCENTILE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.4
	25th PERCENTILE	0.5	1.0	0.5	0.5	0.5	0.5	0.5	0.9	0.9	1.2	1.3	2.6
	50th PERCENTILE	0.5	1.4	0.5	0.5	0.5	2.0	0.5	1.9	1.8	1.6	1.8	3.0
	75th PERCENTILE	0.6	2.3	0.5	0.5	0.5	2.0	1.4	3.0	3.0	3.0	3.1	4.1
	90th PERCENTILE	0.9	3.0	0.8	0.5	0.5	2.6	3.0	3.2	4.4	3.0	4.0	5.3
	%ND	75.0	17.4	80.0	100.0	100.0	40.0	75.0	25.0	21.1	20.0	18.5	9.1
Dissolved Arsenic	# EVENTS	1	2	2	1	2	2	2	0	2	2	1	2
	MEAN CONC	-	0.5	0.5	-	0.5	0.5	0.5	-	0.5	0.5	-	0.5
	STD ERROR (MEAN)	-	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0
	STD DEVIATION	-	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0
	CV	-	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0
	10th PERCENTILE	-	0.5	0.5	-	0.5	0.5	0.5	-	0.5	0.5	-	0.5
	25th PERCENTILE	-	0.5	0.5	-	0.5	0.5	0.5	-	0.5	0.5	-	0.5
	50th PERCENTILE	-	0.5	0.5	-	0.5	0.5	0.5	-	0.5	0.5	-	0.5
	75th PERCENTILE	-	0.5	0.5	-	0.5	0.5	0.5	-	0.5	0.5	-	0.5
	90th PERCENTILE	-	0.5	0.5	-	0.5	0.5	0.5	-	0.5	0.5	-	0.5
	%ND	-	100.0	100.0	-	100.0	100.0	100.0	-	100.0	100.0	-	100.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/L

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Arsenic	# EVENTS	12	11
	MEAN CONC	2.8	1.5
	STD ERROR (MEAN)	1.3	0.7
	STD DEVIATION	1.7	0.9
	CV	0.6	0.6
	10th PERCENTILE	0.6	0.5
	25th PERCENTILE	1.7	0.8
	50th PERCENTILE	2.7	1.5
	75th PERCENTILE	3.7	1.8
	90th PERCENTILE	5.0	2.8
	%ND	16.7	27.3
Dissolved Arsenic	# EVENTS	3	3
	MEAN CONC	0.5	0.5
	STD ERROR (MEAN)	0.0	0.0
	STD DEVIATION	0.0	0.0
	CV	0.0	0.0
	10th PERCENTILE	0.5	0.5
	25th PERCENTILE	0.5	0.5
	50th PERCENTILE	0.5	0.5
	75th PERCENTILE	0.5	0.5
	90th PERCENTILE	0.5	0.5
	%ND	100.0	100.0

NOT[illegible] (DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC[illegible]RATIONS ARE REPORTED IN ug/l.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Cadmium	# EVENTS	4	23	5	2	5	5	4	12	19	20	27	33
	MEAN CONC	1.5	4.6	1.5	1.3	2.0	1.8	0.7	2.6	1.0	1.4	0.8	1.0
	STD ERROR (MEAN)	1.2	2.3	1.0	0.7	1.2	1.0	0.7	2.3	0.6	0.9	0.5	0.6
	STD DEVIATION	1.5	4.1	1.3	0.7	1.3	1.2	0.8	3.8	0.9	1.3	0.9	0.9
	CV	1.0	0.9	0.9	0.5	0.6	0.6	1.1	1.5	0.9	0.9	1.1	0.9
	10th PERCENTILE	0.4	2.1	0.6	0.7	0.9	1.0	0.1	0.8	0.4	0.5	0.1	0.3
	25th PERCENTILE	0.8	2.7	1.0	1.0	1.0	1.0	0.2	0.9	0.5	0.6	0.4	0.5
	50th PERCENTILE	1.0	3.2	1.0	1.3	1.0	1.0	0.3	1.2	0.7	1.0	0.5	0.7
	75th PERCENTILE	1.8	5.0	1.0	1.7	3.0	2.0	0.8	2.2	1.2	1.7	0.8	1.0
	90th PERCENTILE	3.1	6.5	2.8	1.9	3.6	3.2	1.5	3.5	1.9	2.2	1.6	1.8
	%ND	75.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	14.8	3.0
Dissolved Cadmium	# EVENTS	1	17	2	1	2	2	2	12	2	14	21	27
	MEAN CONC	-	1.2	0.2	-	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1
	STD ERROR (MEAN)	-	0.6	0.1	-	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1
	STD DEVIATION	-	0.8	0.1	-	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1
	CV	-	0.7	0.5	-	0.5	0.5	0.0	0.4	0.0	0.5	0.4	0.7
	10th PERCENTILE	-	0.5	0.1	-	0.12	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	-	0.6	0.2	-	0.15	0.2	0.1	0.2	0.1	0.1	0.1	0.1
	50th PERCENTILE	-	0.9	0.2	-	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1
	75th PERCENTILE	-	1.5	0.3	-	0.25	0.3	0.1	0.2	0.1	0.1	0.1	0.1
	90th PERCENTILE	-	2.4	0.3	-	0.28	0.3	0.1	0.4	0.1	0.2	0.2	0.2
	%ND	-	0.0	50.0	-	50.0	50.0	100.0	16.7	52.6	85.7	85.7	81.5

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRATIONS ARE REPORTED IN [illegible]

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Cadmium	# EVENTS	12	11
	MEAN CONC	4.2	1.3
	STD ERROR (MEAN)	2.4	0.3
	STD DEVIATION	3.8	0.4
	CV	0.9	0.3
	10th PERCENTILE	1.6	0.9
	25th PERCENTILE	1.9	1.1
	50th PERCENTILE	3.5	1.2
	75th PERCENTILE	4.6	1.4
	90th PERCENTILE	5.5	1.4
	%ND	0.0	0.0
Dissolved Cadmium	# EVENTS	12	11
	MEAN CONC	0.3	0.3
	STD ERROR (MEAN)	0.2	0.1
	STD DEVIATION	0.2	0.1
	CV	0.6	0.4
	10th PERCENTILE	0.1	0.2
	25th PERCENTILE	0.2	0.3
	50th PERCENTILE	0.3	0.3
	75th PERCENTILE	0.5	0.5
	90th PERCENTILE	0.6	0.5
	%ND	25.0	9.1

NOTI DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC. .IONS ARE REPORTED IN ug/L

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Chromium	# EVENTS	4	20	5	2	5	5	4	12	17	20	25	30
	MEAN CONC	11.5	35.1	10.6	22.0	20.4	29.6	12.0	24.2	57.0	26.7	33.8	26.5
	STD ERROR (MEAN)	4.0	26.5	3.9	1.0	9.4	17.8	5.0	12.9	37.5	15.0	23.3	18.5
	STD DEVIATION	4.8	44.6	4.0	1.0	13.2	22.4	6.3	16.0	48.5	20.6	29.3	25.5
	CV	0.4	1.3	0.4	0.0	0.6	0.8	0.5	0.7	0.9	0.8	0.9	1.0
	10th PERCENTILE	6.9	9.6	7.0	21.2	8.6	14.8	6.2	13.0	18.2	3.7	5.6	5.8
	25th PERCENTILE	8.3	11.5	7.0	21.5	17.0	16.0	8.0	13.8	26.0	9.5	11.0	7.8
	50th PERCENTILE	10.5	20.0	8.0	22.0	19.0	21.0	10.5	16.5	33.0	29.0	23.0	19.0
	75th PERCENTILE	13.8	37.3	15.0	22.5	19.0	23.0	14.5	30.5	76.0	34.0	51.0	29.5
	90th PERCENTILE	16.9	75.1	15.6	22.8	34.0	53.6	19.0	41.6	109.6	43.7	76.4	73.1
	%ND	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dissolved Chromium	# EVENTS	1	3	2	1	2	2	2	0	2	2	1	3
	MEAN CONC	-	4.5	1.0	-	1.5	1.5	1.0	-	0.1	1.0	-	0.8
	STD ERROR (MEAN)	-	2.0	0.0	-	0.5	0.5	0.0	-	0.0	0.0	-	0.2
	STD DEVIATION	-	2.1	0.0	-	0.5	0.5	0.0	-	0.0	0.0	-	0.2
	CV	-	0.5	0.0	-	0.3	0.3	0.0	-	0.0	0.0	-	0.3
	10th PERCENTILE	-	2.5	1.0	-	1.1	1.1	1.0	-	0.1	1.0	-	0.6
	25th PERCENTILE	-	3.8	1.0	-	1.25	1.3	1.0	-	0.1	1.0	-	0.8
	50th PERCENTILE	-	6.0	1.0	-	1.5	1.5	1.0	-	0.1	1.0	-	1.0
	75th PERCENTILE	-	6.0	1.0	-	1.75	1.8	1.0	-	0.1	1.0	-	1.0
	90th PERCENTILE	-	6.0	1.0	-	1.9	1.9	1.0	-	0.1	1.0	-	1.0
	%ND	-	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	33.3

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Chromium	# EVENTS	12	11
	MEAN CONC	50.4	16.8
	STD ERROR (MEAN)	18.7	3.3
	STD DEVIATION	25.5	4.7
	CV	0.5	0.3
	10th PERCENTILE	28.0	12.0
	25th PERCENTILE	37.0	14.0
	50th PERCENTILE	43.0	16.0
	75th PERCENTILE	55.8	17.5
	90th PERCENTILE	74.2	21.0
	%ND	0.0	0.0
Dissolved Chromium	# EVENTS	4	3
	MEAN CONC	1.1	1.9
	STD ERROR (MEAN)	0.6	0.8
	STD DEVIATION	0.7	0.9
	CV	0.7	0.5
	10th PERCENTILE	0.5	1.2
	25th PERCENTILE	0.5	1.3
	50th PERCENTILE	0.8	1.4
	75th PERCENTILE	1.3	2.3
	90th PERCENTILE	1.9	2.8
	%ND	50.0	0.0

NOTI ` DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC... ..IONS ARE REPORTED IN ug/l.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Chromium (VI)	# EVENTS	2	6	2	2	4	3	3	0	6	6	5	6
	MEAN CONC	5.0	5.0	5.0	5.0	5.0	5.0	5.0	-	5.0	5.0	5.0	5.0
	STD ERROR (MEAN)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0
	STD DEVIATION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0
	CV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0
	10th PERCENTILE	5.0	5.0	5.0	5.0	5.0	5.0	5.0	-	5.0	5.0	5.0	5.0
	25th PERCENTILE	5.0	5.0	5.0	5.0	5.0	5.0	5.0	-	5.0	5.0	5.0	5.0
	50th PERCENTILE	5.0	5.0	5.0	5.0	5.0	5.0	5.0	-	5.0	5.0	5.0	5.0
	75th PERCENTILE	5.0	5.0	5.0	5.0	5.0	5.0	5.0	-	5.0	5.0	5.0	5.0
	90th PERCENTILE	5.0	5.0	5.0	5.0	5.0	5.0	5.0	-	5.0	5.0	5.0	5.0
	%ND	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	100.0
Dissolved Chromium (VI)	# EVENTS	1	2	2	1	2	2	2	0	2	2	1	2
	MEAN CONC	-	5.0	5.0	-	5.0	5.0	5.0	-	5.0	5.0	-	5.0
	STD ERROR (MEAN)	-	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0
	STD DEVIATION	-	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0
	CV	-	0.0	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0
	10th PERCENTILE	-	5.0	5.0	-	5.0	5.0	5.0	-	5.0	5.0	-	5.0
	25th PERCENTILE	-	5.0	5.0	-	5.0	5.0	5.0	-	5.0	5.0	-	5.0
	50th PERCENTILE	-	5.0	5.0	-	5.0	5.0	5.0	-	5.0	5.0	-	5.0
	75th PERCENTILE	-	5.0	5.0	-	5.0	5.0	5.0	-	5.0	5.0	-	5.0
	90th PERCENTILE	-	5.0	5.0	-	5.0	5.0	5.0	-	5.0	5.0	-	5.0
	%ND	-	100.0	100.0	-	100.0	100.0	100.0	-	100.0	100.0	-	100.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Copper	# EVENTS	4	23	5	2	5	5	4	11	18	20	27	33
	MEAN CONC	42.3	54.6	24.0	30.5	96.9	51.8	10.5	51.8	52.1	61.6	35.7	32.9
	STD ERROR (MEAN)	17.8	25.6	4.8	2.5	89.2	16.6	3.3	37.1	27.8	34.2	22.6	15.6
	STD DEVIATION	18.3	45.9	6.2	2.5	113.8	21.5	4.3	61.6	32.2	63.9	34.0	25.7
	CV	0.4	0.8	0.3	0.1	1.2	0.4	0.4	1.2	0.6	1.0	1.0	0.8
	10th PERCENTILE	23.1	23.2	17.2	28.5	17.9	29.4	6.1	17.0	20.7	23.9	7.1	14.0
	25th PERCENTILE	26.3	29.0	22.0	29.3	44.0	39.0	9.3	20.0	29.0	27.8	17.5	20.0
	50th PERCENTILE	41.5	47.0	25.0	30.5	50.0	54.0	11.0	29.5	40.5	52.5	26.0	26.0
	75th PERCENTILE	57.5	59.5	26.0	31.8	70.0	55.0	12.3	56.5	77.8	60.5	44.3	33.0
	90th PERCENTILE	62.0	80.2	30.2	32.5	220.0	74.8	14.5	58.0	95.0	96.4	56.8	59.8
	%ND	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0
Dissolved Copper	# EVENTS	1	16	2	1	2	2	2	12	14	14	21	26
	MEAN CONC	-	12.4	7.5	-	9.5	9.0	6.5	6.0	6.6	6.9	5.8	5.2
	STD ERROR (MEAN)	-	5.0	1.5	-	2.5	0.0	2.5	2.0	1.9	2.3	3.1	2.0
	STD DEVIATION	-	8.6	1.5	-	2.5	0.0	2.5	2.4	2.2	2.6	5.9	3.1
	CV	-	0.7	0.2	-	0.3	0.0	0.4	0.4	0.3	0.4	1.0	0.6
	10th PERCENTILE	-	5.3	6.3	-	7.5	9.0	4.5	3.7	3.9	4.0	2.7	2.8
	25th PERCENTILE	-	8.2	6.8	-	8.3	9.0	5.3	4.1	5.0	4.9	3.2	3.1
	50th PERCENTILE	-	11.0	7.5	-	9.5	9.0	6.5	5.5	6.1	6.2	4.1	4.5
	75th PERCENTILE	-	13.3	8.3	-	10.8	9.0	7.8	7.5	8.6	9.1	6.0	5.9
	90th PERCENTILE	-	16.0	8.7	-	11.5	9.0	8.5	9.9	9.7	10.7	8.0	7.5
	%ND	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

NOTE ...DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCE...IONS ARE REPORTED IN ug/l.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Copper	# EVENTS	12	11
	MEAN CONC	54.3	29.8
	STD ERROR (MEAN)	20.3	7.0
	STD DEVIATION	22.8	11.6
	CV	0.4	0.4
	10th PERCENTILE	24.5	22.0
	25th PERCENTILE	30.5	24.5
	50th PERCENTILE	59.0	27.0
	75th PERCENTILE	72.0	30.5
	90th PERCENTILE	76.8	33.0
	%ND	0.0	0.0
Dissolved Copper	# EVENTS	10	11
	MEAN CONC	8.5	9.4
	STD ERROR (MEAN)	2.6	2.7
	STD DEVIATION	2.9	3.4
	CV	0.3	0.4
	10th PERCENTILE	5.4	6.9
	25th PERCENTILE	6.0	7.3
	50th PERCENTILE	7.6	8.2
	75th PERCENTILE	11.5	10.6
	90th PERCENTILE	12.1	14.0
	%ND	0.0	0.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Lead	# EVENTS	4	23	5	2	5	5	4	12	19	20	27	33
	MEAN CONC	173.3	120.6	43.6	5.5	112.3	73.4	5.1	108.5	41.1	67.7	46.9	41.2
	STD ERROR (MEAN)	210.9	71.6	8.9	1.5	81.1	43.9	5.4	74.1	23.2	35.0	33.3	23.1
	STD DEVIATION	243.7	140.3	9.8	1.5	108.2	47.1	6.3	113.4	26.8	54.4	54.2	36.8
	CV	1.4	1.2	0.2	0.3	1.0	0.6	1.2	1.0	0.7	0.8	1.2	0.9
	10th PERCENTILE	23.1	41.0	32.0	4.3	18.3	16.2	0.7	33.0	15.4	28.9	5.6	14.2
	25th PERCENTILE	30.8	54.5	35.0	4.8	45.0	30.0	0.9	45.8	21.5	34.5	13.0	21.0
	50th PERCENTILE	40.0	86.0	45.0	5.5	91.0	90.0	2.0	73.5	32.0	57.5	32.0	32.0
	75th PERCENTILE	182.5	130.0	53.0	6.3	110.0	110.0	6.3	108.0	65.5	80.3	49.5	42.0
	90th PERCENTILE	430.0	148.0	54.2	6.7	233.0	122.0	12.1	159.0	79.2	98.4	86.2	60.0
	%ND	0.0	0.0	0.0	0.0	20.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0
Dissolved Lead	# EVENTS	1	17	2	1	2	2	2	12	14	14	21	27
	MEAN CONC	-	8.2	0.5	-	1.3	1.8	0.5	3.4	1.5	1.6	1.1	1.5
	STD ERROR (MEAN)	-	5.4	0.0	-	0.8	1.3	0.0	1.9	1.0	1.3	0.8	1.5
	STD DEVIATION	-	6.4	0.0	-	0.8	1.3	0.0	2.5	1.1	1.5	1.2	2.5
	CV	-	0.8	0.0	-	0.6	0.7	0.0	0.7	0.8	0.9	1.1	1.6
	10th PERCENTILE	-	2.2	0.5	-	0.7	0.8	0.5	0.6	0.5	0.5	0.5	0.5
	25th PERCENTILE	-	3.1	0.5	-	0.9	1.1	0.5	2.0	0.5	0.5	0.5	0.5
	50th PERCENTILE	-	5.5	0.5	-	1.3	1.8	0.5	2.8	0.9	0.5	0.5	0.5
	75th PERCENTILE	-	10.5	0.5	-	1.6	2.4	0.5	4.2	2.3	2.6	1.0	0.9
	90th PERCENTILE	-	18.4	0.5	-	1.9	2.8	0.5	7.0	2.8	3.0	3.0	3.4
	%ND	-	0.0	100.0	-	50.0	50.0	100.0	16.7	50.0	57.1	63.6	74.1

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CONC...AIONS ARE REPORTED IN ug/l.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Lead	# EVENTS	12	11
	MEAN CONC	114.6	152.5
	STD ERROR (MEAN)	45.4	60.5
	STD DEVIATION	54.6	87.4
	CV	0.5	0.6
	10th PERCENTILE	44.3	96.0
	25th PERCENTILE	70.3	98.5
	50th PERCENTILE	115.0	120.0
	75th PERCENTILE	162.5	155.0
	90th PERCENTILE	179.0	230.0
	%ND	0.0	0.0
Dissolved Lead	# EVENTS	12	11
	MEAN CONC	2.8	9.0
	STD ERROR (MEAN)	2.3	5.9
	STD DEVIATION	2.5	6.6
	CV	0.9	0.7
	10th PERCENTILE	0.5	1.9
	25th PERCENTILE	0.5	2.7
	50th PERCENTILE	1.8	11.0
	75th PERCENTILE	5.1	13.5
	90th PERCENTILE	6.0	14.0
	%ND	50.0	0.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN [illegible]

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Mercury	# EVENTS	4	23	5	2	5	5	4	12	19	20	27	33
	MEAN CONC	0.4	0.3	0.1	0.1	0.7	0.6	0.6	0.1	0.3	0.3	0.4	0.2
	STD ERROR (MEAN)	0.3	0.3	0.0	0.0	0.9	0.6	0.7	0.0	0.2	0.3	0.4	0.2
	STD DEVIATION	0.4	0.8	0.0	0.0	1.2	0.7	0.8	0.1	0.4	0.6	0.8	0.6
	CV	1.1	2.9	0.3	0.0	1.7	1.3	1.3	0.5	1.6	2.3	2.1	2.5
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.4	0.1	0.2	0.1	0.1	0.6	0.7	0.1	0.2	0.1	0.1	0.1
	90th PERCENTILE	0.8	0.2	0.2	0.1	1.8	1.4	1.5	0.2	0.3	0.3	0.6	0.2
	%ND	50.0	87.0	60.0	100.0	80.0	60.0	50.0	83.3	52.6	80.0	77.8	81.8
Dissolved Mercury	# EVENTS	1	5	2	1	2	2	2	3	5	6	5	6
	MEAN CONC	-	0.1	0.1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	STD ERROR (MEAN)	-	0.0	0.0	-	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	STD DEVIATION	-	0.0	0.0	-	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CV	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	10th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	90th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	%ND	-	100.0	100.0	-	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NOT[illegible] [illegible](DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC[illegible]ATIONS ARE REPORTED IN ug/l.

ENVIRONMENTAL WE... EATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Mercury	# EVENTS	9	8
	MEAN CONC	0.1	0.1
	STD ERROR (MEAN)	0.0	0.0
	STD DEVIATION	0.0	0.1
	CV	0.0	0.5
	10th PERCENTILE	0.1	0.1
	25th PERCENTILE	0.1	0.1
	50th PERCENTILE	0.1	0.1
	75th PERCENTILE	0.1	0.1
	90th PERCENTILE	0.1	0.2
	%ND	100.0	87.5
Dissolved Mercury	# EVENTS	4	4
	MEAN CONC	0.1	0.1
	STD ERROR (MEAN)	0.0	0.0
	STD DEVIATION	0.0	0.0
	CV	0.0	0.0
	10th PERCENTILE	0.1	0.1
	25th PERCENTILE	0.1	0.1
	50th PERCENTILE	0.1	0.1
	75th PERCENTILE	0.1	0.1
	90th PERCENTILE	0.1	0.1
	%ND	100.0	100.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Nickel	# EVENTS	4	23	5	2	5	5	4	12	19	20	27	33
	MEAN CONC	132.8	53.1	20.8	39.0	0.7	48.0	0.6	52.2	98.2	45.3	68.0	61.8
	STD ERROR (MEAN)	158.6	26.6	11.4	21.0	0.9	33.6	0.7	39.5	65.8	27.1	41.8	46.1
	STD DEVIATION	183.6	37.0	13.3	21.0	1.2	38.0	0.8	54.0	83.5	33.4	51.1	63.9
	CV	1.4	0.7	0.6	0.5	1.7	0.8	1.3	1.0	0.9	0.7	0.8	1.0
	10th PERCENTILE	16.6	21.0	6.6	22.2	0.1	11.8	0.1	16.4	15.8	14.7	9.6	12.0
	25th PERCENTILE	17.5	30.5	15.0	28.5	0.1	28.0	0.1	21.5	38.0	17.5	23.0	22.0
	50th PERCENTILE	32.5	40.0	18.0	39.0	0.1	31.0	0.2	28.8	62.0	34.0	65.0	39.0
	75th PERCENTILE	147.8	59.0	30.0	49.5	0.1	70.0	0.7	75.3	136.8	61.3	103.0	78.0
	90th PERCENTILE	329.1	84.8	36.0	55.8	1.8	94.0	1.5	84.1	209.0	93.0	142.0	144.0
	%ND	0.0	0.0	20.0	0.0	20.0	20.0	25.0	8.3	5.3	5.0	0.0	0.0
Dissolved Nickel	# EVENTS	1	2	2	1	2	2	2	0	2	2	1	2
	MEAN CONC	-	7.0	2.5	-	0.1	6.0	3.5	-	3.0	3.0	-	7.0
	STD ERROR (MEAN)	-	1.0	1.5	-	0	2.0	2.5	-	2.0	2.0	-	1.0
	STD DEVIATION	-	1.0	1.5	-	0	2.0	2.5	-	2.0	2.0	-	1.0
	CV	-	0.1	0.6	-	0.0	0.3	0.7	-	0.7	0.7	-	0.1
	10th PERCENTILE	-	6.2	1.3	-	0.1	4.4	1.5	-	1.4	1.4	-	6.2
	25th PERCENTILE	-	6.5	1.8	-	0.1	5.0	2.3	-	2.0	2.0	-	6.5
	50th PERCENTILE	-	7.0	2.5	-	0.1	6.0	3.5	-	3.0	3.0	-	7.0
	75th PERCENTILE	-	7.5	3.3	-	0.1	7.0	4.8	-	4.0	4.0	-	7.5
	90th PERCENTILE	-	7.8	3.7	-	0.1	7.6	5.5	-	4.6	4.6	-	7.8
	%ND	-	0.0	50.0	-	50.0	0.0	50.0	-	50.0	50.0	-	0.0

NOT. [illegible] DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC. [illegible] AIONS ARE REPORTED IN ug/L

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Nickel	# EVENTS	12	11
	MEAN CONC	131.3	32.2
	STD ERROR (MEAN)	52.0	9.9
	STD DEVIATION	71.0	14.3
	CV	0.5	0.4
	10th PERCENTILE	55.1	22.0
	25th PERCENTILE	74.0	25.0
	50th PERCENTILE	130.0	31.0
	75th PERCENTILE	155.0	33.5
	90th PERCENTILE	179.0	47.0
	%ND	0.0	0.0
Dissolved Nickel	# EVENTS	3	3
	MEAN CONC	13.0	1.5
	STD ERROR (MEAN)	12.7	0.6
	STD DEVIATION	13.4	0.7
	CV	1.0	0.4
	10th PERCENTILE	3.1	1.0
	25th PERCENTILE	3.5	1.0
	50th PERCENTILE	4.1	1.0
	75th PERCENTILE	18.1	1.7
	90th PERCENTILE	26.4	2.1
	%ND	0.0	66.7

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Selenium	# EVENTS	4	23	5	2	5	5	4	12	20	21	28	34
	MEAN CONC	0.3	0.2	0.3	0.8	0.1	0.3	0.3	0.2	0.2	0.2	0.3	0.5
	STD ERROR (MEAN)	0.3	0.1	0.3	0.3	0.0	0.3	0.3	0.1	0.1	0.2	0.2	0.3
	STD DEVIATION	0.4	0.2	0.4	0.3	0.0	0.4	0.4	0.1	0.2	0.2	0.2	0.4
	CV	1.1	1.1	1.2	0.3	0.2	1.2	1.1	0.5	0.9	1.0	0.8	0.9
	10th PERCENTILE	0.1	0.1	0.1	0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4
	75th PERCENTILE	0.4	0.2	0.2	0.9	0.1	0.2	0.4	0.2	0.3	0.2	0.4	0.6
	90th PERCENTILE	0.7	0.2	0.7	1.0	0.1	0.7	0.7	0.2	0.4	0.4	0.6	1.0
	%ND	100.0	65.2	100.0	0.0	100.0	100.0	75.0	41.7	55.0	61.9	35.7	24.2
Dissolved Selenium	# EVENTS	1	2	2	1	2	2	2	0	2	2	1	3
	MEAN CONC	-	0.1	0.1	-	0.1	0.1	0.1	-	0.6	0.1	-	0.6
	STD ERROR (MEAN)	-	0.0	0.0	-	0	0.0	0.0	-	0.5	0.0	-	0.4
	STD DEVIATION	-	0.0	0.0	-	0	0.0	0.0	-	0.5	0.0	-	0.4
	CV	-	0.0	0.0	-	0.0	0.0	0.0	-	0.8	0.0	-	0.6
	10th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	-	0.2	0.1	-	0.2
	25th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	-	0.3	0.1	-	0.5
	50th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	-	0.6	0.1	-	0.8
	75th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	-	0.8	0.1	-	0.9
	90th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	-	0.9	0.1	-	1.0
	%ND	-	100.0	100	-	100.0	100.0	100.0	-	50.0	100.0	-	50.0

NOT[illegible] DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC[illegible]TIONS ARE REPORTED IN ug/l.

ENVIRONMENTAL WET ..EATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Selenium	# EVENTS	10	9
	MEAN CONC	0.2	0.1
	STD ERROR (MEAN)	0.1	0.0
	STD DEVIATION	0.1	0.0
	CV	0.5	0.4
	10th PERCENTILE	0.1	0.1
	25th PERCENTILE	0.1	0.1
	50th PERCENTILE	0.3	0.1
	75th PERCENTILE	0.3	0.2
	90th PERCENTILE	0.4	0.2
	%ND	30.0	33.3
Dissolved Selenium	# EVENTS	0	0
	MEAN CONC	-	-
	STD ERROR (MEAN)	-	-
	STD DEVIATION	-	-
	CV	-	-
	10th PERCENTILE	-	-
	25th PERCENTILE	-	-
	50th PERCENTILE	-	-
	75th PERCENTILE	-	-
	90th PERCENTILE	-	-
	%ND	-	-

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Silver	# EVENTS	4	23	5	2	5	5	4	12	19	20	27	33
	MEAN CONC	0.9	3.2	0.2	1.8	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.2
	STD ERROR (MEAN)	0.6	3.2	0.1	1.3	0.0	0.1	0.1	0.3	0.1	0.1	0.1	0.2
	STD DEVIATION	0.7	5.4	0.1	1.3	0.0	0.1	0.1	0.4	0.1	0.2	0.1	0.4
	CV	0.8	1.7	0.8	0.7	0.3	0.5	0.5	1.1	0.6	0.8	0.8	1.4
	10th PERCENTILE	0.2	0.3	0.1	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.3	0.6	0.1	1.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.7	1.3	0.1	1.8	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	1.3	3.0	0.1	2.4	0.1	0.2	0.2	0.4	0.2	0.3	0.2	0.3
	90th PERCENTILE	1.7	6.6	0.3	2.8	0.2	0.3	0.3	0.8	0.3	0.4	0.3	0.4
	%ND	0.0	0.0	60.0	0.0	80.0	60.0	50.0	58.3	68.4	55.0	74.1	60.6
Dissolved Silver	# EVENTS	1	17	2	1	2	2	2	12	14	14	21	27
	MEAN CONC	-	0.2	0.1	-	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	STD ERROR (MEAN)	-	0.2	0.0	-	0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	STD DEVIATION	-	0.2	0.0	-	0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
	CV	-	1.2	0.0	-	0.0	0.0	0.3	0.0	0.0	0.0	0.1	0.5
	10th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	-	0.1	0.1	-	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	90th PERCENTILE	-	0.6	0.1	-	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	%ND	-	88.2	100.0	-	100.0	100.0	50.0	100.0	100.0	100.0	95.2	92.6

NOTE ... DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC... ATIONS ARE REPORTED IN ug/l.

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Silver	# EVENTS	9	8
	MEAN CONC	0.6	0.1
	STD ERROR (MEAN)	0.5	0.0
	STD DEVIATION	0.6	0.0
	CV	1.0	0.0
	10th PERCENTILE	0.1	0.1
	25th PERCENTILE	0.1	0.1
	50th PERCENTILE	0.5	0.1
	75th PERCENTILE	0.7	0.1
	90th PERCENTILE	1.5	0.1
	%ND	44.4	100.0
Dissolved Silver	# EVENTS	9	8
	MEAN CONC	0.1	0.1
	STD ERROR (MEAN)	0.0	0.0
	STD DEVIATION	0.0	0.0
	CV	0.0	0.0
	10th PERCENTILE	0.1	0.1
	25th PERCENTILE	0.1	0.1
	50th PERCENTILE	0.1	0.1
	75th PERCENTILE	0.1	0.1
	90th PERCENTILE	0.1	0.1
	%ND	100.0	100.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l

ENVIRONMENTAL WET WEATHER MONITORING DATA
Santa Clara County

	STATION	L1	L2	L3	L4	L5	L6	L7	L9	S1	S2	S3	S4
Total Zinc	# EVENTS	4	23	5	2	5	5	4	12	19	20	27	32
	MEAN CONC	255.0	1423.9	220.0	54.0	336.0	244.0	7.1	387.6	215.1	254.5	143.6	129.5
	STD ERROR (MEAN)	120.0	751.5	56.0	34.0	87.2	44.8	4.4	319.5	97.8	114.9	81.6	57.3
	STD DEVIATION	121.8	1343.5	63.2	34.0	107.1	49.6	4.7	531.3	113.6	165.4	108.5	90.2
	CV	0.5	0.9	0.3	0.6	0.3	0.2	0.7	1.4	0.5	0.6	0.8	0.7
	10th PERCENTILE	129.0	720.0	156.0	26.8	240.0	188.0	1.9	132.0	96.0	127.0	37.4	57.5
	25th PERCENTILE	142.5	820.0	180.0	37.0	240.0	200.0	3.9	157.5	120.0	137.5	66.5	80.5
	50th PERCENTILE	250.0	950.0	200.0	54.0	310.0	240.0	8.0	197.5	230.0	235.0	120.0	110.0
	75th PERCENTILE	362.5	1715.0	260.0	71.0	360.0	300.0	11.3	317.5	292.5	292.5	175.0	140.0
	90th PERCENTILE	385.0	1960.0	296.0	81.2	462.0	300.0	11.7	490.0	370.0	416.0	267.0	216.0
	%ND	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0
Dissolved Zinc	# EVENTS	1	17	2	1	2	2	2	12	14	14	20	26
	MEAN CONC	-	707.6	100.0	-	100.0	100.0	5.0	49.1	30.8	26.6	15.6	13.7
	STD ERROR (MEAN)	-	431.1	0.0	-	0.0	0.0	2.0	14.6	23.6	15.2	8.9	5.9
	STD DEVIATION	-	514.1	0.0	-	0.0	0.0	2.0	18.2	31.2	23.3	12.1	7.3
	CV	-	0.7	0.0	-	0.0	0.0	0.4	0.4	1.0	0.9	0.8	0.5
	10th PERCENTILE	-	228.0	100.0	-	100.0	100.0	3.4	28.4	4.4	6.3	4.9	4.6
	25th PERCENTILE	-	310.0	100.0	-	100.0	100.0	4.0	38.8	6.5	10.3	6.9	10.0
	50th PERCENTILE	-	500.0	100.0	-	100.0	100.0	5.0	49.0	22.0	23.5	13.5	13.5
	75th PERCENTILE	-	1000.0	100.0	-	100.0	100.0	6.0	60.8	37.0	32.0	20.3	16.8
	90th PERCENTILE	-	1490.0	100.0	-	100.0	100.0	6.6	72.6	84.4	38.5	25.0	24.5
	%ND	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8

NOTI DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC IONS ARE REPORTED IN ug/l.

ENVIRONMENTAL WE[illegible]EATHER MONITORING DATA
Santa Clara County

	STATION	T1	T2
Total Zinc	# EVENTS	12	11
	MEAN CONC	310.8	207.9
	STD ERROR (MEAN)	135.8	61.9
	STD DEVIATION	149.0	101.8
	CV	0.5	0.5
	10th PERCENTILE	124.0	140.0
	25th PERCENTILE	167.5	170.0
	50th PERCENTILE	300.0	180.0
	75th PERCENTILE	442.5	210.0
	90th PERCENTILE	498.0	250.0
	%ND	0.0	0.0
Dissolved Zinc	# EVENTS	12	11
	MEAN CONC	21.0	47.5
	STD ERROR (MEAN)	14.5	17.1
	STD DEVIATION	16.7	19.9
	CV	0.8	0.4
	10th PERCENTILE	5.4	33.0
	25th PERCENTILE	9.0	33.5
	50th PERCENTILE	14.5	39.0
	75th PERCENTILE	31.8	63.5
	90th PERCENTILE	47.8	70.0
	%ND	0.0	0.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRATIONS ARE REPORTED IN [illegible]

B.2 DRY WEATHER

B.2.1 ALAMEDA

SUMMARY OF ENVIRONMENT... DRY WEATHER MONITORING DATA
Alameda County

	STATION	L2	S1	S2	S3	S4	S5	S6
Total Arsenic	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	0.8	1.0	1.1	0.9	1.5	0.9	0.5
	STD ERROR (MEAN)	0.3	0.5	0.7	0.6	1.1	0.5	0.0
	STD DEVIATION	0.3	0.6	0.7	0.6	1.3	0.8	0.0
	CV	0.3	0.6	0.7	0.7	0.8	0.9	0.0
	10th PERCENTILE	0.6	0.5	0.5	0.5	0.5	0.5	0.5
	25th PERCENTILE	0.6	0.5	0.5	0.5	0.5	0.5	0.5
	50th PERCENTILE	0.8	0.8	0.5	0.5	0.8	0.5	0.5
	75th PERCENTILE	0.9	1.4	2.0	0.9	2.3	1.0	0.5
	90th PERCENTILE	1.0	1.8	2.0	2.0	3.3	1.6	0.5
	%ND	50.0	0.0	62.5	75.0	50.0	62.5	100.0
Dissolved Arsenic	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	0.5	1.3	0.8	0.9	1.3	1.1	0.7
	STD ERROR (MEAN)	0.0	0.6	0.5	0.6	0.9	0.7	0.3
	STD DEVIATION	0.0	0.6	0.6	0.6	1.1	0.9	0.5
	CV	0.0	0.5	0.7	0.7	0.9	0.8	0.7
	10th PERCENTILE	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	25th PERCENTILE	0.5	0.6	0.5	0.5	0.5	0.5	0.5
	50th PERCENTILE	0.5	1.3	0.5	0.5	0.8	0.5	0.5
	75th PERCENTILE	0.5	1.9	0.8	0.9	1.3	1.3	0.5
	90th PERCENTILE	0.5	2.0	1.7	2.0	2.6	2.3	1.0
	%ND	100.0	33.3	75.0	75.0	50.0	62.5	87.5

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Alameda County

	STATION	L2	S1	S2	S3	S4	S5	S6
Total Copper	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	8.5	1.3	2.3	3.0	14.4	6.5	2.5
	STD ERROR (MEAN)	3.5	0.8	0.9	1.3	9.7	4.6	2.3
	STD DEVIATION	3.5	0.9	1.1	1.6	11.6	5.7	2.8
	CV	0.4	0.7	0.5	0.5	0.8	0.9	1.1
	10th PERCENTILE	5.7	0.5	1.0	0.5	3.7	0.5	0.5
	25th PERCENTILE	6.8	0.6	1.8	2.4	7.3	3.1	0.5
	50th PERCENTILE	8.5	1.0	2.0	3.0	10.0	4.5	1.3
	75th PERCENTILE	10.3	1.8	2.5	4.3	20.8	8.5	2.8
	90th PERCENTILE	11.3	2.5	4.0	5.0	27.8	14.5	6.2
	%ND	0.0	0.0	0.0	25.0	12.5	25.0	37.5
Dissolved Copper	# EVENTS	2	6	7	8	8	8	8
	MEAN CONC	1.3	1.2	1.7	3.0	13.8	4.1	1.3
	STD ERROR (MEAN)	0.8	0.6	0.9	1.5	12.6	1.9	1.1
	STD DEVIATION	0.8	0.6	1.0	1.8	14.1	2.8	1.3
	CV	0.6	0.5	0.6	0.6	1.0	0.7	1.1
	10th PERCENTILE	0.7	0.5	0.5	0.5	1.6	0.5	0.5
	25th PERCENTILE	0.9	0.6	0.8	1.6	2.8	3.1	0.5
	50th PERCENTILE	1.3	1.0	2.0	3.0	6.5	4.0	0.5
	75th PERCENTILE	1.6	1.8	2.5	5.0	23.3	5.0	1.1
	90th PERCENTILE	1.9	2.0	3.0	5.0	33.3	6.5	3.3
	%ND	50.0	33.3	28.6	25.0	12.5	25.0	75.0

NOTE [illegible]L) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC[illegible]ONS ARE REPORTED IN ug/L

SUMMARY OF ENVIRONMENT... DRY WEATHER MONITORING DATA
Alameda County

	STATION	L2	S1	S2	S3	S4	S5	S6
Total Chromium	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	6.3	1.4	1.5	1.1	1.4	1.1	1.4
	STD ERROR (MEAN)	0.3	0.9	1.3	0.5	0.9	0.4	1.3
	STD DEVIATION	0.3	1.2	1.6	0.6	0.9	0.5	1.8
	CV	0.0	0.9	1.0	0.5	0.7	0.5	1.2
	10th PERCENTILE	6.1	0.5	0.5	0.5	0.5	0.5	0.5
	25th PERCENTILE	6.1	0.6	0.5	0.5	0.5	0.9	0.5
	50th PERCENTILE	6.3	1.0	0.5	1.0	1.3	1.0	0.5
	75th PERCENTILE	6.4	1.4	1.9	1.3	2.0	1.3	1.3
	90th PERCENTILE	6.5	2.8	3.6	2.0	2.3	2.0	3.2
	%ND	0.0	0.0	62.5	37.5	50.0	25.0	62.5
Dissolved Chromium	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	1.3	0.6	0.7	1.3	1.1	0.5	0.6
	STD ERROR (MEAN)	0.8	0.1	0.2	1.2	0.7	0.0	0.1
	STD DEVIATION	0.8	0.2	0.2	1.8	0.9	0.0	0.2
	CV	0.6	0.3	0.4	1.4	0.8	0.0	0.3
	10th PERCENTILE	0.7	0.5	0.5	0.5	0.5	0.5	0.5
	25th PERCENTILE	0.9	0.5	0.5	0.5	0.5	0.5	0.5
	50th PERCENTILE	1.3	0.5	0.5	0.5	0.8	0.5	0.5
	75th PERCENTILE	1.6	0.5	1.0	0.6	1.3	0.5	0.5
	90th PERCENTILE	1.9	0.8	1.0	2.5	2.3	0.5	0.7
	%ND	50.0	83.3	62.5	75.0	50.0	100.0	87.5

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Alameda County

	STATION	L2	S1	S2	S3	S4	S5	S6
Total Lead	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	11.0	1.9	3.3	0.9	8.3	0.8	1.0
	STD ERROR (MEAN)	5.0	1.1	3.6	0.6	4.0	0.4	0.8
	STD DEVIATION	5.0	1.5	4.2	0.6	4.7	0.5	0.9
	CV	0.5	0.8	1.3	0.7	0.6	0.7	0.9
	10th PERCENTILE	7.0	0.5	0.5	0.5	3.1	0.5	0.5
	25th PERCENTILE	8.5	0.8	0.5	0.5	4.0	0.5	0.5
	50th PERCENTILE	11.0	1.8	0.5	0.5	8.5	0.5	0.5
	75th PERCENTILE	13.5	2.0	4.8	0.9	11.8	0.6	1.0
	90th PERCENTILE	15.0	3.5	10.3	2.0	14.3	1.3	2.5
	%ND	0.0	0.0	62.5	75.0	0.0	75.0	87.5
Dissolved Lead	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	0.5	1.7	1.1	1.1	7.6	0.5	0.8
	STD ERROR (MEAN)	0.0	1.8	1.0	1.0	5.1	0.0	0.5
	STD DEVIATION	0.0	2.4	1.5	1.5	5.6	0.0	0.7
	CV	0.0	1.4	1.4	1.4	0.7	0.0	0.8
	10th PERCENTILE	0.5	0.5	0.5	0.5	0.9	0.5	0.5
	25th PERCENTILE	0.5	0.5	0.5	0.5	3.3	0.5	0.5
	50th PERCENTILE	0.5	0.5	0.5	0.5	6.0	0.5	0.5
	75th PERCENTILE	0.5	0.9	0.5	0.5	13.3	0.5	0.6
	90th PERCENTILE	0.5	4.0	1.9	1.9	14.6	0.5	1.5
	%ND	100.0	66.7	87.5	87.5	12.5	100.0	100.0

NOTE ᵢL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCE. .IONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENT... DRY WEATHER MONITORING DATA
Alameda County

	STATION	L2	S1	S2	S3	S4	S5	S6
Total Mercury	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	STD ERROR (MEAN)	0.0	0.1	0.1	0.0	0.0	0.0	0.1
	STD DEVIATION	0.0	0.2	0.1	0.0	0.1	0.1	0.1
	CV	0.0	0.9	0.7	0.3	0.5	0.5	0.7
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	90th PERCENTILE	0.1	0.4	0.2	0.1	0.2	0.2	0.2
	%ND	100.0	0.0	87.5	87.5	87.5	87.5	87.5
Dissolved Mercury	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	STD ERROR (MEAN)	0.0	0.1	0.0	0.1	0.0	0.1	0.1
	STD DEVIATION	0.0	0.1	0.1	0.1	0.0	0.1	0.1
	CV	0.0	0.7	0.5	0.7	0.3	0.7	0.7
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	90th PERCENTILE	0.1	0.3	0.2	0.2	0.2	0.2	0.2
	%ND	100.0	83.3	87.5	87.5	75.0	87.5	87.5

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRATIONS ARE REPORTED IN ...

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Alameda County

	STATION	L2	S1	S2	S3	S4	S5	S6
Total Nickel	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	16.3	2.6	3.3	2.3	11.8	1.9	1.1
	STD ERROR (MEAN)	2.3	0.9	0.5	0.9	5.2	0.4	1.0
	STD DEVIATION	2.3	1.0	0.6	1.5	5.9	0.6	1.5
	CV	0.1	0.4	0.2	0.7	0.5	0.3	1.4
	10th PERCENTILE	14.5	1.3	2.9	1.0	6.5	1.0	0.5
	25th PERCENTILE	15.1	1.9	3.0	1.8	8.0	1.8	0.5
	50th PERCENTILE	16.3	3.0	3.0	2.0	9.5	2.0	0.5
	75th PERCENTILE	17.4	3.0	4.0	2.0	16.5	2.0	0.5
	90th PERCENTILE	18.1	3.5	4.0	3.2	19.2	2.3	1.9
	%ND	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Dissolved Nickel	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	15.0	2.1	2.3	1.8	9.8	1.9	1.3
	STD ERROR (MEAN)	2.0	0.9	1.3	0.7	6.7	0.9	1.1
	STD DEVIATION	2.0	1.1	1.6	0.9	7.2	1.3	1.5
	CV	0.1	0.5	0.7	0.5	0.7	0.7	1.1
	10th PERCENTILE	13.4	1.0	0.9	0.9	2.0	0.5	0.5
	25th PERCENTILE	14.0	1.1	1.0	1.0	4.3	0.9	0.5
	50th PERCENTILE	15.0	1.8	2.0	2.0	6.5	2.0	0.5
	75th PERCENTILE	16.0	2.8	3.0	2.3	16.8	2.0	1.3
	90th PERCENTILE	16.6	3.5	3.9	3.0	19.6	2.9	2.9
	%ND	0.0	0.0	12.5	12.5	0.0	25.0	75.0

NOTE:]L) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCE. .IONS ARE REPORTED IN ug/L

SUMMARY OF ENVIRONMENT... DRY WEATHER MONITORING DATA
Alameda County

	STATION	L2	S1	S2	S3	S4	S5	S6
Total Selenium	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	0.1	0.1	0.2	0.2	0.1	0.1	0.1
	STD ERROR (MEAN)	0.0	0.0	0.1	0.1	0.0	0.0	0.1
	STD DEVIATION	0.0	0.0	0.1	0.1	0.0	0.1	0.1
	CV	0.0	0.0	0.9	0.9	0.3	0.5	0.7
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	90th PERCENTILE	0.1	0.1	0.2	0.2	0.1	0.2	0.2
	%ND	100.0	0.0	87.5	87.5	87.5	87.5	87.5
Dissolved Selenium	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	STD ERROR (MEAN)	0.0	0.0	0.1	0.0	0.0	0.0	0.0
	STD DEVIATION	0.0	0.0	0.1	0.0	0.0	0.0	0.0
	CV	0.0	0.0	0.7	0.0	0.3	0.0	0.0
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	90th PERCENTILE	0.1	0.1	0.2	0.1	0.1	0.1	0.1
	%ND	100.0	100.0	87.5	100.0	87.5	100.0	100.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRATIONS ARE REPORTED IN ...

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Alameda County

	STATION	L2	S1	S2	S3	S4	S5	S6
Total Silver	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	0.1	0.2	0.1	0.4	0.1	0.1	0.3
	STD ERROR (MEAN)	0.0	0.1	0.0	0.4	0.0	0.0	0.3
	STD DEVIATION	0.0	0.1	0.0	0.7	0.0	0.0	0.4
	CV	0.0	0.4	0.4	1.8	0.4	0.4	1.6
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.2	0.1	0.1	0.1	0.1	0.1
	90th PERCENTILE	0.1	0.2	0.1	0.8	0.1	0.1	0.5
	%ND	100.0	0.0	100.0	87.5	100.0	100.0	87.5
Dissolved Silver	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	0.1	0.1	0.1	0.4	0.1	0.1	0.2
	STD ERROR (MEAN)	0.0	0.0	0.0	0.4	0.0	0.0	0.1
	STD DEVIATION	0.0	0.1	0.0	0.6	0.0	0.0	0.2
	CV	0.0	0.4	0.4	1.5	0.4	0.4	1.1
	10th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.1	0.1	0.3	0.1	0.1	0.1
	90th PERCENTILE	0.1	0.2	0.1	0.8	0.1	0.1	0.3
	%ND	100.0	100.0	100.0	75.0	100.0	100.0	87.5

NOTI DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCE. ..ATIONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Alameda County

	STATION	L2	S1	S2	S3	S4	S5	S6
Total Zinc	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	4000.0	3.4	7.7	16.2	62.8	2.5	2.5
	STD ERROR (MEAN)	800.0	1.5	3.9	14.9	37.8	0.0	0.0
	STD DEVIATION	800.0	2.0	5.5	19.3	45.1	0.0	0.0
	CV	0.2	0.6	0.7	1.2	0.7	0.0	0.0
	10th PERCENTILE	3360.0	2.5	2.5	2.5	8.4	2.5	2.5
	25th PERCENTILE	3600.0	2.5	2.5	2.5	18.0	2.5	2.5
	50th PERCENTILE	4000.0	2.5	8.0	8.5	67.5	2.5	2.5
	75th PERCENTILE	4400.0	2.5	8.5	17.3	87.5	2.5	2.5
	90th PERCENTILE	4640.0	5.3	13.0	39.6	119.0	2.5	2.5
	%ND	0.0	0.0	37.5	37.5	0.0	100.0	100.0
Dissolved Zinc	# EVENTS	2	6	8	8	8	8	8
	MEAN CONC	3475.0	4.8	4.9	11.4	51.4	3.9	5.0
	STD ERROR (MEAN)	675.0	2.3	3.0	7.6	42.8	2.1	3.8
	STD DEVIATION	675.0	2.5	3.1	9.2	47.3	2.8	5.4
	CV	0.2	0.5	0.6	0.8	0.9	0.7	1.1
	10th PERCENTILE	2935.0	2.5	2.5	2.5	5.0	2.5	2.5
	25th PERCENTILE	3137.5	2.5	2.5	2.5	10.5	2.5	2.5
	50th PERCENTILE	3475.0	3.8	2.5	10.5	35.5	2.5	2.5
	75th PERCENTILE	3812.5	7.3	8.0	14.8	87.5	3.1	3.4
	90th PERCENTILE	4015.0	8.0	8.8	23.0	116.0	6.8	9.9
	%ND	0.0	50.0	62.5	37.5	12.5	75.0	75.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRATIONS ARE REPORTED IN [illegible]

B.2.2 SANTA CLARA

SUMMARY OF ENVIRONMEN... DRY WEATHER MONITORING DATA
Santa Clara County

	STATION	S1	S2	S3	S4
Total Arsenic	# EVENTS	3	3	3	3
	MEAN CONC	0.7	1.0	0.8	1.5
	STD ERROR (MEAN)	0.2	0.7	0.2	0.7
	STD DEVIATION	0.2	0.7	0.2	0.7
	CV	0.4	0.7	0.3	0.5
	10th PERCENTILE	0.5	0.5	0.6	0.8
	25th PERCENTILE	0.5	0.5	0.8	1.3
	50th PERCENTILE	0.5	0.5	1.0	2.0
	75th PERCENTILE	0.8	1.3	1.0	2.0
	90th PERCENTILE	0.9	1.7	1.0	2.0
	%ND	0.0	66.7	33.3	33.3

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRATIONS ARE REPORTED IN ug/l

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Santa Clara County

	STATION	S1	S2	S3	S4
Total Cadmium	# EVENTS	3	3	3	3
	MEAN CONC	0.2	0.4	0.5	0.3
	STD ERROR (MEAN)	0.1	0.2	0.4	0.2
	STD DEVIATION	0.1	0.2	0.4	0.2
	CV	0.6	0.6	0.8	0.9
	10th PERCENTILE	0.1	0.2	0.1	0.1
	25th PERCENTILE	0.1	0.3	0.2	0.1
	50th PERCENTILE	0.1	0.4	0.3	0.1
	75th PERCENTILE	0.2	0.5	0.7	0.4
	90th PERCENTILE	0.3	0.6	0.9	0.5
	%ND	66.7	33.3	33.3	66.7

NOTE ƆL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC. .IONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENT. JRY WEATHER MONITORING DATA
Santa Clara County

	STATION	S1	S2	S3	S4
Total Chromium	# EVENTS	3	3	3	3
	MEAN CONC	2.3	3.7	3.5	4.0
	STD ERROR (MEAN)	1.8	1.6	1.7	0.7
	STD DEVIATION	1.9	1.7	1.9	0.8
	CV	0.8	0.5	0.5	0.2
	10th PERCENTILE	1.0	2.2	1.8	3.2
	25th PERCENTILE	1.0	2.5	2.3	3.5
	50th PERCENTILE	1.0	3.0	3.0	4.0
	75th PERCENTILE	3.0	4.5	4.5	4.5
	90th PERCENTILE	4.2	5.4	5.4	4.8
	%ND	0.0	0.0	0.0	0.0

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Santa Clara County

	STATION	S1	S2	S3	S4
Total Copper	# EVENTS	6	6	7	6
	MEAN CONC	13.8	4.7	3.8	6.2
	STD ERROR (MEAN)	12.6	3.3	1.9	2.8
	STD DEVIATION	17.1	3.6	2.5	3.2
	CV	1.2	0.8	0.7	0.5
	10th PERCENTILE	3.3	0.5	1.1	2.0
	25th PERCENTILE	6.3	1.1	2.3	3.8
	50th PERCENTILE	7.0	4.5	3.5	7.0
	75th PERCENTILE	10.0	7.5	4.5	8.8
	90th PERCENTILE	31.3	9.0	6.6	9.5
	%ND	16.7	33.3	14.3	0.0

NOTI DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC. .IONS ARE REPORTED IN ug/L

SUMMARY OF ENVIRONMENT. .. DRY WEATHER MONITORING DATA
Santa Clara County

	STATION	S1	S2	S3	S4
Total Lead	# EVENTS	6	6	7	7
	MEAN CONC	0.8	1.1	2.3	1.3
	STD ERROR (MEAN)	0.4	0.6	1.7	1.0
	STD DEVIATION	0.5	0.7	2.3	1.1
	CV	0.7	0.6	1.0	0.9
	10th PERCENTILE	0.5	0.5	0.5	0.5
	25th PERCENTILE	0.5	0.5	0.5	0.5
	50th PERCENTILE	0.5	0.8	2.0	0.5
	75th PERCENTILE	0.7	1.8	2.5	2.0
	90th PERCENTILE	1.4	2.0	4.8	3.0
	%ND	66.7	50.0	42.9	57.1

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Santa Clara County

	STATION	S1	S2	S3	S4
Total Mercury	# EVENTS	6	6	7	7
	MEAN CONC	0.1	0.1	0.4	0.4
	STD ERROR (MEAN)	0.0	0.0	0.6	0.5
	STD DEVIATION	0.1	0.0	0.8	0.7
	CV	0.4	0.0	1.9	1.8
	10th PERCENTILE	0.1	0.1	0.1	0.1
	25th PERCENTILE	0.1	0.1	0.1	0.1
	50th PERCENTILE	0.1	0.1	0.1	0.1
	75th PERCENTILE	0.1	0.1	0.1	0.1
	90th PERCENTILE	0.2	0.1	1.1	0.9
	%ND	83.3	100.0	85.7	85.7

NOT[illegible] [illegible]DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC[illegible]ATIONS ARE REPORTED IN ug/L

SUMMARY OF ENVIRONMENT... DRY WEATHER MONITORING DATA
Santa Clara County

	STATION	S1	S2	S3	S4
Total Nickel	# EVENTS	3	3	3	3
	MEAN CONC	1.3	1.7	1.7	2.3
	STD ERROR (MEAN)	0.4	0.9	0.4	1.8
	STD DEVIATION	0.5	0.9	0.5	1.9
	CV	0.4	0.6	0.3	0.8
	10th PERCENTILE	1.0	1.0	1.2	1.0
	25th PERCENTILE	1.0	1.0	1.5	1.0
	50th PERCENTILE	1.0	1.0	2.0	1.0
	75th PERCENTILE	1.5	2.0	2.0	3.0
	90th PERCENTILE	1.8	2.6	2.0	4.2
	%ND	66.7	66.7	33.3	66.7

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Santa Clara County

	STATION	S1	S2	S3	S4
Total Selenium	# EVENTS	6	6	7	7
	MEAN CONC	1.07	3.2	1.3	2.1
	STD ERROR (MEAN)	1.311	3.1	1.26	1.67
	STD DEVIATION	1.789	3.6	1.6	1.93
	CV	1.7	1.1	1.3	0.9
	10th PERCENTILE	0.100	0.10	0.10	0.28
	25th PERCENTILE	0.100	0.1	0.1	0.70
	50th PERCENTILE	0.10	2.1	0.7	1.0
	75th PERCENTILE	0.78	4.8	1.5	3.5
	90th PERCENTILE	3.00	7.5	3.2	5.0
	%ND	100.0	50.0	57.1	42.9

NOTE)L) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCE. .IONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Santa Clara County

	STATION	S1	S2	S3	S4
Total Silver	# EVENTS	6	6	7	7
	MEAN CONC	0.7	2.7	1.2	1.5
	STD ERROR (MEAN)	0.57	2.6	0.98	1.2
	STD DEVIATION	0.69	2.9	1.07	1.2
	CV	1.0	1.1	0.9	0.8
	10th PERCENTILE	0.1	0.10	0.10	0.1
	25th PERCENTILE	0.1	0.3	0.15	0.2
	50th PERCENTILE	0.4	1.4	0.90	2.0
	75th PERCENTILE	0.9	4.3	2.0	2.5
	90th PERCENTILE	1.5	6.5	2.4	3.0
	%ND	50.0	33.3	28.6	28.6

NOTE: (0.5*MDL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONCENTRAIONS ARE REPORTED IN ug/l.

SUMMARY OF ENVIRONMENTAL DRY WEATHER MONITORING DATA
Santa Clara County

Total Zinc

STATION	S1	S2	S3	S4
# EVENTS	6	6	7	7
MEAN CONC	20.5	10.8	10.0	14.6
STD ERROR (MEAN)	18.5	5.7	4.0	4.7
STD DEVIATION	25.1	7.8	5.1	5.4
CV	1.22	0.7	0.5	0.4
10th PERCENTILE	4.5	6.0	5.6	9.6
25th PERCENTILE	7.5	6.3	8.0	10.5
50th PERCENTILE	12.0	7.5	8.0	12.0
75th PERCENTILE	13.5	9.5	12.0	18.0
90th PERCENTILE	45.0	19.0	15.5	21.8
%ND	0.0	0.0	0.0	0.0

NOTE: [illegible]DL) WAS USED AS THE INPUT PARAMETER FOR METAL CONCENTRATIONS REPORTED AS ND.
CONC[illegible]IONS ARE REPORTED IN ug/l.