Sampling Plan
And

Quality Assurance/Quality Control Procedures
For

SWAMP Follow-Up Sampling Project 2006

May 10, 2006

Approvals

Project Manager _____ Date 23 May 06
James Smith

Regional Board QA Officer _____ Date 23 May 2006
Lisa Honma

Laboratory Contract Manager _____ Date _____
Linda Pardy

Contact Information:

California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92121-4340
Noopur Pathak, Student Assistant
(858) 627-3933, NPathak@waterboards.ca.gov
James Smith, Senior Environmental Scientist
(858) 467-2732, JSmith@waterboards.ca.gov

Sampling Plan
And

Quality Assurance/Quality Control Procedures
For

SWAMP Follow-Up Sampling Project 2006

May 10, 2006

Approvals

Project Manager _____ Date_____
James Smith

Regional Board QA Officer _____ Date_____
Lisa Honma

Laboratory Contract Manager _____ Date 5/31/06
Back up Tony Felix

Contact Information:

California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92121-4340
Noopur Pathak, Student Assistant
(858) 627-3933, NPathak@waterboards.ca.gov
James Smith, Senior Environmental Scientist
(858) 467-2732, JSmith@waterboards.ca.gov

Sampling Plan and Quality Assurance/Quality Control Procedures for SWAMP Follow-Up Sampling Project 2006

TABLE OF CONTENTS

3. Distribution List

Title:	No. of copies:	Name (Affiliation):	Tel. No.:
Project Manager	1	James Smith, RWQCB	(858) 627-2732
Project Advisor	1	David Gibson, RWQCB	(858) 467-4387
Project Advisor	1	Julie Chan, RWQCB	(858) 627-3926
Project Lead	Original	James Smith, RWQCB	(858) 627-2732
QA Officer	1	Lisa Honma, RWQCB	(858) 467-2960
Laboratory Contact	0	Marilyn Romero, WECK	(626) 336-2139
Sampler	1	Noopur Pathak, RWQCB	(858) 627-3933

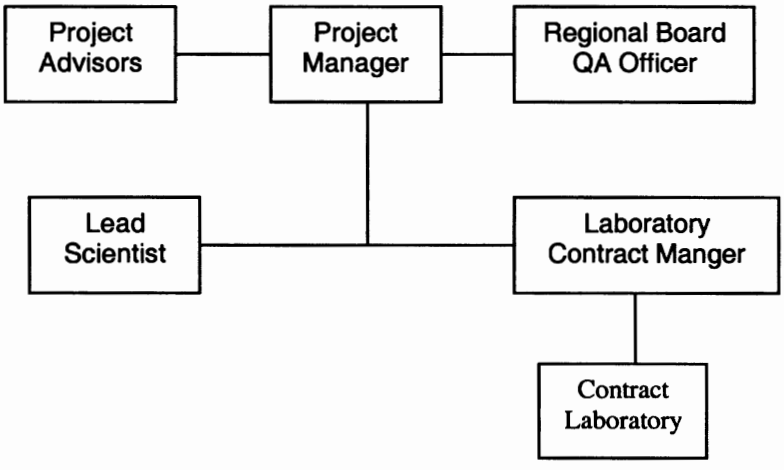
4. Project/Task Organization

The Project Team will consist of James Smith, Noopur Pathak, David Gibson and Julie Chan. The Project Manager will be responsible for general oversight of the project. He will serve as the main point of contact, lead of the Project Team and will hold the original versions of the Quality Assurance Project Plan (QAPP) and the Monitoring Plan (MP). Noopur Pathak will be Lead Scientist for the Project, SWAMP Follow-up Sampling Project, 2006. She will coordinate all sample collection and ensure handling is done in accordance with this QAPP. Julie Chan and David Gibson will serve as Project Advisors and offer expert advice and assistance (as needed) on all aspects of the project.

The Quality Assurance Officer for the California Regional Water Quality Control Board, San Diego Region (Regional Board) will ensure that all aspects of this Quality Assurance Project Plan (QAPP) are adhered to by those individuals taking and handling samples for the California Regional Water Quality Control Board, San Diego Region. Lisa Honma will serve in this capacity and is not part of the Project Team.

Linda Pardy will serve as the Laboratory Contract Manager and ensure that the sample handling and analysis of the project samples by Weck Laboratories is performed in accordance the contractual obligations.

Figure 1: Organization Chart



5. Problem Definition/Background

5.1 Problem Statement

The 11 watersheds of the San Diego Region have been sampled only once during the first watershed rotation in the Surface Water Ambient Monitoring Program (SWAMP) since 2000. The SWAMP sampling revealed significant concentrations of nutrients (nitrogen and phosphorous) and significant toxicity. Bacterial indicators were not sampled. Bioassessment samples collected by the Regional Board in 1998-2001 and by the San Diego Municipal Storm Water Permit Copermittees (Copermittees) showed significant degradation of the benthic macroinvertebrate community. Since those samples were collected and analyzed, major property developments and impacts to jurisdictional wetlands have occurred changing the character of the watershed. It is necessary to perform follow up monitoring to further evaluate the watershed in preparation for the next round of SWAMP sampling. Contract laboratory funds are available for the fiscal year 2005-2006 that will allow the Regional Board to take water quality samples for approximately one month from several streams during dry weather. Due to budget, staff, and time constrains, the monitoring will be limited to one site in each watershed. Sites will only be sampled once.

5.2 Decisions or Outcomes

This project will serve as a snapshot to follow up the first round of SWAMP monitoring. An important factor will be inclusion of bacterial indicators in SWAMP for the first time; if useful, lab contract funds may be used to continue bacterial indicator sampling to complement the SWAMP program. The data collected may be useful for further assessing the impairment of these waterbodies and may aid in development of a Monitoring Order (see Porter-Cologne Water Quality Control Act, Section 13383) that would require the responsible parties in these watersheds to collect data in the next one to two years. This project will also increase staff experience with developing and writing a sampling plan, a QAPP, and become more familiar with the impaired waterbodies of the region.

5.3 Water Quality or Regulatory Criteria

Data collected for this project will be compared to the water quality standards contained in the *Water Quality Control Plan for the San Diego Basin (9)* (Basin Plan).

6. Project Task/Description

6.1 Work Statement and Produced Products

This project will collect water samples for analysis of pH, turbidity, conductance, hardness, nutrient concentrations (including ammonia, nitrate, orthophosphate, total nitrogen and total phosphorus, Sulfate (SO4)), Trace Organic Chemistry, metals (Al, Cr, Mn, Ni, Cu, Zn, Ag, Cd, Pb, As, Se), Toxicity Testing - Fresh Water Origin (*Ceriodaphnia* 7-day Survival & Reproduction and *Selenastrum* (algae) test), Sediment (Amphipod 10-d Survival (*Hyalella*)—acute), Sediment Physical Characteristics (sediment grain size), and bacterial indicators (total and fecal coliform, and enterococcus) in 11 watersheds at 11 sites over the course of an approximate three-week (June 2006) period.

6.2 Constituents to be Monitored and Sample Cost

The following table summarizes the sampling and analysis plan for all samples and the estimated analyzing cost for each sample:

Table 1: Sampling and Analysis Plan and Budget Estimation

Trace Organic Chemistry	Full Scan pesticides and PCB congeners	$100.00
	PAH's	$250.00
		$350.00
Trace Metal Chemistry	**Water ICP-MS metals suite--filtered "dissolved"** (Includes Al, Cr, Mn, Ni, Cu, Zn, Ag, Cd, Pb, As, Se--all costs)	**$110.00**
Conventional Water Chemistry	OrthoPhosphate as P (OPO4)	$12.00
	Phosphorous Total as P (total; TPHOS)	$20.00
	Nitrate as N (NO3)	$12.00
	Nitrite as N (NO2)	$12.00
	Nitrogen, Total Kjeldahl (TKN)	$35.00
	Ammonia as N (NH3)	$20.00
	Sulfate (SO4)	$12.00
	Alkalinity as CaCO3 (ALK)	$10.00
	Total Suspended Solids (TSS)	$12.00
		$145.00
Toxicity Testing - Fresh Water Origin	*Ceriodaphnia* 7-day Survival & Reproduction	$1,000.00
	Selenastrum (algae) test (one of USEPA 3-spp)	$700.00
Sediment	Amphipod 10-d Survival (*Hyalella*)--acute	$1,200
		$2,900.00
Sediment Physical Characteristics	Sediment grain size (% silt/clay = fines only)	$75.00
Bacti	Enterococcus	$35.00
	Total Fecal and Coliform	$40.00
Total		**$3,615.00**

Sample analysis was based on the 2002 SWAMP program and Copermittee Dry Weather and Receiving Waters Monitoring Report with the addition of bacterial indicators.

6.3 Sampling Sites

Suitable sampling sites were established during site selection and reconnaissance in 2001 and 2002. Sampling sites were selected based on previously used sampling sites by the Regional Board as well as safety and accessibility concerns. A summary of the sampling sites is shown in the following table:

Table 2: Sampling Locations

Watershed	GPS Coordinates, Lat/Long	SWAMP Station Name	HSA	Sample Location ID #
San Juan	33.51215 -117.75179	Aliso Creek 6	901	ALC 6
Santa Margarita	33.47404 -117.14148	Santa Margarita River	902	SMR 1
San Luis Rey	33.28907 -117.07136	Keys Creek	903	KYS 3
Carlsbad	33.08559 -117.15037	Escondido Creek 5	904	ESC 8
San Dieguito	33.1277 -116.67877	Santa Ysabel Creek	905	YSA 4
Penasquitos	32.83703 -117.23178	Rose Canyon Creek	906	RSC4
San Diego	32.99342 -116.84978	San Vicente Creek	907	SVC 3
Pueblo San Diego	32.69629 -117.12237	Chollas Creek	908	CHL 4
Sweetwater	32.75417 -116.47914	Lawson Valley Creek	909	LAW 2
Otay	32.60888 -117.02114	Poggi Creek 3	910	POG 3
Tijuana	32.56539-116.75850	Tecate Creek 2	911	TET 2

6.4 Project Schedule

The following table outlines the anticipated project schedule and completion dates.

Table 3: Project Schedule

Activity	Date (MM/DD/YY)		Deliverable	Deliverable Due Date
	Anticipated Date of Initiation	Anticipated Date of Completion		
Start Project	5/1/06	6/1/06	Sampling Plan and Quality Assurance Project Plan	6/1/06
Sample Collection Week s	5/30/06	6/23/06	Samples Collection	6/30/06
Summarize Data	7/1/06	7/30/06	Complete Data Set and Summary Report	8/31/06

7. Quality Objectives and Criteria for Measurement Data

Data quality objectives for all parameters (see Table –1) measured in this project will consist of the following:

Bacterial Analyses – Representativeness, Comparability, Precision and Accuracy
Nutrient Analyses –Representativeness, Comparability, Precision and Accuracy
Conventional Pollutant Analyses –Representativeness, Comparability, Precision and Accuracy
Metals Analyses – Accuracy, Precision, Recovery, Completeness

Accuracy/ Bias
Accuracy describes how close a measurement is to its true value. Because the basic purpose of this project is to implement Best Management Practices (BMPs) compare pre- and post-construction performance based on "internal" data, and see if progress is being made toward meeting Basin Plan objectives, inherent bias in measurements is not as critical as it would be if, for example, measurements were to be compared to external criteria for decision-making.

Completeness
Completeness is the fraction of planned data that must be collected in order to fulfill the statistical criteria of the project. For this project there are no statistical criteria that require certain percentage of data. However, it is expected that 80% to 90% of all measurements could be taken when anticipated. This accounts for adverse weather conditions, safety concerns, and equipment problems.

Precision

The precision objectives apply to duplicate and split samples taken as part of a Quality Control (QC) session or as part of periodic in-field QC checks. Precision describes how well repeated measurements agree.

Water Quality

The evaluation of precision for water quality parameters tracked by the commercial laboratory will be conducted by the use of spikes, matrix spikes, and check standards as outlined in the Laboratory Quality Assurance document and the Standard Operating Procedures for the prescribed Method.

Representativeness
The representativeness of the data is mainly dependent on the sampling locations and the sampling procedures adequately representing the true condition of the sample site. Sample sites, sampling of relevant media (water, sediment and biota), and use of only approved/documented analytical methods will determine that the measurement data does represent the conditions at the investigation site, to the extent possible. The types and number of potential sampling points will temper the goal for meeting total representation of the site.

It is well known that water flowing past a given location on land is constantly changing in response to inflow, tidal cycle, weather, etc. Sampling schedules will be designed with respect to frequency, locations and methodology in order to maximize representativeness, where possible and applicable.

Comparability
The comparability of data produced by and for SWAMP is predetermined by the commitment of its staff and contracted laboratories to use standardized methods, where possible, including USEPA-approved analytical methods, or documented modifications

thereof, which provide equal or better results. These methods have specified units in which the results are to be reported.

Measurements are made according to standard procedure, or documented modifications thereof which provide equal or better results, using common units such as Celsius, feet, feet/sec, mg/L, mg/kg, etc. Analytical procedures are set by the USEPA approval list published in 40 CFR 136.

Precision and Accuracy

The precision and accuracy of data are determined by particular actions of the analytical laboratory and field staff. The precision of data is a measure of the reproducibility of the measurement when an analysis is repeated. It is reported in Relative Percent Difference (RPD) or Relative Standard Deviation (RSD). The accuracy of an analysis is a measure of how much of the constituent actually present is determined. It is measured, where applicable, by adding a known amount of the constituent to a portion of the sample and determining how much of this spike is then measured. It is reported as Percent Recovery. The acceptable percent deviations and the acceptable percent recoveries are dependent on many factors including: analytical method used, laboratory used, media of sample, and constituent being measured.

Precision measurements will be determined on laboratory replicates. The number of replicates will be one per sampling event. At least ten (10) percent of all samples collected shall be quality control samples.

Action Limits

The action limit is a measurement threshold at which a management decision to take action or not to take action is made. Monitoring in this project is primarily for gathering of data and for assessing effects/ performance, not for making decisions. Refer to the WECK Labs QAPP for each parameter at Regional Board office.

8. Special Training Needs/Certification

Although no specialized training or certification is needed for this project, all field staff received an initial training on field instructions from the Lead Scientist. The Regional Board QA Officer will ensure that this training has been implemented. A list of sampling personnel and the date of their training will be completed by the Lead Scientist and kept with the QAPP.

9. Documents and Records

The Regional Board will collect records of sample collection and field observations. Samples sent to WECK Laboratory will include a Chain of Custody form. WECK Laboratory will generate records for sample receipt and storage, analyses, and reporting.

Copies of this QAPP will be distributed to all parties involved with the project, including field collectors. Any future amendments to the Sampling Plan will be held and distributed in the same fashion. All originals of this first and subsequent document will be held at the Regional Board office. Copies of versions, other than the most current, will be discarded so as not to create confusion.

10. Sampling Process Design

10.1. Collection of Water Samples for Conventional Pollutants

All water samples collected for conventional constituents in the water column will be collected using clean techniques that minimize sample contamination. Sampling methods will generally conform to USEPA "clean" sampling methodology described in *Method 1669: Sampling Ambient Water for Trace Metals* (USEPA 1995a). Samplers will always wear gloves to prevent contamination of the sample and to protect human health. Grab samples will be collected into appropriate pre-cleaned containers into polyethylene or Teflon™ sample containers appropriate for the analyses to be performed or will be collected directly into the sample containers, if appropriate. After collection, field-collected samples will be stored at 4°C until arrival at the contract laboratory.

This sample collection method requires that the sample bottle and lid come into contact only with surfaces known to be clean, or with the water sample. If the performance requirements for specific samples are not met, the sample will be re-collected. If contamination of the sample container is suspected, a fresh sample container will be used.

Note: Make sure there is enough blue-ice for all samples. Each sample container should be in immediate contact (touching) the blue ice. Samplers should bring a small ice chest to the sample site containing sufficient blue ice for each sample container to be in immediate contact with blue ice. Sampling containers should be placed on blue ice without delay. This means not transporting sampling containers without cooler, and not placing sampling containers on hot asphalt while opening vehicle.

Coolers should be placed in vehicle in a closely packed fit to avoid movement of ice chests and samples during transportation.

Sample containers should be placed in ice chest upright when possible, and in a closely packed fashion to avoid spillage and movement.

10.2. Collection of Water Samples for Analyzing Indicator Bacteria

Pathogen monitoring will include sampling for indicator bacteria (fecal and total coliform, and Enterococcus). *Note*: Samplers must wear gloves when collecting any indicator bacteria samples in order to prevent introduced bacterial contamination.

Note: Sample containers that have been dropped into mud are considered contaminated, and a new sample container used. A set of sample containers will be brought for using as spares if and when original containers are dropped into mud and become contaminated.

Samples analyzed for bacteria will be collected as near-surface grab samples. Sampling for bacteria will in most cases be performed according to the sampling procedures detailed for Standard Methods 9221B and 9221E (APHA *et al.* 1998). In brief, the sampling procedures are summarized as follows:

a. Sample containers should be cleaned and sterilized using procedures described in Standard Methods 9030 and 9040 (APHA *et al.* 1998). In most cases, these

containers are provided by the laboratories conducting the analyses. Alternatively, Whirl-pak bags may also be used, per protocol

b. For waters suspected to contain chlorine residual, sample bottles should contain a small amount of sodium thiosulfate ($Na_2S_2O_3$) sufficient to neutralize bactericidal activity. In most cases, bottles provided by contract laboratories already contain the sodium thiosulfate as a precautionary measure. For water containing high concentrations of copper or zinc, sample bottles should contain sufficient EDTA solution to reduce metal toxicity. *Note*: These conditions are rare in surface waters.

c. Sample bottles may be glass or plastic (e.g. polypropylene) with a capacity of at least 100 ml., or again, Whirl-pak bags. After sterilization, sample bottles should be kept closed until they are to be filled.

d. When removing caps from sample bottles, be careful to avoid contaminating inner surface of caps or bottles.

e. Using clean techniques, fill sample bottles (or Whirl-pak bags), leaving sufficient air space to facilitate mixing by shaking. Do not rinse bottles.

f. Recap bottles tightly.

g. Samples that require a preservative have to be collected with a separate, clean container that does not contain any preservative and be transferred to the bottle with the preservative to prevent loss of the preservative.

If at any time the sampling crew suspects that the sample or sampling container has been contaminated, the sample should be re-collected into a new sample container. The samples will be kept at 4°C (dark) and transported to the laboratory so that the analysis begins within 6 hours of collection. The 20th edition of Standard Methods (APHA et al. 1998) recommends analysis of samples as soon as possible, but specifies that non-drinking water samples analyzed for non-compliance purposes may be held for up to 24 hours (below 10°C) until time of analysis. Data from these samples should not be used for assessment of regulatory compliance.

10.3. Sample Handling and Custody Requirements

In the field, all samples will be packed in wet ice or frozen ice packs during transport so that they will be kept at approximately 4°C. All caps and lids will be checked for tightness prior to storing. All samples will be handled, prepared, transported and stored in a manner so as to minimize bulk loss, analyte loss, and contamination or biological degradation. Sample containers will be clearly labeled with an indelible marker. Water samples will be kept in Teflon™, glass, or polyethylene bottles and kept cool at a temperature of 4°C until analyzed. Maximum holding times for specific analyses are listed in Table 4 below.

Contract laboratories will follow sample custody procedures outlined in their QA plans. Contract laboratory QA plans are on file with the respective laboratory.

All samples remaining after successful completion of analyses will be disposed of properly. It is the responsibility of the personnel of each analytical laboratory to ensure that all applicable regulations are followed in the disposal of samples or related chemicals.

Chain-of-custody procedures require that possession of samples be traceable from the time the samples are collected until completion and submittal of analytical results. A complete chain-of-custody form is to accompany the transfer of samples to the analyzing laboratory.

11. Sampling Methods

Samples will be collected as grab samples from approximately midstream and at least 0.3 meters from bank and about 0.1-meter depth.

Plastic containers supplied by the contract laboratory will be used for sample collection. New sample bottles will be picked up from the laboratory prior to each sampling event.

Table 4: Summary of Sample Container, Volume, Initial Preservation, and Holding Time Recommendations for Water Samples

Parameters for Analysis	Recommended Containers (all containers pre-cleaned)	Minimum Sample Volume (ml)	Initial Field Preservation	Maximum Holding Time
Ammonia, Nitrate, and Nitrite ($NO_3 + NO_2$)	Polyethylene bottles	100 ml	Cool to 4°C, dark	48 hours
Total Keldjahl Nitrogen (TKN)	Polyethylene bottles	200 ml	Cool to 4°C, dark	Recommend: 7 days Maximum: 28 days
Total Phosphorus (TPO_4) and Orthophosphate	Polyethylene bottles	100 ml	Cool to 4°C, dark	28 days
TSS	Polypropylene bottles	100 ml	Cool to 4°C, dark	48 hours
Metals	Polyethylene bottles	100 ml	Cool to 4°C, dark	28 days
Full Scan Pesticides And PCB Congeners	Amber Glass	2 x 1L	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	14 days
PAH'S	Amber Glass	2 x 1L	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	14 days

Parameters for Analysis	Recommended Containers (all containers pre-cleaned)	Minimum Sample Volume (ml)	Initial Field Preservation	Maximum Holding Time
Enterococcus	Factory-sealed, pre-sterilized, disposable Whirl-pak® bags or 125 ml sterile plastic (high density polyethylene or polypropylene) container	100 ml	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	6 hours for regulatory data use; lab must be notified well in advance. Possibly 24hr hold time if non-regulatory data use.
Fecal Coliform	Factory-sealed, pre-sterilized, disposable Whirl-pak® bags or 125 ml sterile plastic (high density polyethylene or polypropylene) container	100 ml volume sufficient for both fecal and total coliform analyses	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	6 hours for regulatory data use; lab must be notified well in advance. Possibly 24hr hold time if non-regulatory data use.
Total Coliform	Factory-sealed, pre-sterilized, disposable Whirl-pak® bags or 125 ml sterile plastic (high density polyethylene or polypropylene) container	100 ml volume sufficient for both fecal and total coliform analyses	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	6 hours for regulatory data use; lab must be notified well in advance. Possibly 24hr hold time if non-regulatory data use.
***Ceriodaphnia* 7-Day Survival & Reproduction**	Polyethylene bottles	1000 ml	Cool to 4°C, dark	36 Hrs
***Selenastrum* (Algae) Test (One Of EPA 3-Spp)**	Polyethylene bottles	1000 ml	Cool to 4°C, dark	36 Hrs
Amphipod 10-D Survival (*Hyalella*) Acute	Amber Glass	500 ml	Cool to 4°C, dark	36 Hrs
Sediment Grain Size (%Silt/Clay = Fines Only)	Amber Glass	500 ml	Cool to 4°C, dark	36 Hrs

12. Sample Handling Custody

The sample container size will be determined be the contract laboratory and can vary. Once sample containers are filled they are labeled and stored on blue ice for transport to the contract laboratory.

The maximum holding times are shown in Table 5: *Summary of Sample Container, Volume, Initial Preservation, and Holding Time Recommendations for Water Samples.*

No special handling or custody procedures are needed. The chain of custody form is used as a shipping record.

The laboratory may dispose of the samples when analysis is completed and all analytical quality assurance/quality control procedures were reviewed and accepted.

13. Analytical Methods

The following table outlines the analytical methods used by the contract laboratory to analyze the samples.

Table 5: Laboratory analytical methods

Analyze	Analytical Method	
	Analytical Method/ SOP	Modified for Method yes/no
Nitrate and Nitrite ($NO_3 + NO_2$)	EPA 354.1	No
Total Keldjahl Nitrogen (TKN)	EPA 35101-351.4	No
Ammonia as N (NH3)	EPA 350.1/ 350.2/ 350.3/	
Total Phosphorus (TPO_4)	EPA 365.3	No
OrthoPhosphate as P (OPO4)	EPA 365.1/ 365.2/ 365.3/ SM4500 P E	
Sulfate (SO4)	EPA 375.1	
Alkalinity as CaCO3 (ALK)	EPA 305.1	
Total Suspended Solids (TSS)	EPA 160.2	No
Metals (Includes Al, Cr, Mn, Ni, Cu, Zn, Ag, Cd, Pb, As, Se)	EPA 200.7	
Full scan pesticides and PCBs congeners	EPA 608	
PAH's	EPA 610	
Enterococcus	Colialert	No
Fecal Coliform	EPA 9131	No
Total Coliform	EPA 9132	No
***Ceriodaphnia* 7-day survival & reproduction**	EPA/ 600/ 4-91/ 002	
***Selenastrum* (algae) test (one of EPA 3-spp)**	EPA/ 600/ 4-91/ 002	
Amphipod 10-d survival (*Hyalella*)--acute	ASTM E1367-99	
Sediment grain size (% silt / clay = fines only)	ASTM D422	

14. Quality Control

Quality assurance and quality control activities for sampling processes include the collection of field replicates for bacterial and chemical testing. The number of replicates has been established earlier as one replicate for each sampling run.

15. Instrument/Equipment Testing, Inspection, Maintenance, Calibration and Frequency

WECK Analytical Laboratory maintains its equipment and its calibration practices in accordance with its SOPs, which include those specified by the manufacturer and those specified by the method.

16. Data Management

WECK Analytical Laboratory Data will maintain a file of transferred records. The Regional Water Board will maintain copies of all laboratory analysis sheets and chain of custody forms.

17. Reports to Management

The Project Advisor and the Project Manager will provide an analysis of watershed sampling results and recommendations to management.

18. Data Validation and Usability

Data generated by project activities will be reviewed against the data quality objectives and the quality assurance/quality control practices cited in this document. Data will be separated into three categories: data meeting all data quality objectives, data meeting failing precision or recovery criteria, and data failing to meet accuracy criteria. Data meeting all data quality objectives, but with failures of quality assurance/quality control practices will be set aside until the impact of the failure on data quality is determined. Once determined, the data will be moved into either the first category or the last category.

Data falling in the first category is considered usable by the project. Data falling in the last category is considered not usable. Data falling in the second category will have all aspects assessed. If sufficient evidence is found supporting data quality for use in this project, the data will be moved to the first category, but will be flagged with a "J" as per USEPA specifications.

19. Verification and Validation Methods

All data records will be checked visually and recorded as checked by initials and dates. The contract laboratory performs checks and any issues will be noted. Any corrections require an agreement with the Regional Board that the correction is appropriate.

Appendix 1:

Field Operations Manual and Health and Safety Guidelines for the SWAMP Follow-Up Sampling Project 2006

A. Scope and Application

This Field Operations Manual and Health and Safety Guidelines apply to the collection of surface water samples from San Diego watersheds creeks during dry weather. It includes procedures for collection and preserving samples for transport to a laboratory for analysis of conventional pollutants and bacterial indicators.

B. Objectives

Section 303(d) of the Clean Water Act (CWA) lists several lagoons and estuaries in the San Diego Region that do not meet water quality standards. The primary objective for collection of this data is to assist the California Water Quality Control Board, San Diego Region (Regional Board) in assessing the ambient water quality of several lagoons in the San Diego Region. The data will serve as a baseline to assess the impairment of these lagoons and will aid in development of a Monitoring Order (see Porter-Cologne Water Quality Control Act, Section 13383) that will require the responsible parties in the watersheds to collect data in the next one to two years.

C. Sampling Equipment

The following is a checklist of the sampling equipment needed for each sampling event:

1. Bag/Backpack
2. Non-talc latex gloves
3. Sampling pole with clamp which can be adjusted to fit sample containers
4. Duct tape to secure sample container to sampling pole and clamp
5. Clear packing tape to secure label to sample container after sample collection.
6. Chain-of-Custody forms with plastic bag to keep COC dry
7. Pre-labeled sample containers- the preprinted labels should list the following: Station ID, Sampler, Analysis, and Date. Time should be recorded at the time of collection. The sample containers for a site could be collectively bagged to save time during collection.
8. Clear packing tape to secure label after sample collection
9. Ice chest – large ice chests, and at least two small ice chests. Bring an extra small ice chest for hand transportation of sample containers to and from each site. The ice chest cools the sample, reduces exposure of samples to direct sunlight, and eases transportation of sample containers. SWAMP requires prevention of sample exposure to direct sunlight and cooling of samples to at least 4°C within 45 minutes after time sample collection, and prevention of sample exposure to direct sunlight. (For information see SWAMP QAMP page 3-4).
10. Blue ice – enough to ensure all sample containers touch ice.

11. Field notebook and field data sheets (water quality data sheets, and site recon forms. The field data sheet provides space to record water quality and station occupation information, and can be downloaded from SWAMP QAPP, Appendix D. Site Recon forms are required for each site and can be downloaded from SWAMP.
12. Pen/Pencil – bring extra
13. Permanent marker – bring extra
14. Clipboard
15. GPS calibrated to decimal degrees (i.e., 38.12345, -117.12345)
16. Watch- camera and watch to be synchronized
17. Camera
18. Copy of the Sampling Plan and QA/QC
19. Clean water and disinfectant for washing hands is needed at certain sites. Other sites may have restrooms with soap and water available to wash hands. A paper towel or cloth is needed to dry hands.
20. Trash bag – This is useful for depositing contaminated sample containers, gloves, paper towels and so on.
21. Cash – To purchasing items like duct tape, clamps, ice.
22. Small dip net – For retrieving lost sample containers and other items in the waterbody.
23. Name tag and orange SDRWQCB field vests for each crewmember.
24. Hip waders – A pair of waders for each crewmember would be useful, especially if each crewmember needs to walk thru mud, or into a waterbody.
25. Cell phone and essential phone numbers for the sampling site, laboratory, and office.

D. Field Information Required At Each Site

The following information shall be recorded on each sample bottle at the time of sampling:

1. Client name (SDRWQCB)
2. Site or project name
3. Location of sample collection
4. Sample ID number
5. Sampling date and time
6. Preservation used in the sample (if applicable)
7. Name of sampler

The following information shall be recorded in the field notebook:

At the start of the day:

1. Project name
2. Date
3. Weather conditions (precipitation, cloud-cover, approximate temperature, wind, tide cycle)
4. Names of people sampling

At each site:

1. Time of sample collected
2. Site name, sampling site name
3. GPS coordinates
4. Sample ID number
5. Tide information (outgoing, incoming, low-low tide, etc.)
6. Information about QC samples collected (if applicable)
7. Comments (any pertinent observations, such high turbidity, floating material, wildlife, etc.)

E. Sampling Procedures

Collection of water samples should be conducted at outgoing tide.

1. Go to designated sampling sites and select a work area nearby that is as flat as possible and with minimal vegetation. Remove sampling equipment and supplies from bag/backpack, minimizing contact with soil, vegetation, etc.

Take field notes, label sample bottles, and fill out the chain-of-custody form for the samples.

a. Time of sample collection,
b. Site name, sampling site name,
c. GPS coordinates of specific sample location,
d. Sample ID number,
e. Tide information,
f. Information about QC samples collected (if applicable),
g. Comments about observations at site.

2. Put on disposable gloves.

3. Proceed to sampling location with sample bottle and sampling pole (if required).

4. Rinse surface of gloves with receiving water. If bottles are not certified to be clean by the lab do the following: triple-rinse the sample bottle, if no preservative is in the bottle, by filling about ½ of the bottle, shake and rinse all internal surfaces; pour water out without disturbing receiving water; shake droplets out of bottle. For rinsing and sampling (without using sampling pole), fill the bottle by submerging the top of the bottle with the cap on 3 to 6 cm below the water surface, unscrewing the cap with the bottle opening facing upstream and tilted slightly up, screwing the cap back on while still underwater. When using sampling pole, rinse as described above and sample by submerging the open bottle and filling the bottle using a sweeping motion.

5. Double-check the sample bottle cap seals and arrangement of samples and ice in the cooler.

F. Sample Minimum Volume and Holding Times

Sample holding times for each analyte is shown in the following table:

Table A: Sample holding times

Parameters for Analysis	Recommended Containers (all containers pre-cleaned)	Minimum Sample Volume (ml)	Initial Field Preservation	Maximum Holding Time
Ammonia, Nitrate, and Nitrite ($NO_3 + NO_2$)	Polyethylene bottles	100 ml	Cool to 4°C, dark	48 hours
Total Keldjahl Nitrogen (TKN)	Polyethylene bottles	200 ml	Cool to 4°C, dark	Recommend: 7 days Maximum: 28 days
Total Phosphorus (TPO_4) and Orthophosphate	Polyethylene bottles	100 ml	Cool to 4°C, dark	28 days
TSS	Polypropylene bottles	100 ml	Cool to 4°C, dark	48 hours
Metals	Polyethylene bottles	100 ml	Cool to 4°C, dark	28 days
Full Scan Pesticides And PCB Congeners	Amber Glass	2 x 1L	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	14 days
PAH'S	Amber Glass	2 x 1L	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	14 days
Enterococcus	Factory-sealed, pre-sterilized, disposable Whirl-pak® bags or 125 ml sterile plastic (high density polyethylene or polypropylene) container	100 ml	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	6 hours for regulatory data use; lab must be notified well in advance. Possibly 24hr hold time if non-regulatory data use.
Fecal Coliform	Factory-sealed, pre-sterilized, disposable Whirl-pak® bags or 125 ml sterile plastic (high density polyethylene or polypropylene) container	100 ml volume sufficient for both fecal and total coliform analyses	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	6 hours for regulatory data use; lab must be notified well in advance. Possibly 24hr hold time if non-regulatory data use.
Total Coliform	Factory-sealed, pre-sterilized, disposable Whirl-pak® bags or 125 ml sterile plastic (high density polyethylene or polypropylene) container	100 ml volume sufficient for both fecal and total coliform analyses	Sodium thiosulfate is pre-added to the containers in the laboratory (chlorine elimination). Cool to 4°C; dark.	6 hours for regulatory data use; lab must be notified well in advance. Possibly 24hr hold time if non-regulatory data use.
***Ceriodaphnia* 7-Day Survival & Reproduction**	Polyethylene bottles	1000 ml	Cool to 4°C, dark	36 Hrs

Parameters for Analysis	Recommended Containers (all containers pre-cleaned)	Minimum Sample Volume (ml)	Initial Field Preservation	Maximum Holding Time
***Selenastrum* (Algae) Test (One Of EPA 3-Spp)**	Polyethylene bottles	1000 ml	Cool to 4°C, dark	36 Hrs
Amphipod 10-D Survival (*Hyalella*) Acute	Amber Glass	500 ml	Cool to 4°C, dark	36 Hrs
Sediment Grain Size (%Silt/Clay = Fines Only)	Amber Glass	500 ml	Cool to 4°C, dark	36 Hrs

G. Quality Control

At least ten (10) percent of all samples collected shall be quality control samples.

Duplicates: Duplicate samples shall be collected from at least one sampling site, determined randomly by the sampling team. Duplicate samples should be noted in the field notebook and should be given a separate name and not be indicated on the chain-of-custody form.

Field Method Blanks: Not needed
Travel Blanks: Not needed
Split Samples: Not needed
Spiked Samples: Lab will determine if needed and perform matrix spikes

H. Contract Laboratory Information

Contract Laboratory Address and Business Hours:

Marilyn Romero
Weck Laboratories, Inc.
14859 East Clark Avenue
City of Industry CA 91745
Phone: (626) 336-2139 Ext. 106
FAX: (626) 336-2634

Business Hours: Monday – Friday, 8:00 a.m. to 5:00 p.m.

Contact Marilyn Romero prior to fieldwork to provide and arrange pick up of sample containers and labels.

I. Emergency Contacts and Directions

Contact: **911**

Appendix 2:

Chain-of-Custody Record

California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100, San Diego, CA 92123-4340 *Phone 858 467-2952*

Contractor Date/Time Stamp

Contractor Log #

Client: San Diego Regional Water Quality Control Board
Address: 9174 Sky Park Court, Suite 100, San Diego, CA 92123-4340

Attn: **Phone:** 858 467-2952
Email: @waterboards.ca.gov **Fax:** 858 571-6972

Project:

Sampled by:

Sample Date (Mo/Dy/Yr):

Preservative Type									
Container Type									

REQUESTED ANALYSIS

#	RWQCB Sample ID	SampleTime	Matrix									
1				☐	☐	☐	☐	☐	☐	☐	☐	☐
2				☐	☐	☐	☐	☐	☐	☐	☐	☐
3				☐	☐	☐	☐	☐	☐	☐	☐	☐
4				☐	☐	☐	☐	☐	☐	☐	☐	☐
5				☐	☐	☐	☐	☐	☐	☐	☐	☐
6				☐	☐	☐	☐	☐	☐	☐	☐	☐
7				☐	☐	☐	☐	☐	☐	☐	☐	☐
8				☐	☐	☐	☐	☐	☐	☐	☐	☐
9				☐	☐	☐	☐	☐	☐	☐	☐	☐
10				☐	☐	☐	☐	☐	☐	☐	☐	☐

Storage of Sample(s): ☐Cold; ☐Ambient; ☐Warm	**Correct Containers:** ☐Yes; ☐No	**Tamper-Proof Seals Intact:** ☐ Yes; ☐ No	**Priority:** ☐ Routine (10 days); ☐ Urgent (2 days); or ☐ Emergency (24 hrs)
All Samples Properly Preserved: ☐Yes; ☐No; ☐ N/A	**VOAs w/ZHS:** ☐Yes; ☐No	**Disposal:** ☐ N/C (aqueous); ☐ Return; ☐ Hold	

RELINQUISHED BY	DATE / TIME	RECEIVED BY	COMMENTS
Signature:	Dy/Mo/Yr:	Signature:	
Print:		Print:	
Company:	Time:	Company:	

Additional Data for Chain-of-Custody Record

Contractor Log #

California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100, San Diego, CA 92123-4340 Phone 858 467-2952

Sampled by:	Project:	Sample Date:

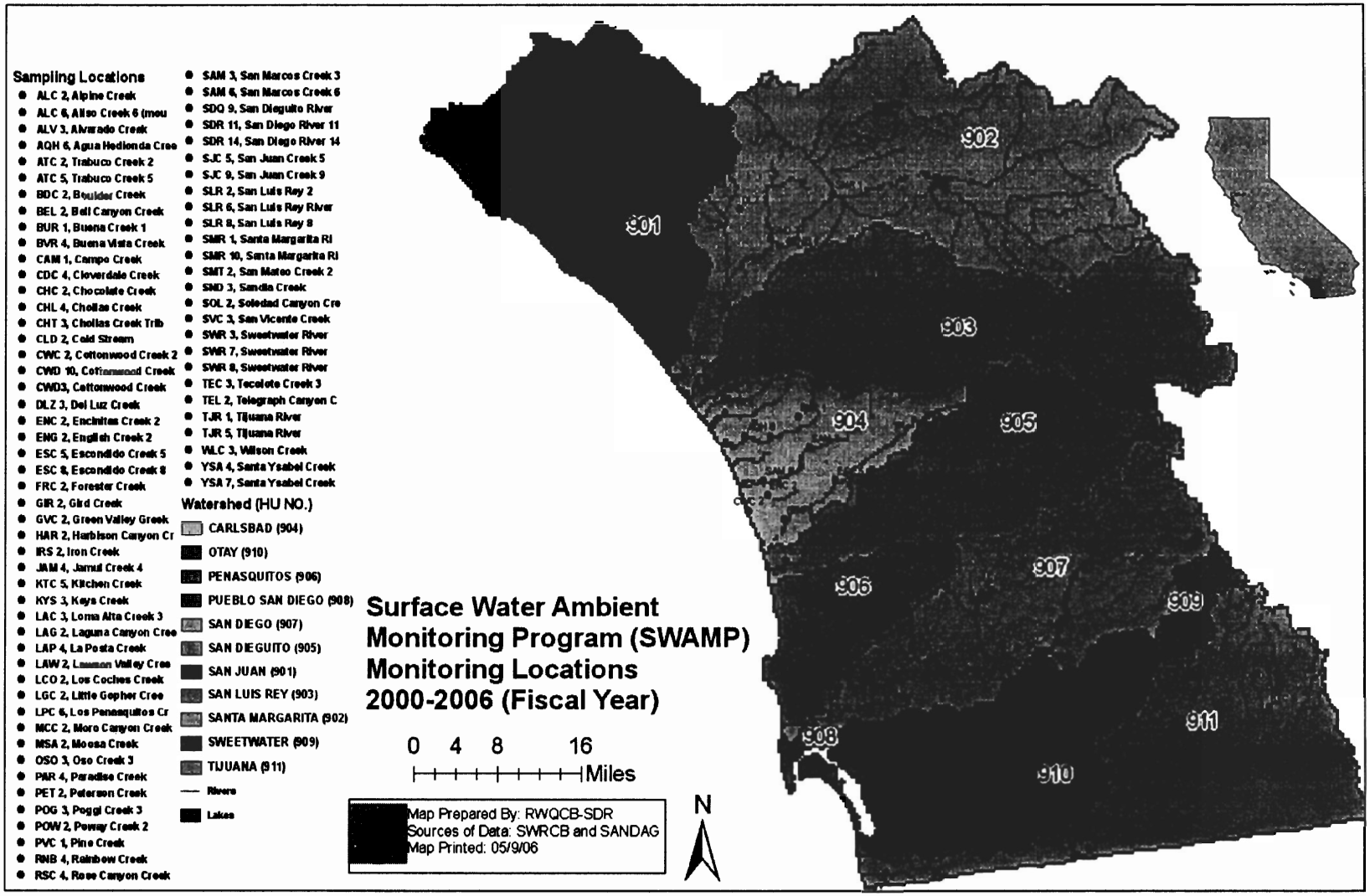
#	RWQCB Sample ID	HSA	Station Name	Sample Time	Depth Collected	Units	Distance from Bank	Units	Event Type	Sample Type:	Sample Device	Replicate
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

#	RWQCB Sample ID	Sample Location	Notes
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Additional Comments

Page of .

Appendix 3:


Sampling Locations
ALC 2, Alpine Creek
ALC 6, Aliso Creek 6 (mou
ALV 3, Alvarado Creek
AQH 6, Agua Hedionda Cree
ATC 2, Trabuco Creek 2
ATC 5, Trabuco Creek 5
BDC 2, Boulder Creek
BEL 2, Bell Canyon Creek
BUR 1, Buena Creek 1
BVR 4, Buena Vista Creek
CAM 1, Campo Creek
CDC 4, Cloverdale Creek
CHC 2, Chocolate Creek
CHL 4, Chollas Creek
CHT 3, Chollas Creek Trib
CLD 2, Cold Stream
CWC 2, Cottonwood Creek 2
CWD 10, Cottonwood Creek
CWD3, Cottonwood Creek
DLZ 3, Del Luz Creek
ENC 2, Encinitas Creek 2
ENG 2, English Creek 2
ESC 5, Escondido Creek 5
ESC 8, Escondido Creek 8
FRC 2, Forester Creek
GIR 2, Gird Creek
GVC 2, Green Valley Creek
HAR 2, Harbison Canyon Cr
IRS 2, Iron Creek
JAM 4, Jamul Creek 4
KTC 5, Kitchen Creek
KYS 3, Keys Creek
LAC 3, Loma Alta Creek 3
LAG 2, Laguna Canyon Cree
LAP 4, La Posta Creek
LAW 2, Lawson Valley Cree
LCO 2, Los Coches Creek
LGC 2, Little Gopher Cree
LPC 6, Los Penasquitos Cr
MCC 2, Moro Canyon Creek
MSA 2, Moosa Creek
OSO 3, Oso Creek 3
PAR 4, Paradise Creek
PET 2, Peterson Creek
POG 3, Poggi Creek 3
POW 2, Poway Creek 2
PVC 1, Pine Creek
RNB 4, Rainbow Creek
RSC 4, Rose Canyon Creek
SAM 3, San Marcos Creek 3
SAM 6, San Marcos Creek 6
SDQ 9, San Dieguito River
SDR 11, San Diego River 11
SDR 14, San Diego River 14
SJC 5, San Juan Creek 5
SJC 9, San Juan Creek 9
SLR 2, San Luis Rey 2
SLR 6, San Luis Rey River
SLR 8, San Luis Rey 8
SMR 1, Santa Margarita Ri
SMR 10, Santa Margarita Ri
SMT 2, San Mateo Creek 2
SND 3, Sandia Creek
SOL 2, Soledad Canyon Cre
SVC 3, San Vicente Creek
SWR 3, Sweetwater River
SWR 7, Sweetwater River
SWR 8, Sweetwater River
TEC 3, Tecolote Creek 3
TEL 2, Telegraph Canyon C
TJR 1, Tijuana River
TJR 5, Tijuana River
WLC 3, Wilson Creek
YSA 4, Santa Ysabel Creek
YSA 7, Santa Ysabel Creek
Watershed (HU NO.)
CARLSBAD (904)
OTAY (910)
PENASQUITOS (906)
PUEBLO SAN DIEGO (908)
SAN DIEGO (907)
SAN DIEGUITO (905)
SAN JUAN (901)
SAN LUIS REY (903)
SANTA MARGARITA (902)
SWEETWATER (909)
TIJUANA (911)
Rivers
Lakes
Surface Water Ambient Monitoring Program (SWAMP) Monitoring Locations 2000-2006 (Fiscal Year)
0 4 8 16
Miles
Map Prepared By: RWQCB-SDR
Sources of Data: SWRCB and SANDAG
Map Printed: 05/9/06
N
901
902
903
904
905
906
907
908
909
910
911