San Diego Region

Irrigated Lands Group

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2011 DEC 20 P 12:23

December 20, 2011

Barry Pulver
Engineering Geologist
Monitoring Assessment and Research Unit
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Dear Mr. Pulver:

The San Diego Region Irrigated Lands Group Educational Corporation is pleased to submit its Monitoring and Reporting Program Plan and Quality Assurance Project Plan in keeping with the requirements of Conditional Waiver No. 4 as adopted in Resolution No. R9-2007-0104.

Please note that the signature page in the Quality Assurance Project Plan is currently being circulated. The original will be mailed to you when all signatures have been obtained.

In addition to hard copies of the two required plans an electronic copy has been provided as well.

When signed below by a representative of the San Diego Regional Water Quality Control Board a copy of this letter shall serve as proof of receipt of the Monitoring and Reporting Program Plan and the Quality Assurance Project Plan.

Thank you for your assistance in reaching this milestone in the application of Waiver No. 4.

Sincerely,

Eric Larson
Administrator

Acknowledgement of receipt:

Signature ______________________ Date ____________

Printed name ______________________

1670 East Valley Parkway, Escondido, CA 92027 | Phone: (760) 745-2215 | info@sdirrigatedlandsgroup.org

QUALITY ASSURANCE PROJECT PLAN

San Diego Region Irrigated Lands Group

DECEMBER 16, 2011

QUALITY ASSURANCE PROJECT PLAN

December 16, 2011

Prepared by:

PW ENVIRONMENTAL
230 Dove Court
Santa Paula CA 93060
(805) 656-4677

Prepared for:

San Diego Region Irrigated Lands Group
Billing Address: 1670 East Valley Parkway
Escondido CA 92027

SDRWQCB Conditional Waiver No. 4

PROJECT MANAGEMENT

1.0 APPROVAL SIGNATURES

PROJECT ORGANIZATION:

Title:	Name (Affiliation):	Signature:	Date
Project Manager	Eric Larson (SDRILG)		
Laboratory Project Manager	Brandon Gee (Weck)		
Laboratory QA Officer	Alan Ching (Weck)		
Project Manager	Zachary Moran (PW)		
Project QA Officer	Bryn Home (PW)		
Field Supervisor	Ed De La Llave (PW)		

REGIONAL BOARD (SDRWQCB):

Title:	Name:	Signature:	Date
Contract Manager	SDRWQCB Staff-TBD		
Contract Supervisor	SDRWQCB Staff-TBD		
QA Officer	SDRWQCB Staff-TBD		

2.0 TABLE OF CONTENTS

San Diego Region Irrigated Lands Group

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APPENDICES:

3.0 DISTRIBUTION LIST

Title:	Name (Affiliation):	Tel. No.:	Copies
Contractor Project Manager	Zachary Moran (PW)	(805) 525-5563	1
Contractor QA Officer	Bryn Home (PW)	(805) 525-5563	1
Contractor Field Supervisor	Ed De La Llave (PW)	(805) 525-5563	1
Regional Board Manager	TBD (SDRWQCB)	TBD	original
Regional Board Supervisor	TBD (SDRWQCB)	TBD	1
Regional Board QA Officer	TBD (SDRWQCB)	TBD	1
Laboratory Project Manager	Brandon Gee (Weck)	(626) 336-2139	1
Laboratory QA Officer	Alan Ching (Weck)	(626) 336-2139	1
SDRILG Administrator	Eric Larson (SDRILG)	(760) 745-2215	1

4.0 PROJECT TASKS/ORGANIZATION

4.1 INVOLVED PARTIES AND ROLES

The San Diego Region Irrigated Lands Group (SDRILG) was formed to comply with the California Regional Water Quality Control Board, San Diego Region's (SDRWQCB) *Conditional Waiver No. 4 – Discharges from Agriculture and Nursery Operations* (Waiver). Mr. Eric Larson is the Administrator and primary contact for the SDRILG. PW Environmental (PW) was contracted to assist the SDRILG with the technical requirements of the Waiver. Mr. Zachary Moran is the Project Manager for the program, Mr. Bryn Home is the Quality Assurance (QA) Officer, and Mr. Ed De La Llave is the Field Supervisor. Table 1 presents a list of contact information for all personnel involved in the program.

Table 1. Personnel Responsibilities

NAME	ORGANIZATION AFFILIATION	TITLE	CONTACT INFORMATION
Zachary Moran	PW Environmental	Project Manager	(805) 525-5563
Bryn Home	PW Environmental	QA Officer	(805) 525-5563
Ed De La Llave	PW Environmental	Field Supervisor/Field Personnel	(805) 525-5563
Nathan Martinez	PW Environmental	Field Personnel	(805) 525-5563
Jodi Woods	PW Environmental	Field Personnel	(805) 525-5563
Terry Bourque	PW Environmental	Field Personnel	(805) 525-5563
Eric Larson	SDRILG	Administrator	(760) 745-2215
SDRWQCB Staff-TBD	SDRWQCB	Executive Officer	TBD
SDRWQCB Staff-TBD	SDRWQCB	QA Officer	TBD
SDRWQCB Staff-TBD	SDRWQCB	Supervisor	TBD
Brandon Gee	Weck Laboratories	Project Manager	(626) 336-2139
Alan Ching	Weck Laboratories	QA Officer	(626) 336-2139

The SDRILG is responsible for organizing and managing the administrative aspect of the SDRILG while PW manages the technical aspect of the SDRILG. Membership within the SDFB is required in order enroll in the SDRILG. The SDRILG assisted the individual participants in completing and submitting the Notice of Intent (NOI) forms. PW developed the required Monitoring and Reporting Program Plan (MRPP) and this Quality Assurance Project Plan (QAPP), on behalf of the SDRILG. PW is also currently responsible for the oversight of field monitoring and sampling at the selected sites for the SDRILG, and all additional reporting. Weck Laboratories, Inc. (Weck) is responsible for the laboratory analytical testing for the group.

4.2 QUALITY ASSURANCE OFFICER ROLE

As the QA Officer, Mr. Home's role is to establish the QA and quality control (QC) procedures found in this QAPP as part of the sampling, field analysis, and laboratory analysis program. Mr. Home will perform all QA and QC procedures for the project independent of the project management and monitoring programs. Mr. Home will also work with Mr. Ching, the QA Officer for Weck, by communicating all QA and QC issues contained in this QAPP.

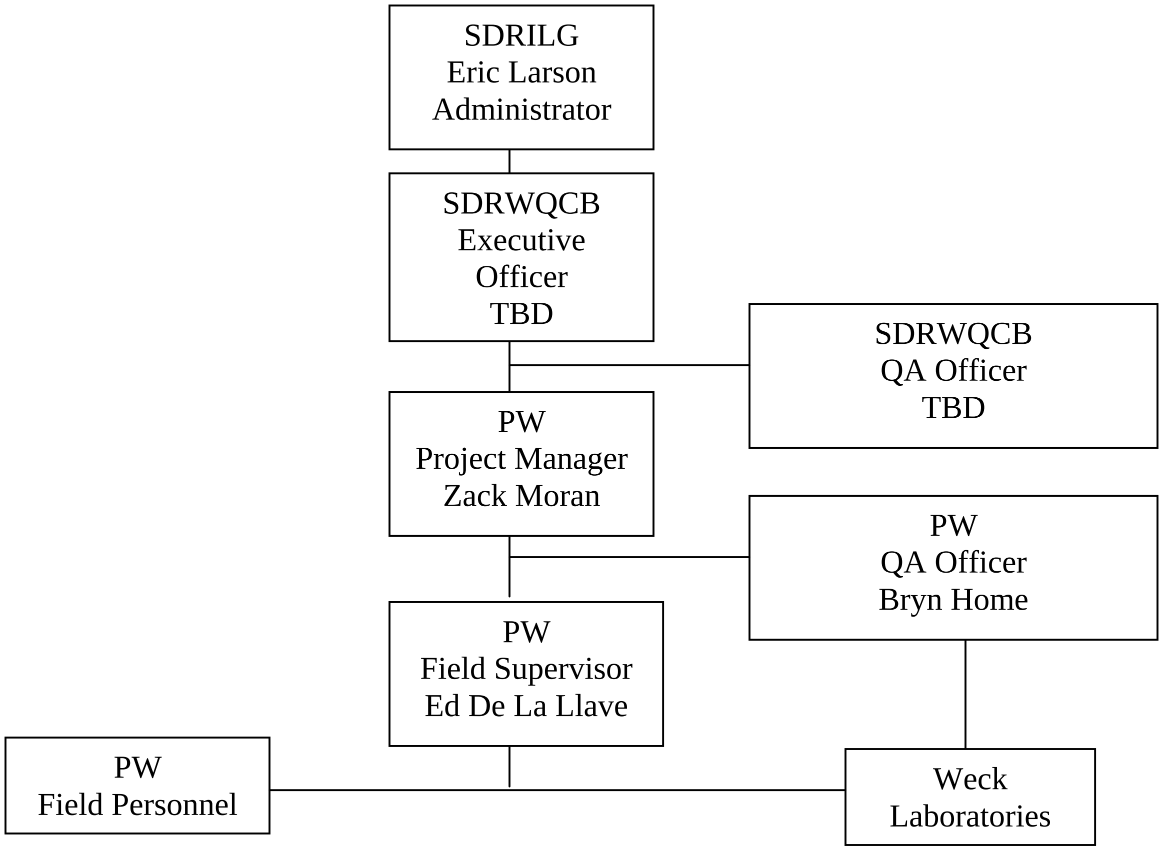
Mr. Home will review and assess all procedures during the duration of the Waiver against QAPP requirements. All findings will be reported to Mr. Moran, including all requests for corrective action. Mr. Home may stop all actions, including those conducted by Weck, if there are significant deviations from required practices or if there is evidence of a systematic failure.

4.3 PERSONS RESPONSIBLE FOR QAPP UPDATE AND MAINTENANCE

Changes and updates to this QAPP may be made after a review of the evidence for change by the SDRILG, and with the concurrence of both the SDRWQCB Project Manager and QA Officer. SDRILG's QA Officer will be responsible for making the changes, submitting drafts for review, preparing a final copy, and submitting the final for signature. Copies of previous versions of the QAPP will be discarded so as not to cause confusion.

4.4 ORGANIZATIONAL CHART AND RESPONSIBILITIES

Figure 1. Management Structure



5.0 PROBLEM DEFINITION AND BACKGROUND

5.1 PROBLEM STATEMENT

The San Diego Regional Water Quality Control Board (SDRWQCB) is a State of California Agency that regulates water quality within the San Diego Region. The San Diego Region includes the coastal watersheds of San Diego County, the southern portion of Orange County and a small portion of Riverside County. The SDRILG operates throughout the entirety of the San Diego Region.

Water quality impacts associated with agriculture can be primarily traced to discharges resulting from irrigation or stormwater. These discharges typically contain pollutants that have been imported or introduced into the irrigation or stormwater; in addition, irrigation practices can mobilize and/or concentrate some pollutants. In order to mitigate these potentially polluted discharges from impacting the beneficial uses of water bodies within the San Diego Region, the SDRWQCB adopted Conditional Waiver No. 4 (as part of Resolution R9-2007-0104) on October 10, 2007, as mandated by state law and policy.

To comply with the Waiver, agricultural and nursery operations were required to form or join a monitoring group or submit an individual Notice of Intent (NOI) by January 1, 2011. In addition to the general conditions listed in the Waiver, dischargers are required to implement monitoring programs to assess the impacts of discharges from irrigated lands. The purpose of this Quality Assurance Project Plan (QAPP) to identify the QA components that are necessary to implement the monitoring requirements of the Waiver. Monitoring groups are required to submit a QAPP to the SDRWQCB by December 31, 2011. The Waiver was adopted in its current form for five years and is set to expire December 31, 2012.

The SDRILG has enrollees within the San Juan Watershed, Santa Margarita Watershed, San Luis Rey Watershed, Carlsbad Watershed, San Dieguito Watershed, Los Penasquitos Watershed, San Diego Watershed, Pueblo San Diego Watershed, Sweetwater Watershed, Otay Watershed and Tijuana Watershed (Figure 2). All eleven Watersheds have impacted waterbodies that appear on the Federal 303(d) list, and listed contaminants include constituents that could be related to agricultural uses.

For the purpose of the program, crop types in the group were broken down into seven major subtypes: container nurseries; field grown nursery or floral crops; grapes, berries and vine fruit; greenhouse crops; row and field crops; tree fruit; and other. The majority of the acreage associated with the SDRILG falls within the tree crop category, which accounts for avocado and citrus fruits. Nursery operations, which account for the container, field grown, floral, and greenhouse subtypes, make up the second largest acreage in the group. Table 2 presents the total acreage for each crop type as well as the percentage of each crop type as a whole of the SDRILG enrollment. Total agricultural parcel acreages and irrigated acreages have been calculated separately.

Table 2 Crop Type Distribution of SDRILG

	Container Nursery	*Field Grown Nursery or Floral*	*Grapes, Berries, and Vine Fruit*	*Greenhouse Crops*	*Other*	*Row and Field Crop*	*Tree Fruit*	***TOTAL***
Irrigated Acreage								
SDRILG Acreage	2155.26	2073.61	530.75	175.47	191.89	1320.42	25020.36	31467.76
SDRILG Crop Type Percentage	6.85%	6.59%	1.69%	0.56%	0.61%	4.20%	79.51%	100.00%
Total Acreage								
SDRILG Acreage	3021.00	3435.87	1646.87	492.02	1901.27	3288.58	40548.11	54333.72
SDRILG Crop Type Percentage	5.56%	6.32%	3.03%	0.91%	3.50%	6.05%	74.63%	100.00%

5.2 DECISIONS OR OUTCOMES

The objective of this QAPP is to identify the QA components that are necessary to implement the monitoring requirements of the Waiver. This objective is achieved using accepted methodology to collect and analyze water samples. This QAPP also serves as a documented basis as to the required protocol for field monitoring, sampling, laboratory analytical accuracy and detection limits.

The objectives of the monitoring program required under the Waiver are:

- To assess waters receiving discharges from SDRILG sites
- To evaluate compliance with water quality objectives outlined in the San Diego Region Basin Plan and subsequent amendments to assess if additional best management practices (BMPs) are required.
- To evaluate findings in conjunction with 303(d) impacted waterbodies within the San Diego Region
- To report findings to the SDRWQCB as specified in the MRPP

Water samples will be collected from designated sampling points located along waterbodies receiving runoff from surrounding agricultural sites.

5.3 WATER QUALITY OR REGULATORY CRITERIA

Water quality objectives are presented on Table 3.

Table 3. Water Quality Objectives

CONSTITUENT	UNITS	WATER QUALITY OBJECTIVE*
Total Phosphorous (TP)	mg/L	0.1 (1)
Orthohosphate (as P)	mg/L	Analogous threshold values have not been set
Nitrate as N (NO_3)	mg/L	45
Nitrate + Nitrite (Sum as N)	mg/L	10
Nitrite (as nitrogen)	mg/L	1
Ammonia as N	mg/L	0.025
Total Kjeldahl Nitrogen	mg/L	Analogous threshold values have not been set
Chloride	mg/L	250
Sulfate	mg/L	250
Total Disolved Solids	mg/L	500
Total Suspended Solids	mg/L	Analogous threshold values have not been set
pH	pH units	6.5-8.5
Temperature	ºC	na
Dissolved Oxygen	mg/L	5 or 6 (2)
Conductivity	µS/cm	900 (3)
Flow Volume	cfs	na
Flow Velocity	ft/sec	na
Stream Depth and Width	ft	na
Percent Canopy Cover Over Stream	%	na
Water Turbidity	NTU	20

* Water Quality Benchmarks based on the surface water basin objectives currently contained in the Water Quality Control Plan San Diego Region (Basin Plan) unless otherwise noted.

(1) Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total Phosphorus (P) concentrations shall not exceed 0.05 mg/l in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water. A desired goal in order to prevent plant nuisances in streams and other flowing waters appears to be 0.1 mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the specific body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board.

(2) The Basin Plan states that dissolved oxygen levels shall not be less than 5.0 mg/l in inland surface waters with designated MAR or WARM beneficial uses or less than 6.0 mg/l in waters with designated COLD beneficial uses. The annual mean dissolved oxygen concentration shall not be less than 7 mg/l more than 10% of the time.

(3) Water Quality Benchmarks based on California Code of Regulations Secondary Drinking Water Standards (Register 2007, Number 8, Title 22, Division 4, Article 16).

mg/l	milligrams per liter
µg/L	micrograms per liter
ºC	degrees Celsius
NTU	nephalitic turbidity units
µS/cm	micro Siemens
ft	feet

6.0 PROJECT TASK/DESCRIPTION

6.1 WORK STATEMENT AND PRODUCED PRODUCTS

The SDRILG has enrollees within all eleven of the major watersheds of the San Diego Region. Maps presenting the locations of SDRILG enrolled growers within each watershed are presented as Figures 2.1-2.11. The vast majority of growers and acreage are located within the San Luis Rey Watershed as presented in Table 4. As a result, the sampling program, as outlined in the MRPP, will be focused on the San Luis Rey Watershed.

Table 4 Crop Type Distribution by Watershed

	Container Nursery	*Field Grown Nursery or Floral*	*Grapes, Berries, and Vine Fruit*	*Greenhouse Crops*	*Other*	*Row and Field Crop*	*Tree Fruit*	***TOTAL ACRES***	***% TOTAL***
Irrigated Acreage									
TOTAL IRRIGATED ACRES	2155.26	2073.61	530.75	175.47	191.89	1320.42	25020.36	31467.76	
San Juan Acreage	15.60	8.00	8.00	0.00	14.00	0.00	344.40	390.00	1.24%
Santa Margarita Acreage	244.16	133.30	17.00	3.39	1.00	42.00	2257.59	2698.44	8.58%
San Luis Rey Acreage	1265.46	1543.62	392.85	60.59	112.59	1048.95	17197.82	21621.88	68.71%
Carlsbad Acreage	448.17	313.23	13.50	104.19	20.75	69.00	1826.09	2794.93	8.88%
San Dieguito Acreage	154.01	23.95	65.10	7.00	4.00	80.05	2574.06	2908.17	9.24%
Los Penasquitos Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.00%
San Diego Acreage	10.57	45.01	9.55	0.00	7.55	35.42	785.10	893.20	2.84%
Pueble San Diego Acreage	1.00	0.00	0.00	0.30	0.00	0.00	0.00	1.30	0.00%
Sweetwater Acreage	9.29	3.50	1.75	0.00	0.00	0.00	5.00	19.54	0.06%
Otay Acreage	0.00	3.00	3.00	0.00	0.00	0.00	28.00	34.00	0.11%
Tijuana Acreage	7.00	0.00	20.00	0.00	32.00	45.00	2.00	106.00	0.34%
% TOTAL	6.85%	6.59%	1.69%	0.56%	0.61%	4.20%	79.51%		

SDRILG will collect water quality data once yearly at selected sampling sites within the San Luis Rey Watershed. A map presenting the locations of sampling sites is presented as Figure 2.3. Detailed information on sampling sites, locations, and schedule are presented in the MRPP. In addition, a background sample collected at a sampling site near open, non-developed land will be compared to data collected for the SDRILG in order to evaluate whether SDRILG enrollees are potentially contributing to surface water impacts.

6.2 CONSTITUENTS TO BE MONITORED/MEASUREMENT TECHNIQUES

The constituents to be monitored are presented on Table 5.

Table 5. Monitoring Constituents

CONSTITUENT	UNITS	FIELD/LABORATORY TEST
Total Phosphorous (TP)	mg/L	Laboratory
Orthohosphate (as P)	mg/L	Laboratory
Nitrate as N (NO_3)	μg/L	Laboratory
Nitrate + Nitrite (Sum as N)	mg/L	Laboratory
Nitrite (as nitrogen)	μg/L	Laboratory
Ammonia as N	mg/L	Laboratory
Total Kjeldahl Nitrogen	mg/L	Laboratory
Chloride	mg/L	Laboratory
Sulfate	mg/L	Laboratory
Total Disolved Solids	mg/L	Laboratory
Total Suspended Solids	mg/L	Laboratory
pH	pH units	Field
Temperature	ºC	Field
Dissolved Oxygen	mg/L	Field
Conductivity	µS/cm	Field
Flow Volume	cfs	Field
Flow Velocity	ft/sec	Field
Stream Depth and Width	ft	Field
Percent Canopy Cover Over Stream	%	Field
Water Turbidity	NTU	Field

mg/l	milligrams per liter
µg/L	micrograms per liter
ºC	degrees Celsius
NTU	nephalitic turbidity units
µS/cm	micro Siemens
ft	feet

Detailed information on the measurement processes and sampling techniques used to collect data are presented in Sections 11 and 13.

6.3 PROJECT SCHEDULE

The field studies will be initiated once the Notice of Applicability is received from the SDRWQCB. The seasons will be broken into the wet season and the dry season. In conformance with similar monitoring programs throughout the state, the wet season is from October 1 – April 30, and the dry season is from May 1 – September 30. As the majority of the sampling sites are located within intermittent, ephemeral streams, sampling will only be conducted during the wet season.

Table 6 shows an anticipated schedule for when monitoring will be conducted and when the Monitoring Program Report (MPR) demonstrating the monitoring results is due to the SDRWQCB. In the Waiver, the MPR has a due date of December 31, 2012. However, if samples are collected late in the year, this will not provide enough time to receive results from the analyzing laboratory and prepare the report. SDRILG proposes to submit the report within two months of the sample collection date with a sampling deadline of December 31, 2012. The MPR will present data collected during the previous calendar year.

Table 6. Anticipated Schedule for Monitoring and Reporting

TASK	SCHEDULE	ANTICIPATED SAMPLING SCHEDULE	NUMBER OF SAMPLING EVENTS
Submit NOI	January 1, 2011		
Submit MRPP and QAPP	January 1, 2012		
Conduct Monitoring	Schedule starts two weeks after receipt of NOA	October 1- April 30	1
Submit MPR	Reporting period ends Septebmer 30. Report due by December 31, 2012.		

6.4 GEOGRAPHICAL SETTING

The San Diego Region includes watersheds south of the Santa Ana River and north of the Mexican border. It is bounded to north by hydrologic divide that extends from Laguna Beach into the Cleveland National Forest, to the east by the Laguna Mountains and mountains in the Cleveland National Forest, to the south by the Mexican border, and to the west by the Pacific Ocean. It encompasses approximately 3,900 square miles, and contains most of San Diego County, and parts of southwestern Riverside County and southwestern Orange County.

The Region is located in the Peninsula Range Physiographic Province of California. It is generally divided into a coastal plain area, a central mountain-valley area, and an eastern mountain-valley area. The most prominent feature in the area is the northwest-trending Peninsula Range, which includes the Santa Ana, Agua Tibia, Palomar, Volcan, Cuyamaca, and Laguna Mountains. The climate in the area is generally an arid Mediterranean climate. The Region has an average temperature of approximately 65° Fahrenheit and an average precipitation of 10 to 13 inches a year, although precipitation in the mountainous areas can reach up to 45 inches a year. Generally speaking, precipitation and temperature variations increase as you head inland from the Pacific Ocean. The majority of the precipitation falls from November through February throughout the region. Surface and groundwater flow in the region is in an east to west direction towards the Pacific Ocean.

Sampling locations for this project are distributed throughout the San Luis Rey Watershed and are displayed on the regional map (Figure 2.3).

6.5 CONSTRAINTS

Reasonable efforts will be made to collect samples during a rainfall trigger event in the wet season. However, due to the low water levels in the region, it is possible that some of the selected SDRILG sampling sites will have inadequate flow for sample collection. Depending on the stream classification at the selected sampling site, it is possible that flow could be minimal (Refer to Table 8 in Section 10.0 for specific information pertaining to sample sites). Due to the length of this program, sampling events will not be rescheduled if there is inadequate or no flow, unless there is ample evidence that a larger rain event of sufficient rainfall intensity would generate enough runoff volume for sampling purposes.

Wet season sampling events will be conducted as outlined in this report, to the extent practicable. Practical restraints on wet season sampling events include, but are not limited to, the following: lab and subcontractor closures during weekends and holidays; sample holding times; safety of the monitoring team; and the time of storm events (day or night).

7.0 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

7.1 DATA QUALITY OBJECTIVES

The data quality objectives of this monitoring program are to supply information that characterizes, as closely as possible, the degree to which runoff water released from growing agricultural properties is impacting surface water bodies of the San Diego Region. This objective will be accomplished using Surface Water Ambient Monitoring Program (SWAMP) procedures for sample collection, and standard methods for laboratory analysis. The data quality objectives for laboratory analysis are presented in Table 7.

QA objectives are the detailed QC specifications for precision, accuracy, representativeness, recovery, comparability, and completeness as outlined in Section 14. The quality assurance objectives will be used as comparison criteria during data quality review to determine if the minimum requirements have been met and the data may be used as planned.

Table 7. Data Quality Objectives

Constituent	Method	Units	Method Detection Limit	Reporting Limit	Precision % or RPD	Accuracy (value or %)	*Recovery %	Completeness
Total Phosphorous (TP)	EPA 365.3	mg/L	0.00083	0.010	20	80-120%	71-118%	90%
Orthophosphate (as P)	EPA 365.3	mg/L	0.00083	0.010	20	80-120%	80-120%	90%
Nitrate as N (NO_3)	EPA 300.0	µg/L	20	10	20	80-120%	80-107%	90%
Nitrate + Nitrite (Sum as N)	EPA 300.0	mg/L	0.020	0.1	20	80-120%	80-111%	90%
Nitrite (as nitrogen)	EPA 300.0	µg/L	20	10	20	80-120%	86-111%	90%
Ammonia as N	EPA 350.1	mg/L	0.048	0.10	15	80-120%	90-110%	90%
Total Kjeldahl Nitrogen	EPA 351.2	mg/L	0.074	0.50	10	80-120%	90-110%	90%
Chloride	EPA 300.0	mg/L	0.10	0.25	20	80-120%	72-118%	90%
Sulfate	EPA 300.0	mg/L	0.10	1.0	20	80-120%	84-114%	90%
Total Disolved Solids	SM 2540C	mg/L	4.0	10	10	na	na	90%
Total Suspended Solids	SM 2540D	mg/L	5.0	5.0	20	na	na	90%
pH	Field	pH units	na	na	+/- 5	+/- 0.5 units	na	90%
Temperature	Field	ºC	na	na	+/- 5	+/- 0.5ºC	na	90%
Dissolved Oxygen	Field	mg/L	na	na	+/- 20	+/- 0.5 mg/L	na	90%
Conductivity	Field	µS/cm	na	na	+/- 5	+/- 5 %	na	90%
Flow Volume	Field	cfs	na	na	na	+/- 10 %	na	90%
FlowVelocity	Field	ft/sec	na	na	na	+/- 10 %	na	90%
Stream Depth and Width	Field	ft	na	na	na	+/- 10 %	na	90%
Percent Canopy Cover	Field	%	na	na	na	na	na	na
Water Turbidity	Field	NTU	na	na	+/- 10	+/- 10 %	na	90%

RPD Relative Percent Difference
na not applicable
* or control limits at +/- 3 standard deviations based on actual lab data

8.0 SPECIAL TRAINING NEEDS/CERTIFICATION

8.1 SPECIALIZED TRAINING OR CERTIFICATIONS

No specialized training or certification is required for this project. Although no specialized training is required, field sampling employees have received training in water sampling techniques as outlined in ASTM standard D3370 and SWAMP guidelines for surface water collection; are 40-hour HAZWOPR certified under CCR Title 8, Section 5192 guidelines and 29 CFR (Code of Federal Regulations) 1910.120; and have received first aid and CPR training. An in-house refresher course on water sampling is undertaken at least once a year.

The California Environmental Laboratory Accreditation Program has certified Weck; their certification numbers is 1132.

8.2 TRAINING AND CERTIFICATION DOCUMENTATION

Documents outlining field sampling employee training are filed, and are available for review. Documented information consists of the type of training, the data covered, the instructor, and whether the course was completed satisfactorily. Records of lab analyst training are available from Weck upon request.

8.3 TRAINING PERSONNEL

The QA Officer will supervise all refresher courses. Weck’s individual QA Officer will be responsible for training lab personnel.

9.0 DOCUMENTS AND RECORDS

All documents generated by this project will be stored in raw and database form. Examples of documentation generated and kept on record include: the MRPP, QAPP, field monitoring records, analytical data reports, MPRs, communications with stakeholders, and chain of custody (COC) documentation. Field monitoring records will be developed and maintained on a site-specific basis. Copies of records held by the laboratory will be provided to PW's Project Manager and maintained in the project file.

Pertinent field information will be recorded on SWAMP field log sheets, including (as applicable):

- The width, depth, and flow rate of stream
- The surface water condition
- Weather and environmental conditions
- Evidence of pesticide/fertilizer or sediment management
- Location of tributaries
- Photographic documentation
- Field monitoring data
- Discussion of any problems encountered
- Discussion of any deviations from the QAPP.

An example of a field log sheet is presented in Appendix A.

At minimum, the following sample specific information from field and laboratory analytical reports will be provided for each sampling event:

- Lab name
- Sample Identification
- Date and time of sample collection
- Date of analysis, analysis method, and dilution factor
- Method Detection Limits (MDL) and Reporting Limits (RL), matrix spikes, relative percent differences (RPD), and percent recovered (if applicable)
- Monitoring location/field descriptions
- Sample type, e.g. grab or composite type
- QC sample type and frequency
- Results of samples collected, all laboratory QC samples (calibrations, blanks, surrogates, laboratory spikes, matrix spikes, reference materials, etc.) and the identification of each analytical sample batch.

Copies of this QAPP will be distributed to parties involved with the project, as listed in Section 3, including field sampling and laboratory personnel. Future changes or amendments to the QAPP will be distributed in the same fashion. Copies of previous versions of the QAPP will be discarded to avoid confusion.

Any Standard Operating Procedures (SOPs) for use by office or field personnel will be certified by the Project Manager and Project QA officer prior to implementation, and will be periodically reviewed and updated as necessary. All pertinent SOPs will be distributed to field monitoring personnel prior to sampling events for use in the field.

The SDRILG Project Manager and Project QA Officer will be responsible for the hard copy documents collected during this program. Electronic reports will be complied in a database for reference and submittal to the SDRWQCB. All monitoring information and data used to complete the monitoring reports will be retained for at least five years from the date of sampling, measurement, report, or application.

DATA GENERATION AND ACQUISITION

10.0 SAMPLING PROCESS DESIGN

SDRILG will collect water quality data at selected sampling sites once during the wet season. A map showing sampling locations is presented as Figure 2.3. Detailed information on sample site selection, individual sampling site details, sample locations, and sampling schedule are presented in the MRPP. Refer to Table 8 for specific site information for SDRILG sampling locations.

Surface water samples will be collected for chemical analyses. Field methods will be conducted according to SWAMP procedures. Proper sampling techniques will be used to ensure that a representative sample is collected, and that cross contamination is not encountered. Reasonable efforts will be made to schedule yearly sampling events during a rain event large enough to generate ample flow during the wet season.

Table 8. SDRILG Sampling Sites

Sampling Site ID	Geographic Coordinates	San Luis Rey Hydrologic Sub-Area	Sampling River	City
SDRILG01	N 33^{o} 15’ 31.78” W 117^{o} 16’ 33.0”	903.11	San Luis Rey Unnamed Tributary	Oceanside, CA
SDRILG02	N 33^{o} 16’ 24.23” W 117^{o} 09’ 11.60”	903.12	Moosa Creek Tributary	Bonsall, CA
SDRILG03	N 33^{o} 22’ 7.07” W 117^{o} 09’ 41.77”	903.12	San Luis Rey Unnamed Tributary	Fallbrook, CA
SDRILG04	N 33^{o} 19’ 44.73” W 117^{o} 07’ 4.48”	903.21	San Luis Rey Unnamed Tributary	Bonsall, CA
SDRILG05	N 33^{o} 21’ 50.25” W 117^{o} 05’ 56.53”	903.21	Gomez Creek	Pala, CA
SDRILG06	N 33^{o} 17’ 46.32” W 117^{o} 05’ 8.83”	903.12	Weaver Creek	Valley Center, CA
SDRILG07	N 33^{o} 16’ 19.32” W 117^{o} 03’ 52.84”	903.21	Keys Creek Tributary	Valley Center, CA
SDRILG08	N 33^{o} 19’ 25.95” W 116^{o} 59’ 47.05”	903.22	Pauma Creek	Pauma Valley, CA
SDRILG09	N 33^{o} 17’ 9.43” W 116^{o} 57’ 22.18”	903.22	Potrero Creek	Pauma Valley, CA
SDRILG10	N 33^{o} 15’ 38.05” W 116^{o} 56’ 41.89”	903.22	San Luis Rey River	Pauma Valley, CA

11.0 SAMPLING METHODS

All field personnel involved in sample collection will be trained in SWAMP procedures, and will use proper sample collection containers and equipment. Sampling personnel will be trained on how to collect a representative sample and avoid potential sources of sample contamination. All equipment that comes into contact with samples or sampling water will be decontaminated in between sampling stations and sampling events. Prior to departure for the sampling sites, field personnel will confirm that all field equipment, as outlined in the field equipment checklist (Appendix A), is available and cleaned for sample and data collection. This includes the number and type of sample containers used for water collection. While at the sampling sites, field log sheets (Appendix A) will be completed to the extent possible, and a COC will be filled out prior to returning to the office. Standard Operating Procedures (SOPs) for inputting data on field sheets, collecting field measurements, and the collection of water samples that are applicable to the MRPP will follow the guidelines outlined in the *Marine Pollution Studies Laboratory – Department of Fish and Game Standard Operating Procedures for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in the Surface Water Ambient Monitoring Program* (SWAMP SOPs; Appendix C). Sections of the SWAMP SOPs that are not applicable to this monitoring program as outlined in the MRPP have been omitted. Any deviations from the SOP will be documented on the field logs.

In order to identify the storm events large enough to trigger a wet season monitoring event, a third party weather forecasting service will be contracted to monitor the 10-day forecast for the sampling region. Once a rain event starts, data provided by the weather forecasting service will be used to evaluate when a threshold of 1.0 inch of rain throughout the sampling area has been met. Once the rain threshold has been met, sampling personnel will be mobilized for sample collection. If required, sampling events may be initiated on weekends as well as weekdays; however, sampling will not be performed during late nighttime hours due to safety concerns involving field crews. If 1.0 inch of rain has fallen but the rain event has ceased, SDRILG will evaluate if there is enough potential runoff to yield sufficient water for sampling based on communications with contacts in the area.

When possible, unpreserved samples will be collected by directly submerging the sample containers in the stream channels. Although this is the primary method for sample collection, due to varying flow and surface conditions this approach may not always be feasible. Stream channel configurations and flow conditions will influence the technique in which grab samples are collected. Complete procedures for collection of surface water samples are presented in Appendix B.

Sample containers will be pre-cleaned by Weck, and certified to be free of contamination according to the US EPA specifications for the appropriate methods.

Sampling devices and sample bottles (that are not pre-sterilized and do not contain preservatives/fixing agents) will be rinsed three times with sample water prior to collecting each sample. Sterile bottles, whirl-paks, and sample bottles with preservatives <u>will not</u> be rinsed with sample water prior to collecting the sample. Also, sample bottles containing preservatives/fixing agents will not be used directly for sampling; a sample device will be used to collect the sample and will be transferred to the appropriate sample bottle.

QC samples will be collected to verify data quality. QC criteria are outlined in Section 14.

Field parameters will be measured according to the guidelines outlined in the SWAMP SOPs. Water quality parameters, including flow rate, pH, dissolved oxygen, electrical conductivity, turbidity, and temperature will be measured prior to collecting samples for laboratory analysis. Water quality parameters will be measured with a hand-held meter. DO measurements will be recorded using a handheld DO probe inserted directly in the stream. All measurements will be recorded after parameters have stabilized. Field observations, such as percent canopy cover, will be evaluated and documented as instructed in the SWAMP SOPs.

Procedures for the measurement of stream depth, stream width, flow velocity, and flow volume will adhere to the guidelines as stated in the SWAMP SOPs. A section of stream at each sampling locations with uniform width and absence of large rocks or obstructions will be used to develop a streambed profile. These cross-section profiles will be measured according to the procedures outlined in the SWAMP SOPs.

Once a streambed cross-section profile has been established, flow velocity will be measured to determine flow volume. When possible, nearby USGS stream gauges will be used to measure flow velocity. If a USGS gauge is not located nearby, a flow meter will be used.

12.0 SAMPLE HANDLING AND CUSTODY

Sample custody will be traceable from the time of sample collection until results are reported. Table 9 describes the sample holding containers, sample preservation methods, and maximum holding times for each monitoring constituent.

Table 9. Sampling Method Requirements

PARAMETER	SAMPLE BOTTLE	TYPICAL SAMPLE VOLUME, PRESERVATION	PREFERRED/MAXIMUM HOLDING TIMES
Total Phosphorous (TP)	Plastic Bottle	0.25 Liter, H_2SO_4	28 days at <6^{o}C, dark
Orthophosphate (as P)	Plastic Bottle	0.25 Liter, Filtered	0.01 days at <6^{o}C, dark
Nitrate as N (NO_3)	Plastic Bottle	0.25 Liter	2 days at <6^{o}C, dark
Nitrate + Nitrite (Sum as N)	Plastic Bottle	0.25 Liter	2 days at <6^{o}C, dark
Nitrite (as nitrogen)	Plastic Bottle	0.25 Liter	2 days at <6^{o}C, dark
Ammonia as N	Plastic Bottle	0.25 Liter, H_2SO_4	28 days at <6^{o}C, dark
Total Kjeldahl Nitrogen	Plastic Bottle	0.25 Liter, H_2SO_4	28 days at <6^{o}C, dark
Chloride	Plastic Bottle	0.25 Liter, 300 Anions	28 days at <6^{o}C, dark
Sulfate	Plastic Bottle	0.5 Liter	28 days at <6^{o}C, dark
Total Disolved Solids	Plastic Bottle	0.5 Liter	7 days at <6^{o}C, dark
Total Suspended Solids	Plastic Bottle	0.5 Liter	7 days at <6^{o}C, dark
pH	Field Measurements	NA	NA
Temperature	Field Measurements	NA	NA
Dissolved Oxygen	Field Measurements	NA	NA
Conductivity	Field Measurements	NA	NA
Flow Volume	Field Measurements	NA	NA
Flow Velocity	Field Measurements	NA	NA
Stream Depth and Width	Field Measurements	NA	NA
Percent Canopy Cover Over Stream	Field Observation	NA	NA
Water Turbidity	Field Measurements	NA	NA

12.1 FIELD CUSTODY

Sampling personnel will be responsible for the maintenance and completion of field log books that contain all the required field sheets, sampling custody information, and documentation. Detailed description of information contained in the field logs is presented in Section 9. Field logbooks will be maintained at the office, and all data will be transferred to electronic format for submittal to the SDRWQCB.

Sample containers will be pre-labeled prior to field events, to the extent possible. Sample labels will contain the following information:

- Site name
- Sample ID
- Date
- Sample time
- Sampling personnel
- Analytical and preservative requirements

Upon sample collection in the field, all sample containers will be checked for tightness and labeling, and will be placed immediately on ice. The ice chest will be maintained at approximately 2-4 ^{o}C. When the ice chest has been filled, it will be labeled and sealed with tape to be transferred for storage. While in storage, all samples will be placed in a refrigerator maintained at 2-4 ^{o}C until the time of shipping or laboratory courier pickup.

12.2 CHAIN-OF-CUSTODY FORM

When samples are transferred from one sampler to another member of the same organization or from the SDRILG to Weck, a COC form will be used. This form will identify the site name, sample location, sample number, matrix, date and time of collection, the sampler's name, sampling equipment and sampling type, and method to preserve sample (if any). It will also indicate the date and time of transfer, and the name and signature of the sampler and sample recipient. When quality control checks are performed by Weck, their samples will be processed under their COC procedures with their labels and documentation procedures. Examples of COCs are included in Appendix D.

12.3 SAMPLE SHIPMENTS AND HANDLING

The field sampling team will have custody of each sample until the time of return to the office or delivery to the analytical laboratory. A COC form that identifies the contents will accompany all sample shipments. The original COC form will accompany the shipment in a waterproof Ziploc bag, and a copy will be retained in the project file.

All shipping containers will be secured with COC seals for transportation to Weck. All samples will be examined to verify proper sealing and that there are no leaks or breaks. The samples will be placed on artificial ice inside an ice chest to maintain the temperature between 2-4 ^{o}C. The artificial ice packed with samples will be sealed in zip lock bags, and will contact the samples. All samples will be packaged in bubble wrap or foam containers to minimize the chance of breaking. Prior to shipping, the ice chest will be secured shut with tape to prevent accidental spillage. Samples will be shipped to Weck according to Department of Transportation standards.

12.4 LABORATORY CUSTODY PROCEDURES

The laboratory will follow sample custody procedures as outlined in their quality assurance manual. Activities will be documented to insure that samples are analyzed within the proper time frame for each analytical requirement. At minimum, Weck will conduct the following:

- Initial sample login and verification of samples received with the COC form
- Document any discrepancies noted during login on the COC
- Initiate internal laboratory custody procedure
- Verify sample preservation
- Notify the project coordinator if any problems or discrepancies are identified
- Properly store samples, including daily refrigerator temperature monitoring and sample security.

All laboratory procedure documents and records will be stored at the analyzing lab. Sample volumes remaining after analysis will be stored for at least 30 days after analysis, and will be disposed of appropriately after this time.

13.0 ANALYTICAL METHODS

Laboratory analytical methods, MDLs, and RLs are summarized in Table 7.

13.1 CHEMISTRY ANALYSES

Prior to the analyses of environmental samples, Weck will demonstrate the ability to meet the minimum performance requirements for each analytical method. Initial demonstration of laboratory capabilities includes the ability to meet the project specified quantitation limits, to the extent practical, the ability to generate acceptable precision and recoveries, and other analytical and quality control parameters as stated in this QAPP. Analytical methods used for chemistry analysis must follow a published method (EPA or Standard Method for the Examination of Water and Wastewater) and document the procedure for sample analyses in a laboratory SOP for review and approval. The Laboratory Quality Assurance Manual for general water quality constituents is presented in Appendix E.

13.2 DETECTION AND REPORTING LIMITS

Weck will routinely conduct MDL studies to document that the MDLs are less than the project specified RL objectives. As the Waiver does not define any specific RL objectives, existing numeric water quality objectives for each analyte as determined by SWAMP and stated in 2008 SWAMP QAPP will be used as the RL objectives for this project. If the MDLs for any analytes exceed the project RL objectives, the following steps will be taken:

1. Perform a new MDL study using concentrations sufficient to prove analyte quantitation at concentrations less than the project specified RLs per the procedure for the Determination of the Method Detection Limit presented in Revision 1.1, 40 CFR 136, 1984.

2. No samples may be analyzed until the issue has been resolved. MDL studies results must be available for review during audits, data review, or as requested. Current MDL study results must be reported at the beginning of every project for review and inclusion in project files.

An MDL is developed from seven aliquots of a standard containing all analytes of interest spiked at three to five times the expected MDL, which are taken through the analytical method sample processing steps. The data is evaluated and used to calculate the MDL. If the calculated MDL is less than three times below the spiked concentrations, another MDL study must be performed using a lower concentration.

Weck will establish MDLs less than or equal to the project RL objectives. MDLs will be lower than the proposed or existing numeric water quality objectives as determined by the SDRWQCB, to the extent possible by the analyzing laboratory. Occasionally samples may be diluted for analysis; this will raise the RLs for the diluted sample, and is unavoidable on occasion. If samples have to be continually diluted to perform analysis, the analyzing laboratory will contact the Project Manager to put procedures in place to modify the existing analytical protocol. Water quality objectives, as outlined in the Basin Plan, are presented on Table 3. Weck will have documentation to support quantitation at the attainable levels.

Weck will report analytical results between the MDL and the RL. These results will be reported as numerical values and qualified as estimates. They will not be reporting as “trace” or “<RL”, or any other qualitative value.

13.3 LABORATORY STANDARDS AND REAGENTS

All stock standards and reagents used for extraction and standard solutions will be tracked through Weck. The preparation and use of all working standards will be recorded in laboratory files that document standard tractability to National Institute for Standards and Technology criteria. Records will have sufficient detail to allow determination of the identity, concentration, and viability of the standards including all dilutions performed to obtain the working standard. Date of preparation, analyte or mixture, concentration, name of preparer, lot number, and expiration date (if applicable) must be recorded on each working standard.

13.4 ALTERNATE LABORATORIES

If the laboratory is unable to perform analysis as outlined in this QAPP due to unforeseen problems, an alternate laboratory will be chosen to provide analysis. The selection of alternate laboratories will be the responsibility of the Project Manager and QA Officer.

14.0 QUALITY CONTROL

The types of quality control assessments required in the monitoring program are discussed below. Table 10 outlines the laboratory acceptance criteria. General procedures for preparation and analysis of quality control samples are provided in Weck's Laboratory Quality Assurance Manual (Appendix E).

Table 10. Laboratory Acceptance Criteria

SAMPLE TYPE	FREQUENCY[1]	ACCEPTANCE LIMITS	CORRECTIVE ACTION
Equipment Blanks	One per equipment batch cleaned[2]	<MDL	Identify contaminant source and clean equipment. Verify with new equipment blank.
Field Blanks	5% of all samples, or one per sampling event, whichever is greater	<MDL	Identify contaminant source and qualify data as needed.
Field Duplicates	5% of all samples, or one per sampling event, whichever is greater	RPD <25% if difference is greater than the RL	Identify variability source, reanalyze samples if possible, and qualify data as needed.
Method Blank	One per analytical batch	<MDL	Identify contamination source, reanalyze method blank and all batch samples.
Lab Duplicate	One per analytical batch	RPD <25% if difference is greater than the RL	Recalibrate and reanalyze.
Matrix Spike	One per analytical batch	Varies[3]	Check recovery, attempt to fix matrix problem, and reanalyze. Qualify if necessary.
Matrix Spike Duplicate	One per analytical batch	RPD <25% if difference is greater than the RL	Check lab duplicate RPD, attempt to fix matrix problem, and reanalyze. Qualify if necessary.
Laboratory Control Sample	One per analytical batch	80-120% recovery	Recalibrate and reanalyze all parameters.
Surrogate Spike	Each sample	30-150% recovery[3]	Check surrigate recovery in LCS, attempt to fix matrix spike and reanalyze sample. Qualify if necessary.

MDL Method Detection Limits
RPD Relative Percent Difference
RL Reporting Limit
GWQC General Water Quality Constituents
LCS Laboratory control sample

1 Each analytical batch is a number of samples (<20, Including quality control samples) that are similar in matrix type and are prepared in unison under the same laboratory conditions (preparation batch).
2 The laboratory is responsible for collecting equipment blanks for cleaning equpment prior to returning the equipment for field use.
3 Based on actual laboratory data, control limits could be set at +/- 3 standard deviations.

14.1 QUALITY ASSURANCE OBJECTIVES

Quality assurance objectives are the detailed QC specifications for precision, accuracy, representativeness, comparability, recovery, and completeness. The quality assurance objectives will be used as comparison criteria during data quality review by SDRILG to evaluate if minimum requirements have been met and the data may be used as planned.

14.2 DEVELOPMENT OF OBJECTIVES

Precision is a measurement of the degree to which two or more measurements are in agreement while accuracy is the degree of agreement between an observed value and an accepted reference or true value. Precision and accuracy objectives are determined through field and lab duplicates, matrix spikes and matrix spike duplicates, laboratory control samples, and surrogate spikes. Acceptable RPD needs to be less than 25 percent for all duplicates. If duplicate sample results vary beyond these objectives, the result will be qualified. Matrix spikes, laboratory control samples, and surrogate spikes are used to measure sampling accuracy to insure the exactness of data.

Comparability is an expression of the assurance with which one measurement can be compared to another. Comparability of data will be managed by insuring that sampling teams adhere to standardized measurement and sampling protocol, and that labs also follow standardized protocols for the preparation and analysis of samples. Detailed information on these protocols is outlined in this QAPP.

Representativeness expresses the degree to which data accurately represents a characteristic of a parameter variation at a sampling point. Representativeness will be managed through the selection of site locations and sampling methodology. Sites were chosen to represent the group as a whole to characterize the type of discharges from participants in the SDRILG. Standard analytical testing and frequency of parameters for each site contribute to the representativeness of the group by allowing data to be compared from each sampling site in relation to the group as a whole, specifically through the evaluation of the type of agriculture, fertilization practices, water use, and topographical setting at each site.

Completeness is a measure of the amount of valid data obtained from a sampling event compared to the amount that was expected to be obtained under normal conditions. Completeness will be achieved by insuring that 90 percent of all field measurements and analytical tests, including general water quality characteristics, pesticides, herbicides, and toxicity, is attained and usable throughout the duration of the program. Completeness criteria will be based solely on sampling data that is available to be collected.

14.3 INTERNAL QUALITY CONTROL

Internal QC is achieved by collecting and/or analyzing a series of duplicate, blank, spike, and spike duplicate samples to ensure that analytical results are within the specified QC objectives. The QC sample results are used to quantify precision and accuracy and identify any problems or limitation in the associated sample results. The internal QC components of a sampling and analysis program will insure that the data of known quality are produced and documented. The internal QC samples, frequency, acceptance criteria, and corrective action will meet the minimum requirements presented in the following sections.

14.4 FIELD QUALITY CONTROLS

Field QC samples are used to assess the influence of sampling procedures and equipment used in sampling. They are also used to characterize matrix heterogeneity.

For basic water quality analyses, quality control samples, prepared in the field, will consist of equipment blanks, field blanks, and field duplicates (when applicable). Field measurements will be taken in triplicate to insure accuracy.

14.4.1 Equipment Blanks

Equipment blanks will be collected and analyzed for all analytes of interest along with the associated environmental samples. Equipment blanks will consist of laboratory-prepared distilled blank water (contaminant free) processed through the sampling equipment prior to field use using the same procedures for environmental samples. This is used to demonstrate that equipment is free of contamination, and will help to identify anomalous sources of data.

14.4.2 Field Duplicates

Field duplicates will be collected at a rate of one per 20 normal samples, or one per sample event, whichever is greater. Field duplicates will be collected at the same time as environmental samples, or as two grab samples collected in rapid succession, and will be analyzed along with the associated environmental samples. If the RPD of field duplicate results is greater than 25 percent and the absolute difference is greater than the reporting limit (RL), both samples should be reanalyzed, if possible. This is used to insure the precision of sampling and analytical methodologies.

14.4.3 Field Blanks

Field blanks will be collected at a rate of one per 20 normal samples, or one per sample event, whichever is greater. Field blanks will consist of laboratory-prepared blank water (certified contaminant free) processed through the sampling equipment in the field using the same procedures for environmental samples. This is used to demonstrate that sampling procedures do not result in contamination of the samples, and will help to identify anomalous sources of data.

14.5 LABORATORY QUALITY CONTROL

For basic water quality analysis, quality control samples prepared by Weck will typically consist of method blanks, laboratory duplicates, laboratory control samples, matrix spikes and matrix spike duplicates, and surrogate spikes added to each sample (organic analysis).

14.5.1 Method Control Blanks

Method blanks will be prepared and analyzed by Weck with each batch of samples. If any analyte is detected in the blank, the blank and associated samples must be re-analyzed after the source of contamination is identified.

14.5.2 Laboratory Duplicates

Laboratory duplicates will be analyzed by Weck with each batch of samples, and will consist of replicate environmental samples. If the RPD of laboratory duplicate results is greater than 25 percent and the absolute difference is greater than the RL, both samples should be reanalyzed, if possible. This is used to insure the precision of sample preparation and analytical methodologies.

14.5.3 Laboratory Control Samples and Surrogate

Laboratory Control Samples (LCS) will be analyzed at the rate of one sample per batch. LCS will consist of a standard reference material or a laboratory fortified method blank. If recovery of any analyte is outside the acceptable range, the laboratory must locate the source of the problem, and the LCS and associated samples must be re-analyzed after the source of the problem is fixed. This is used to insure the accuracy of sample preparation and analytical methodologies.

14.5.4 Matrix Spikes and Matrix Spike Duplicates

Matrix spikes and matrix spike duplicates will be analyzed at a rate of one pair per sample batch. An additional 6 liters of water will be collected from one sampling site each event in order to supply the lab with enough sample to run matrix spikes and matrix spike duplicates. Matrix spike samples consist of a laboratory fortified environmental sample that is spiked at Weck. Spike concentrations are added at approximately five to ten times the reporting limit of the target analyte. If the matrix spike recovery of any analyte is outside the acceptable range, the laboratory must locate the source of the problem, and the matrix spike and associated samples must be re-extracted and re-analyzed after the source of the problem is fixed. If the matrix spike duplicate RPD is greater than 25 percent and the absolute difference is greater than the RL, the laboratory must locate the source of the problem, and the matrix spikes and associated samples must be re-analyzed after the source of the problem is fixed. This is used to insure the performance of sample preparation and analytical methodologies.

14.5.5 Surrogate Spikes

Surrogate spikes are used to evaluate the compounds added by the laboratory to samples to prepare them for analysis. They will be utilized on a sample-specific basis, and are applicable to the analysis of all the pesticides. This will verify the accuracy of analytical measurements for organic analyses.

15.0 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

15.1 EQUIPMENT/MATERIALS CLEANING PROCEDURES

Weck will clean and prepare containers used for sample collection prior to each monitoring event in accordance with SOP documents for each analysis. Sample containers will be sealed after preparation, and will not be opened until the sampling event. All equipment will be inspected prior to use and after sampling for damage, and any damage will be recorded. Cleaned equipment will be used to generate the equipment blanks, as outlined in Section 14.

All boots and field gear that come in contact with mud that could be a carrier of the New Zealand mud snail will be removed, scrubbed, and soaked in 50 percent 409 Cleaner for five minutes as outlined in *Controlling the Spread of New Zealand Mud Snails on Wading Gear* (CA DFG, 2005). An in depth procedure for the cleaning of potentially infested wading gear is presented in Appendix G.

15.2 FIELD MONITORING EQUIPMENT

Monitoring personnel will be responsible for testing, cleaning, and maintaining all water quality monitoring equipment and sample collection equipment in accordance with manufacturer specifications and standard decontamination procedures.

Field parameters will be measured according to SWAMP SOPs located in Appendix C. Water quality parameters, including flow rate, pH, dissolved oxygen, electrical conductivity, turbidity, and temperature will be measured prior to collecting samples for laboratory analysis. Water quality parameters will be measured with a hand-held meter. DO measurements will be recorded using a handheld DO probe inserted directly in the stream. All measurements will be recorded after parameters have stabilized.

When possible nearly USGS stream gauges will be used to measure flow velocity. If a USGS gauge is not located nearly, a flow meter will be used.

15.3 ANALYTICAL INSTRUMENT/EQUIPMENT TESTING PROCEDURES AND CORRECTIVE ACTIONS

Analytical equipment used by the laboratory will be tested, maintained, and inspected according to the QA manual for each analyzing laboratory.

16.0 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

16.1 LABORATORY ANALYTICAL PROCEDURES AND CALIBRATION

Calibration frequencies and procedures for laboratory analytical equipment used by the laboratory are outlined in the QA manual. Any deficiencies in analytical equipment calibration will be dealt with accordingly and will be reported to the project QA Officer.

For this program, only linear calibration with either an average response factor or a linear regression is acceptable for organic analysis. Non-linear calibration is not allowed since using this calibration option could generate a potential for poor quantitation or biased concentration of compounds at low or high concentrations (near the high and low ends of the calibration range).

Weck will construct an initial calibration curve using a minimum of five calibration points for organic analytes and three calibration points for inorganic analytes, where the low-level standard concentrations is less than or equal to the analyte quantitation limits.

16.2 FIELD MONITORING EQUIPMENT

All field monitoring equipment will be calibrated according to manufacturer specifications, or before each field monitoring event, whichever is greater. A description of calibration procedures and frequency is presented on Table 11. Sampling personnel will be responsible for the calibration of the equipment. If calibration results do not meet manufacturers specifications, and subsequent recalibration is not acceptable, spare equipment will be calibrated and used for the monitoring event. All discrepancies in calibration will be noted in the field monitoring log.

Results and frequency of calibration will be recorded on a calibration log sheet (Appendix H).

Table 11. Field Equipment Calibration

Field Monitoring Parameter	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
pH	Use standard buffering solutions, including high, low, and mid range measurements	Day of sampling event, or by manufacturers specifications, whichever is greater	Sampling personnel
Temperature	Is factory set, but will be verified by a standard glass thermometer		
Electrical Conductivity	Will be corrected by comparing readings to known conductivity standards		
Dissolved Oxygen	Will be calibrated according to manufacturer specifications		
Turbidity	Use standard solution, including high, low, and mid range measurements		

17.0 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Sampling personnel will inspect all equipment and materials used during field monitoring events prior to monitoring and sampling. Any equipment or materials that show signs of damage or contamination will not be used for sampling events, or will be decontaminated accordingly. A complete equipment list is presented in Appendix A. Inspection protocols for laboratory materials, equipment, and reagents are documented in the QA manual for the laboratory.

18.0 NON-DIRECT MEASUREMENTS

Data from prior studies and other monitoring programs may be used for data evaluation purposes. Data used will be reviewed in accordance with the data quality objectives as stated in this QAPP, and will be deemed either acceptable or unacceptable by the QA Officer.

19.0 DATA MANAGEMENT

Data will be maintained as outlined in Section 9. Copies of field logs, copies of COC forms, original preliminary and final lab reports, and electronic media reports will be kept for review by the SDRWQCB. SDRILG will retain original field logs. Weck will retain original COC forms. Weck will also retain copies of the preliminary and final data reports.

Field log sheets are checked and signed in the field by sampling personnel. Sampling personnel will identify any results where holding times have been exceeded, sample identification information is incorrect, samples were inappropriately handled, or calibration information is missing or inadequate. Such data will be marked as unacceptable by sampling personnel and will not be entered into the electronic database. All acceptable data will be entered electronically into a database and stored.

Weck will report their results to the Project Manager. The Project Manager will verify sample identification information, review the COC forms, and identify the data appropriately in the database.

Concentrations of chemicals will be calculated as described in the referenced method document for each analyte or parameter, or a SOP. The data generated will be converted to a standard database format maintained by SDRILG and available to the SDRWQCB for review. After data entry or data transfer procedures are completed for each sample event, data will be inspected for data transcription errors, and corrected as appropriate. After the final QA checks for errors are completed, the data will be added to the final database.

ASSESSMENT AND OVERSIGHT

20.0 ASSESSMENT AND RESPONSE ACTIONS

Data will be consistently assessed and documented to evaluate whether project QA objectives have been met, to quantitatively assess data quality, and to identify potential limitations on data use. Assessment and compliance with quality control procedures will be undertaken during the data collection phase of the project. Field personnel will assess the performance of sampling procedures, and will report to the Project Manager on any corrective actions. Individual laboratories are responsible for the assessment of analytical equipment maintenance, calibration, analytical methods, and QC results presented in the Quality Assurance Manual and SOPs, and will report corrective actions to the project QA Officer.

Upon return from field sampling, field data sheets, COC documentation, sample numbers, sample holding times, QC samples, and other documents will be assessed by SDRILG's QA Officer to insure proper procedures and documentation were followed. The QA Officer will review laboratory analytical data for spike and duplicate precision and accuracy, assign data flags, calculate completeness, and evaluate any indication of contamination.

If any discrepancies are encountered during assessment or during an audit, the QA Officer will address the discrepancy with the appropriate personnel. The discussion will involve whether the data collected is accurate, the possible causes leading to the deviation, how the deviation could affect data quality, and what corrective actions are to be considered. A log will be maintained outlining all discussion points and corrective actions, and will be available to the SDRWQCB and the Project Manager upon request.

21.0 REPORTS TO MANAGEMENT

In addition to information outlined in Section 9, SDRILG will also generate the following reports:

21.1 MONITORING PROGRAM REPORT

The MPR will be prepared annually by the SDRILG and will include the following sections:

1. Introduction: title page, table of contents, description of group enrollment, updated enrollment list, and objectives of MPR.
2. Monitoring: location of samples collected, descriptions and photographs of sampling sites, Location map of sampling sites including GPS coordinates of sampling sites, constituents monitored and frequency, objective, and analytical methods.
3. Results and Discussion: tabulated data, summary of data to demonstrate compliance or non-compliance, comparison of data to benchmark values in the Basin Plan, quality control results, data interpretation.
4. Quality control data interpretation and affirmation that analyses were conducted by a certified laboratory.
5. Conclusion and recommendations.
6. References and Appendices including, but not limited to, copies of field data/sample log sheets, COC forms and laboratory and field quality control samples results.

Table 12 outlines the timetable for report submittal to management.

Table 12. Report Submittals

Type of Report	Projected Delivery Date	Organization Responsible for Report Preparation	Report Recipients
Lab Analytical Data Reports	Within sixty days of sampling event	Analytical Laboratories	SDRILG
MRP	31-Dec-12	PW Environmental	SDRWQCB

DATA VALIDATION AND USABILITY

22.0 DATA REVIEW, VERIFICATION, AND VALIDATION

Applicable data generated during this project will be reviewed against the data quality objectives outlined in Sections 7, 14, 15, 16, and 17 of this report. Data that does not meet all quality assurance/quality control objectives will be analyzed to assess their potential impacts on data quality. Once their impacts have been evaluated, the data will either be included or thrown out of the data set. Only data that has met data quality objectives, or data that has acceptable deviations explained, will be submitted. All data that is included, but does not meet all data quality objectives, will be flagged in the reports. When QA requirements have not been met, the samples will be reanalyzed when possible and only the results of the reanalysis will be submitted, provided they are acceptable.

The laboratory QA Officer will be responsible for verifying data generated by the laboratory meets data quality objectives. Once complete laboratory analytical results are received, SDRILG's QA Officer will independently review and validate the data, including reviews of precision, accuracy, and completeness. SDRILG's QA Officer is ultimately responsible, based on the review of data, to accept or qualify data.

23.0 VERIFICATION AND VALIDATION METHODS

Data will be visually checked and recorded upon initial sampling and field monitoring, and will be checked again upon return. This verification will include review of all sample numbers and collection logs, sample preparation, field logbooks, COC forms, calculation worksheets, and raw data. The QA Officer will be responsible for the review of all the data records upon return to the office.

The laboratory QA manual will be used to accept, reject, or qualify the data generated by Weck. The laboratory management will be responsible for validating the data generated by the laboratory.

The laboratory personnel will verify that the measurement process was "in control" (i.e., all specified data quality objectives were met or acceptable deviations explained) for each batch of samples before proceeding with analysis of a subsequent batch. In addition, each laboratory will establish a system for detecting and reducing transcription and/or calculation errors prior to reporting data.

Upon receipt of laboratory analytical data, SDRILG's QA Officer will be responsible for reviewing the sample analyses, documentation, data collection processes, sample preparations, and sample collection for completeness. This includes checking for data flags, correct application of dilution factors and conversion factors, and transcription errors.

24.0 REFERENCES

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Figure 2 San Diego Region Irrigated Lands Group San Diego Region Watersheds

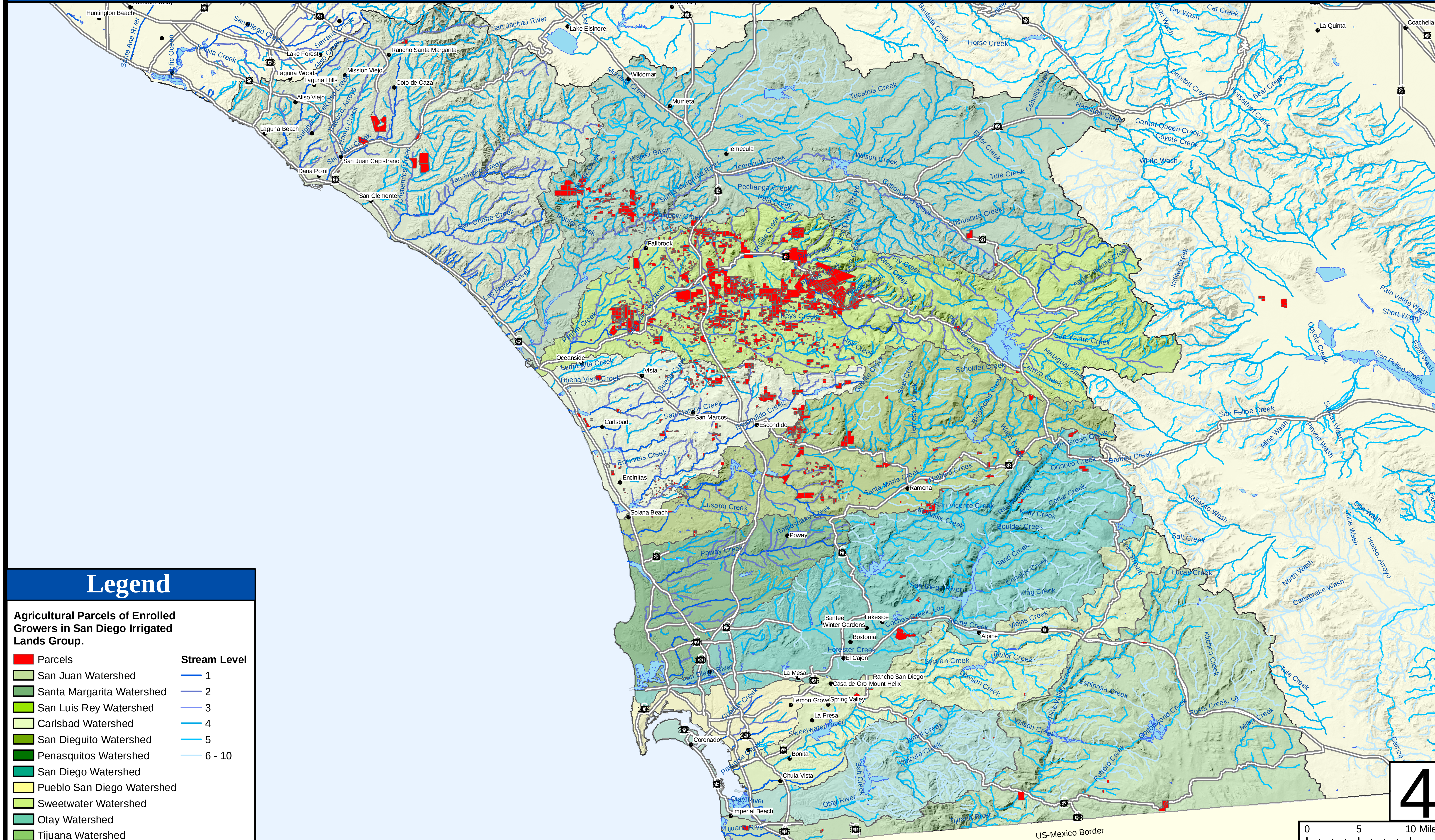


Figure 2.1 San Diego Region Irrigated Lands Group San Juan Watershed

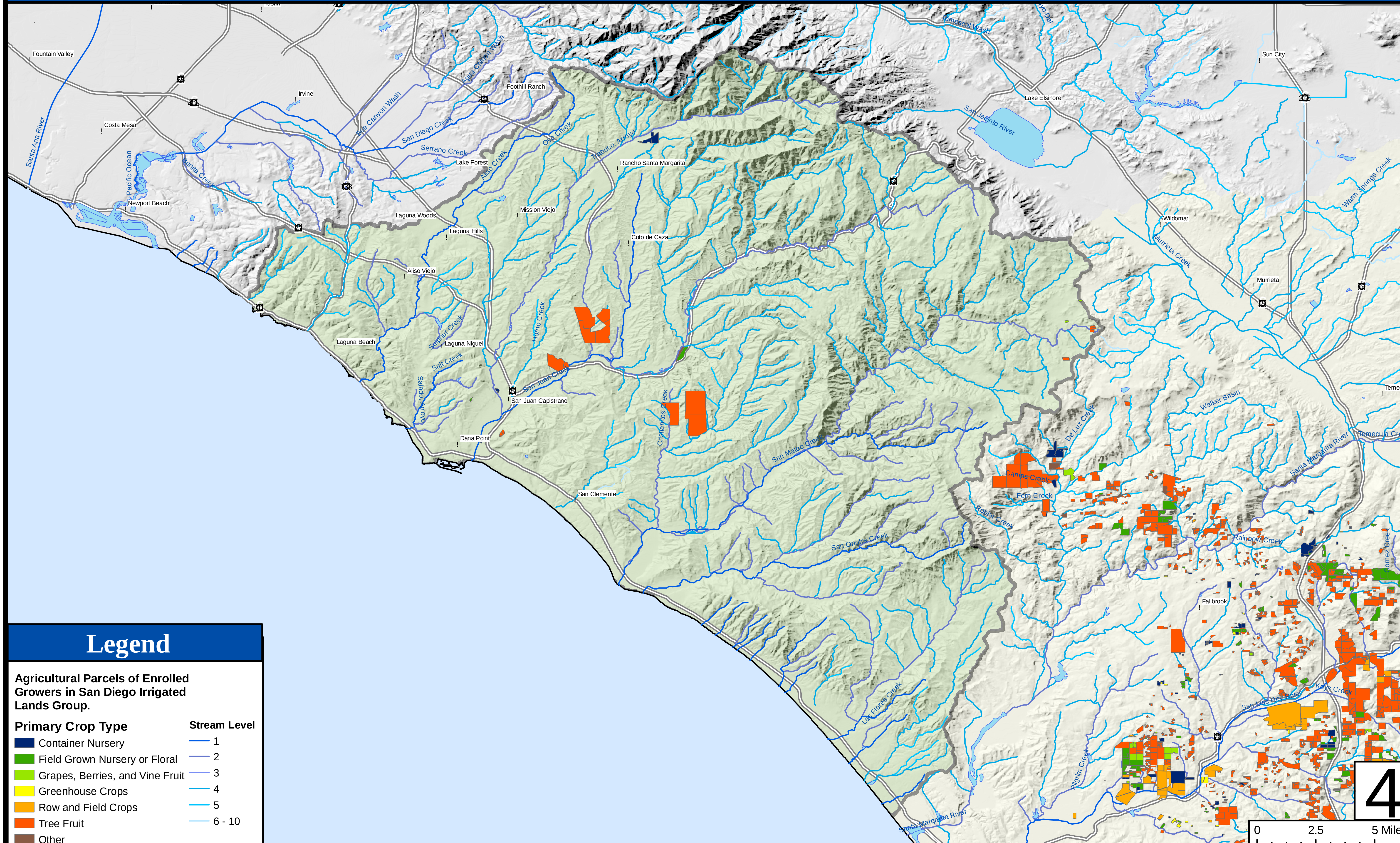


Figure 2.2 San Diego Region Irrigated Lands Group Santa Margarita Watershed

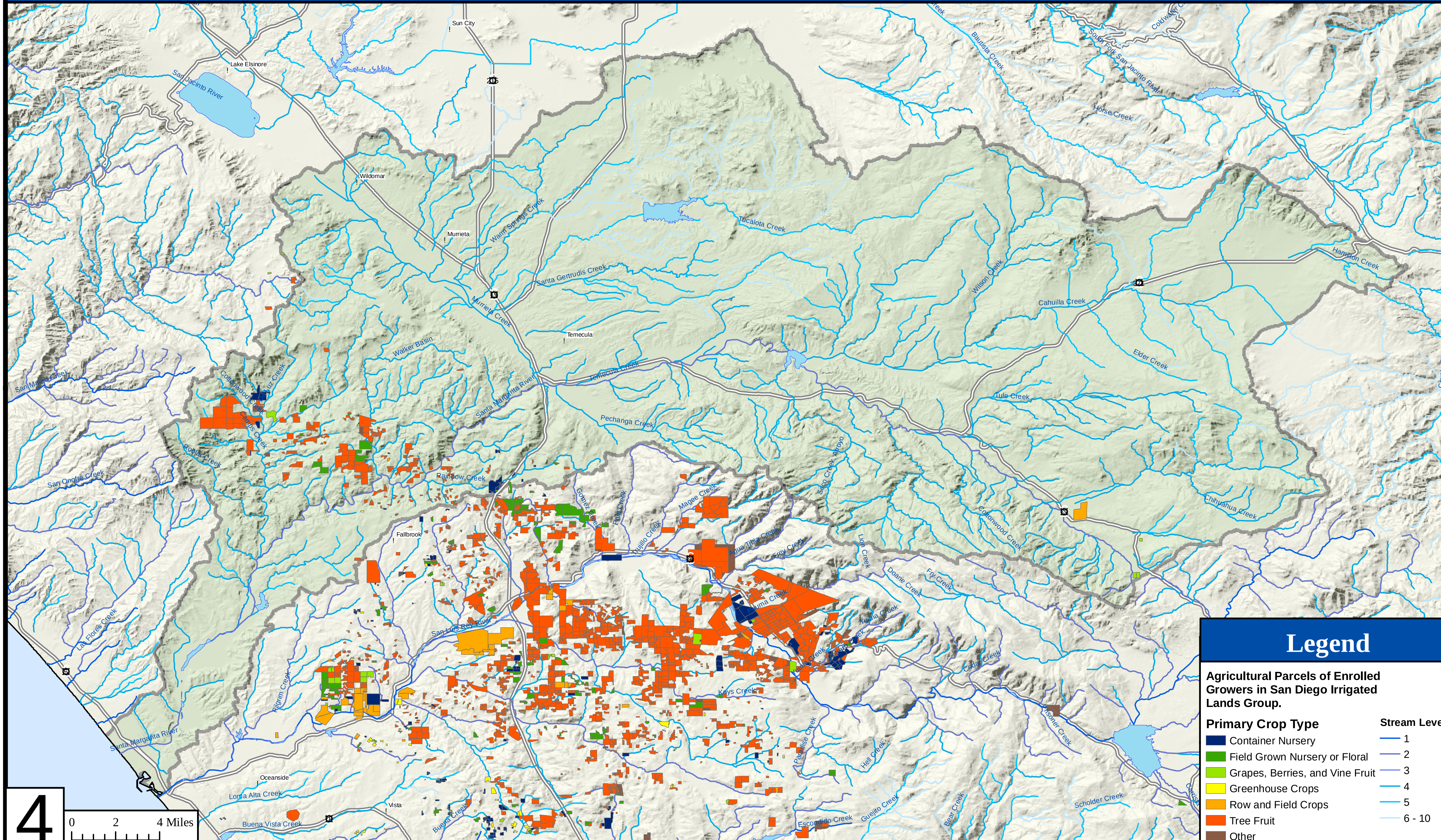


Figure 2.3 San Diego Region Irrigated Lands Group San Luis Rey Watershed

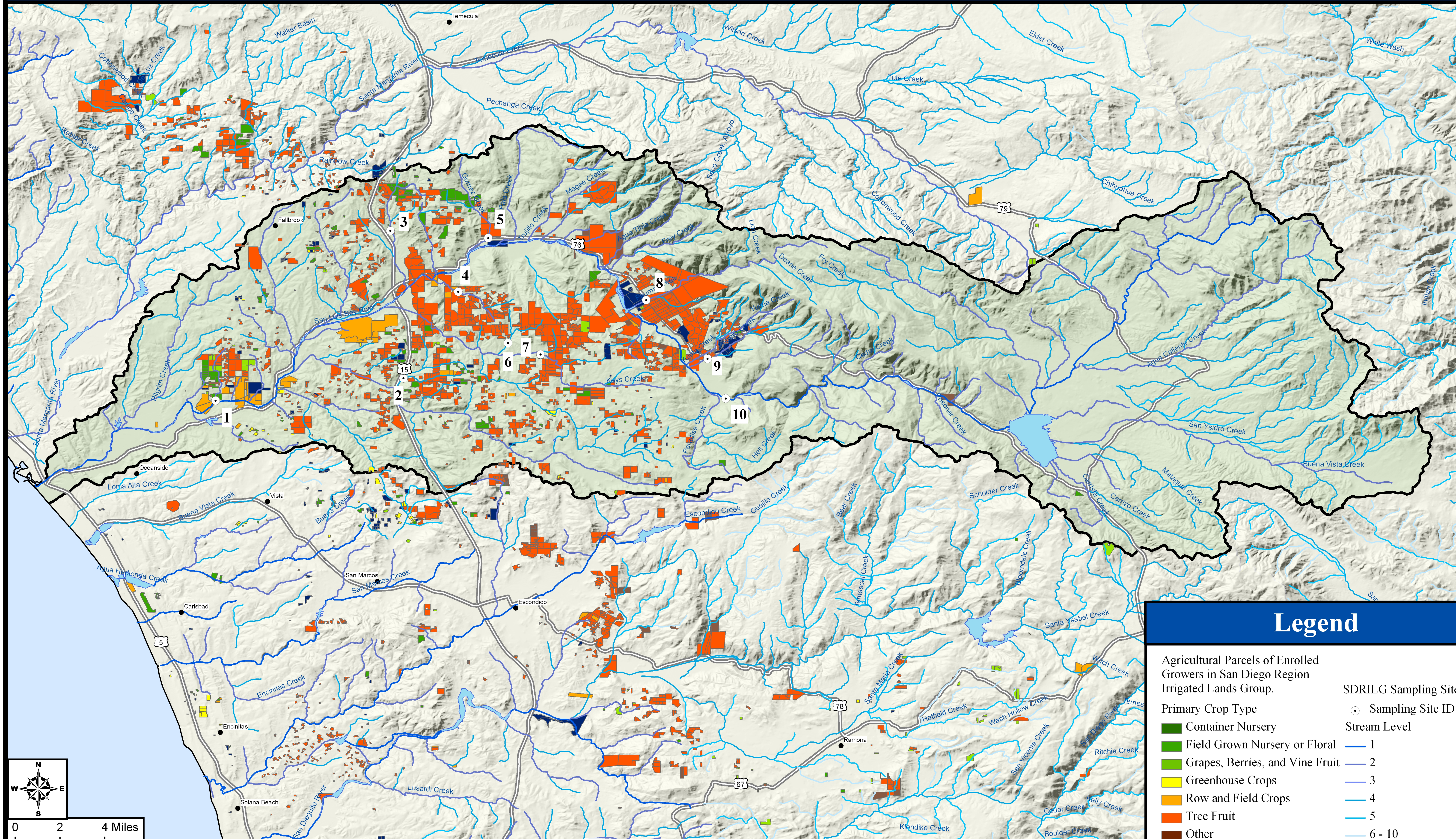


Figure 2.4 San Diego Region Irrigated Lands Group Carlsbad Watershed

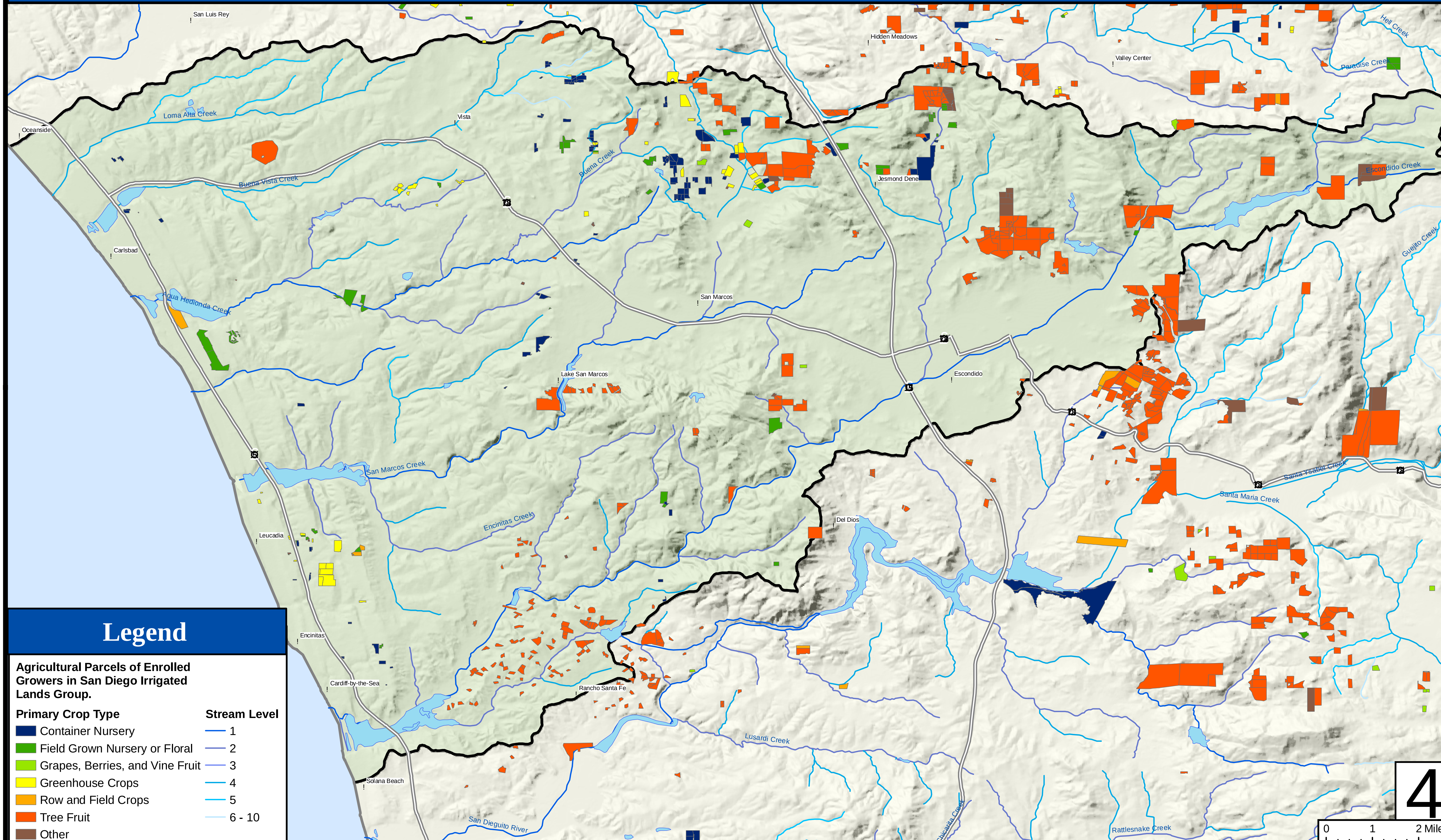


Figure 2.5 San Diego Region Irrigated Lands Group San Dieguito Watershed

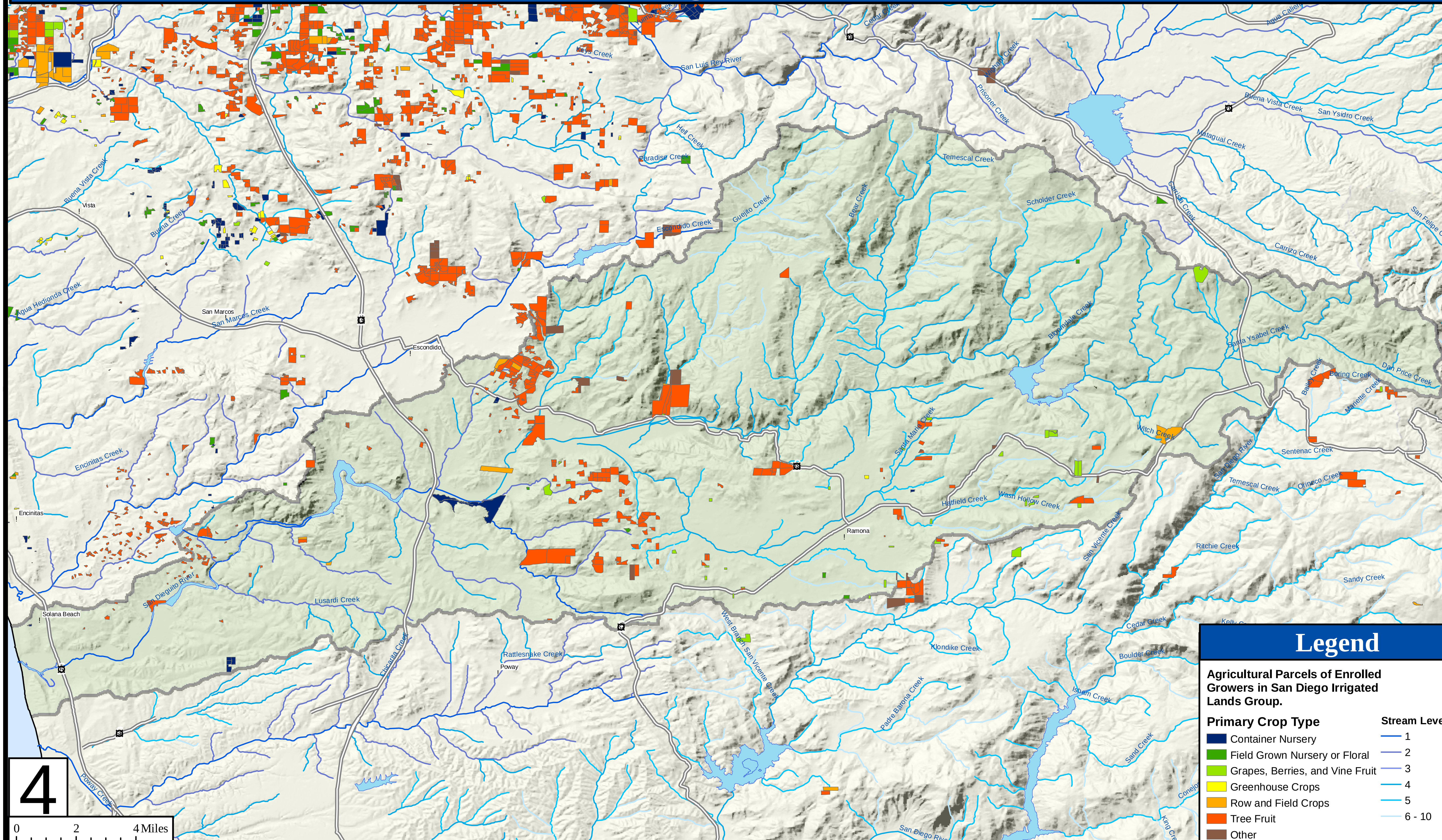


Figure 2.6

San Diego Region Irrigated Lands Group
Penasquitos Watershed

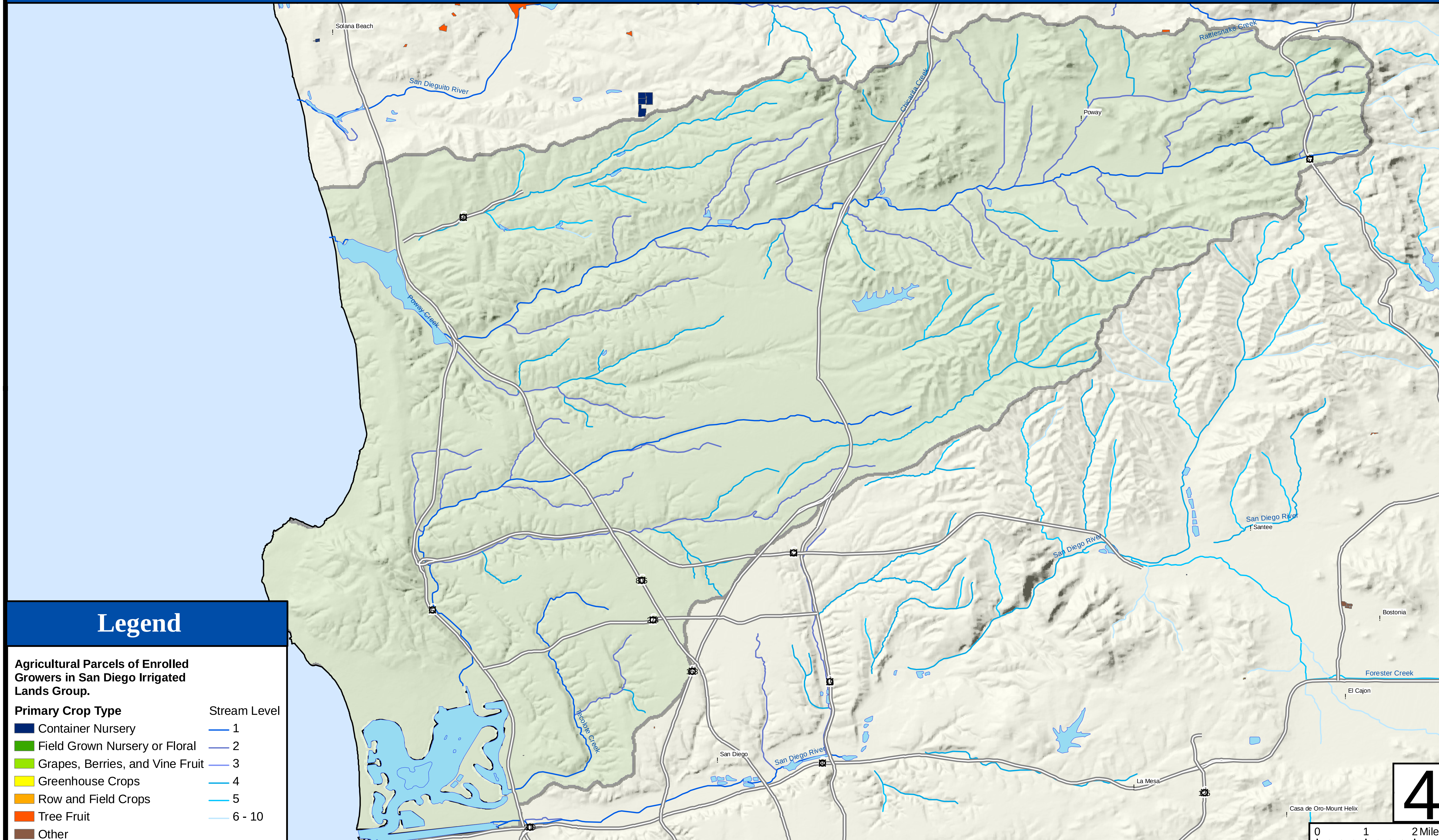


Figure 2.7 San Diego Region Irrigated Lands Group San Diego Watershed

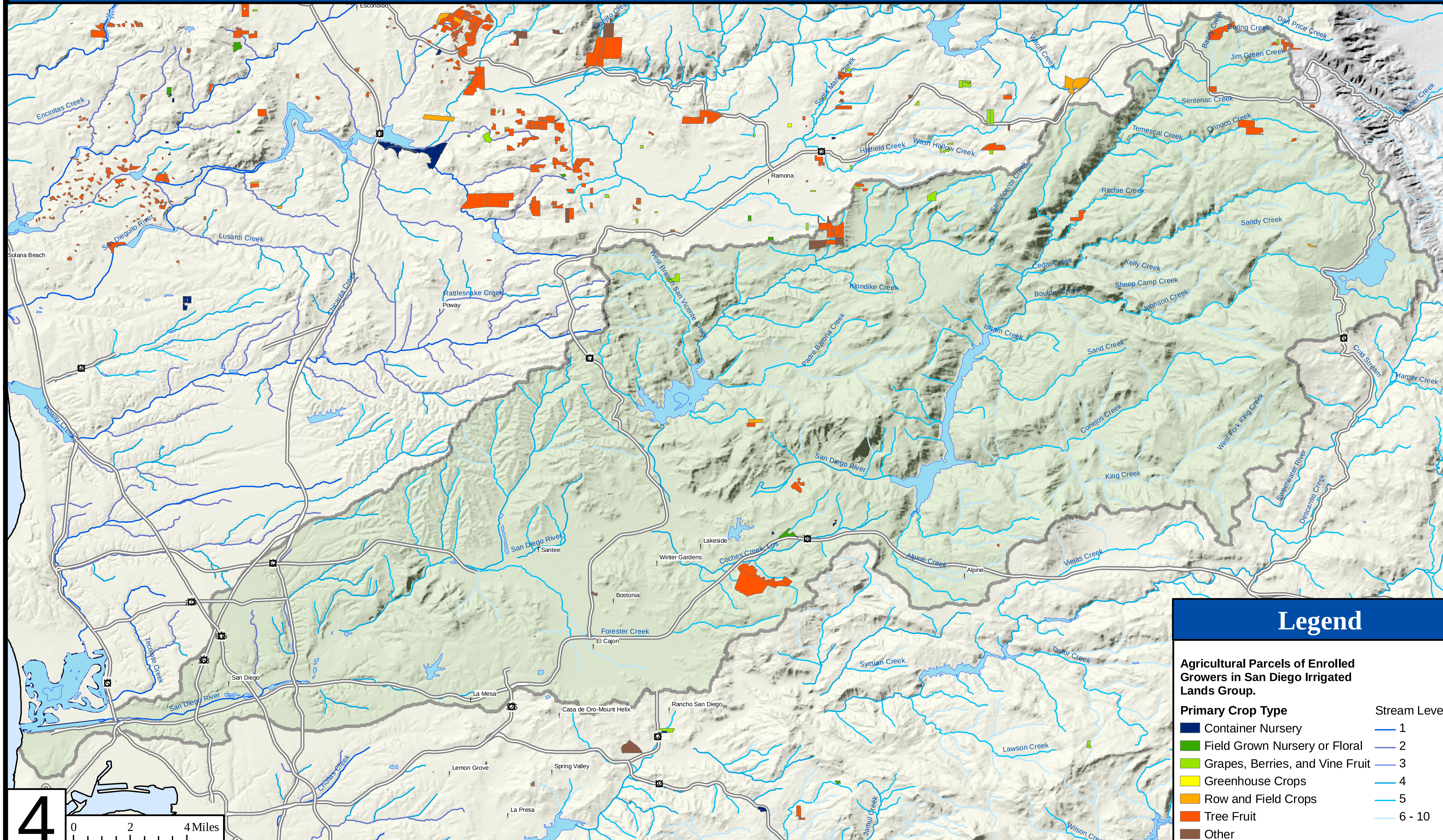


Figure 2.8 San Diego Region Irrigated Lands Group
Pueblo San Diego Watershed

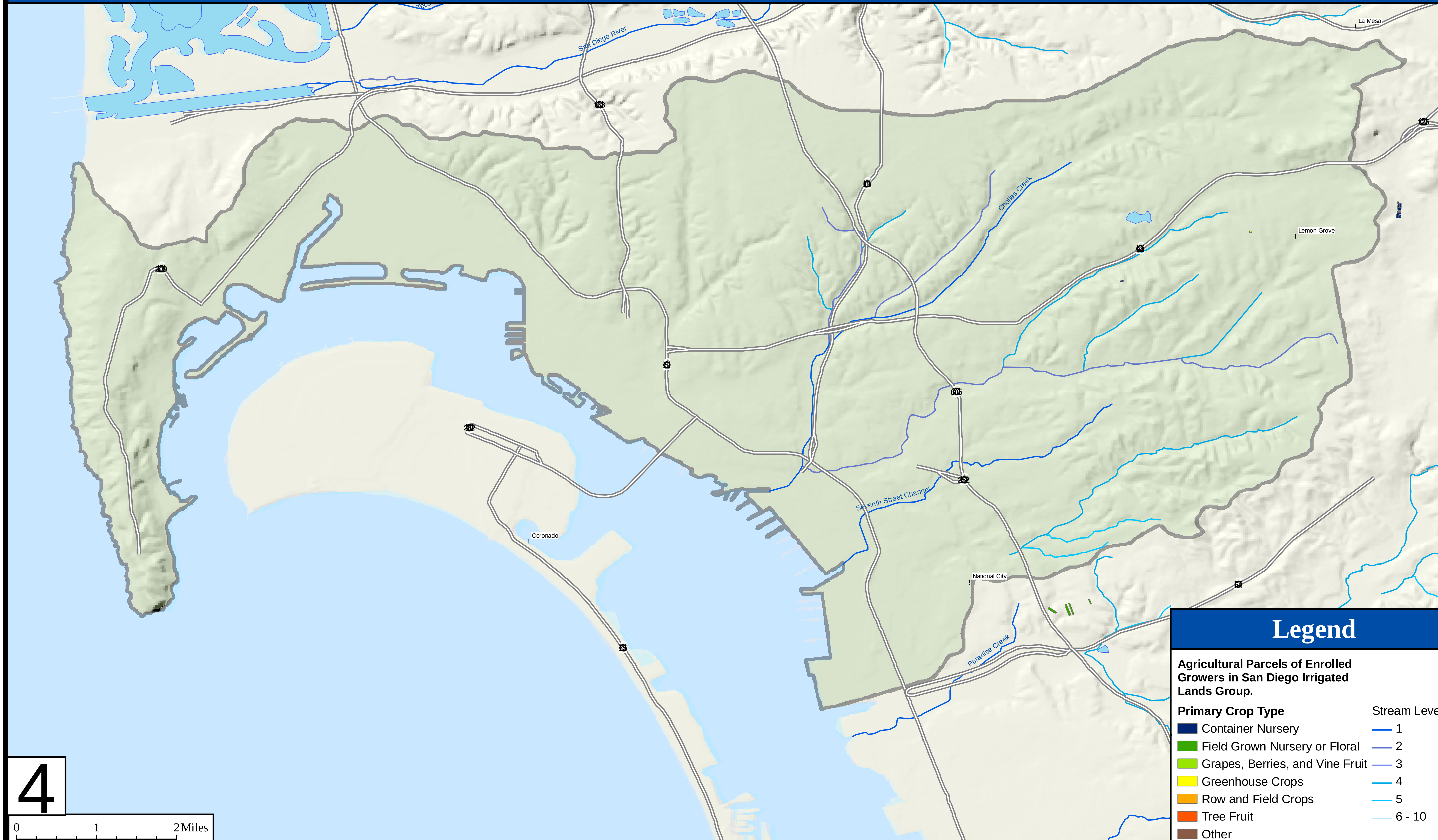


Figure 2.9 San Diego Region Irrigated Lands Group Sweetwater Watershed

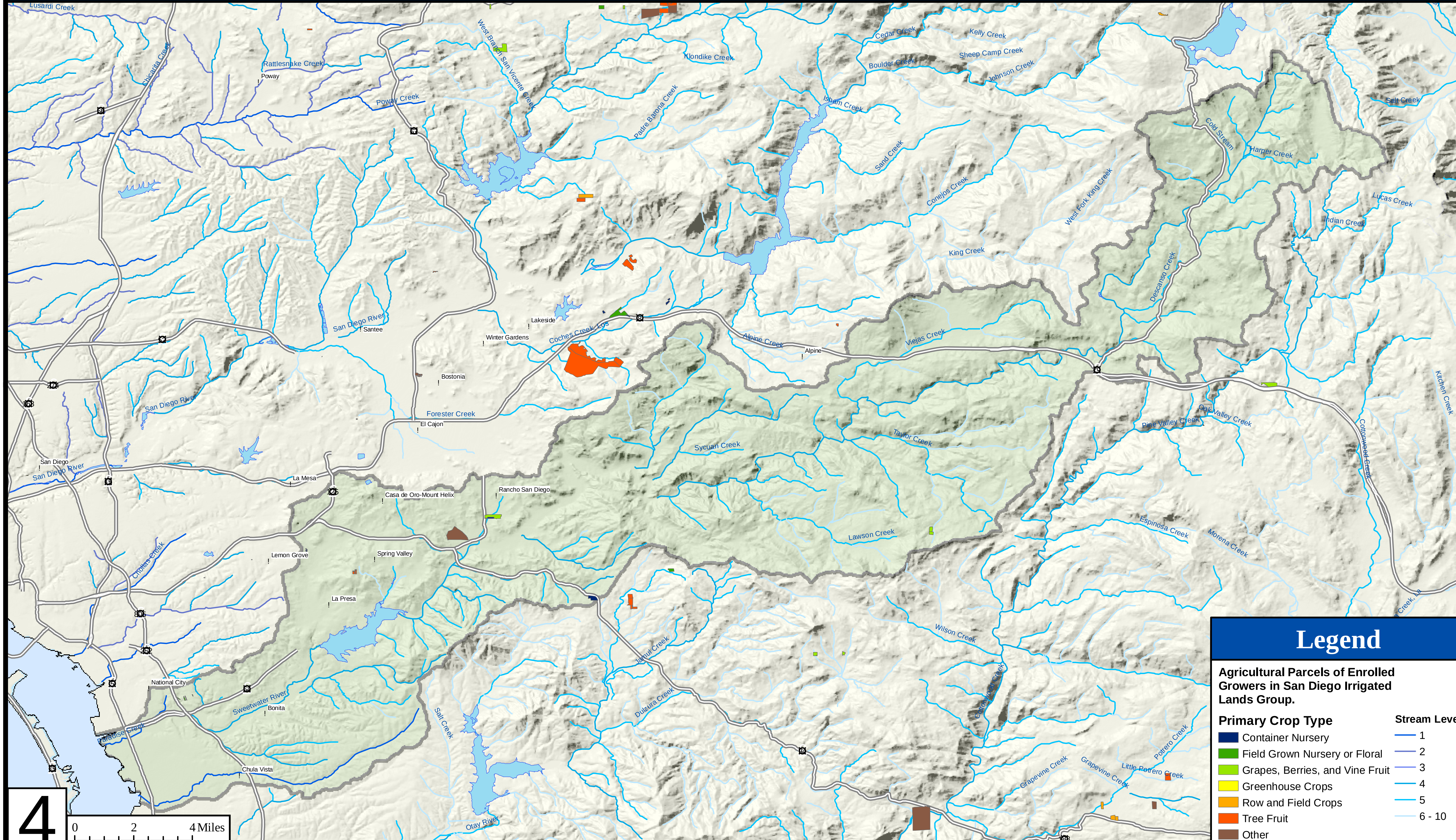


Figure 2.10 San Diego Region Irrigated Lands Group Otay Watershed

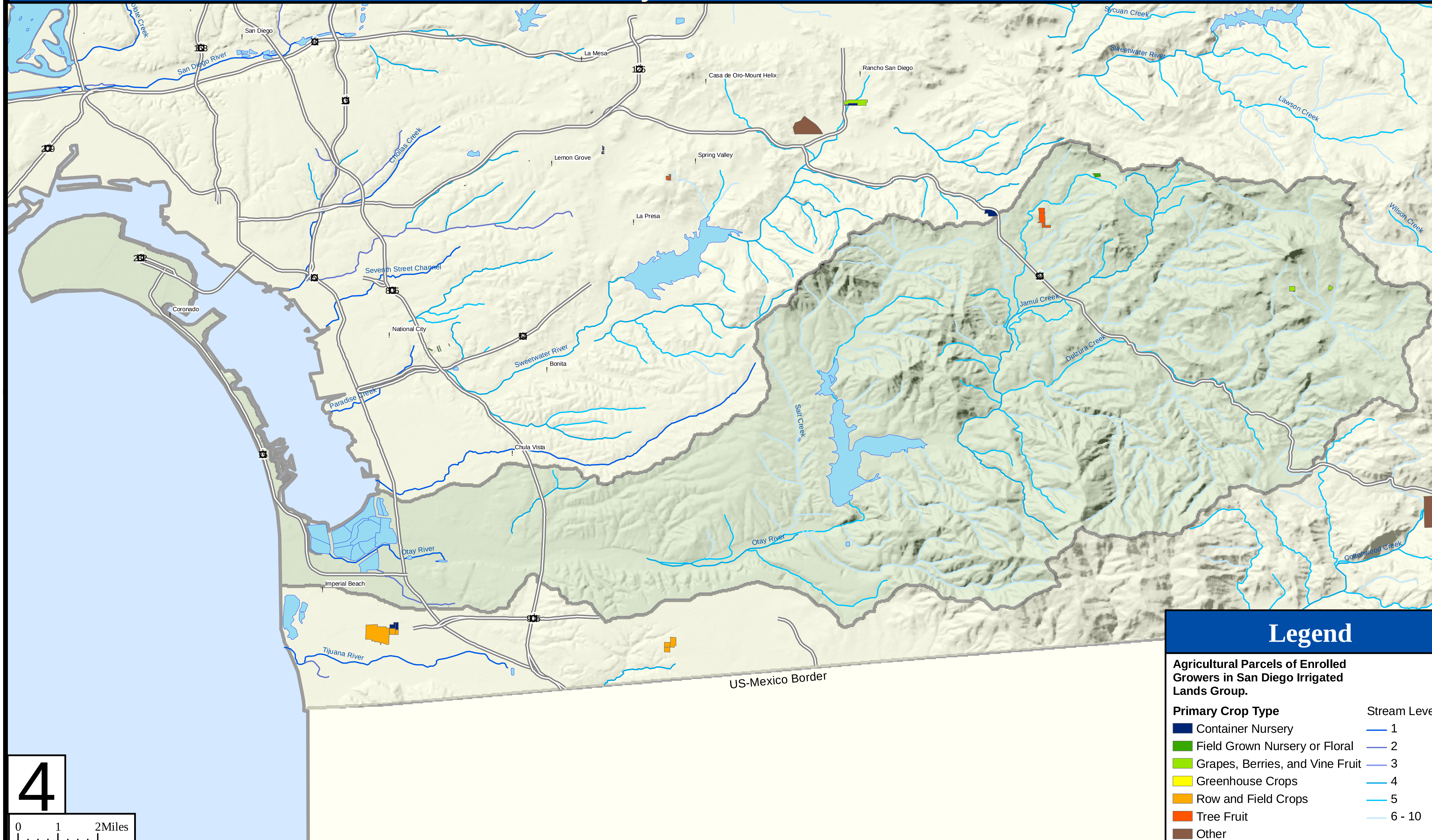
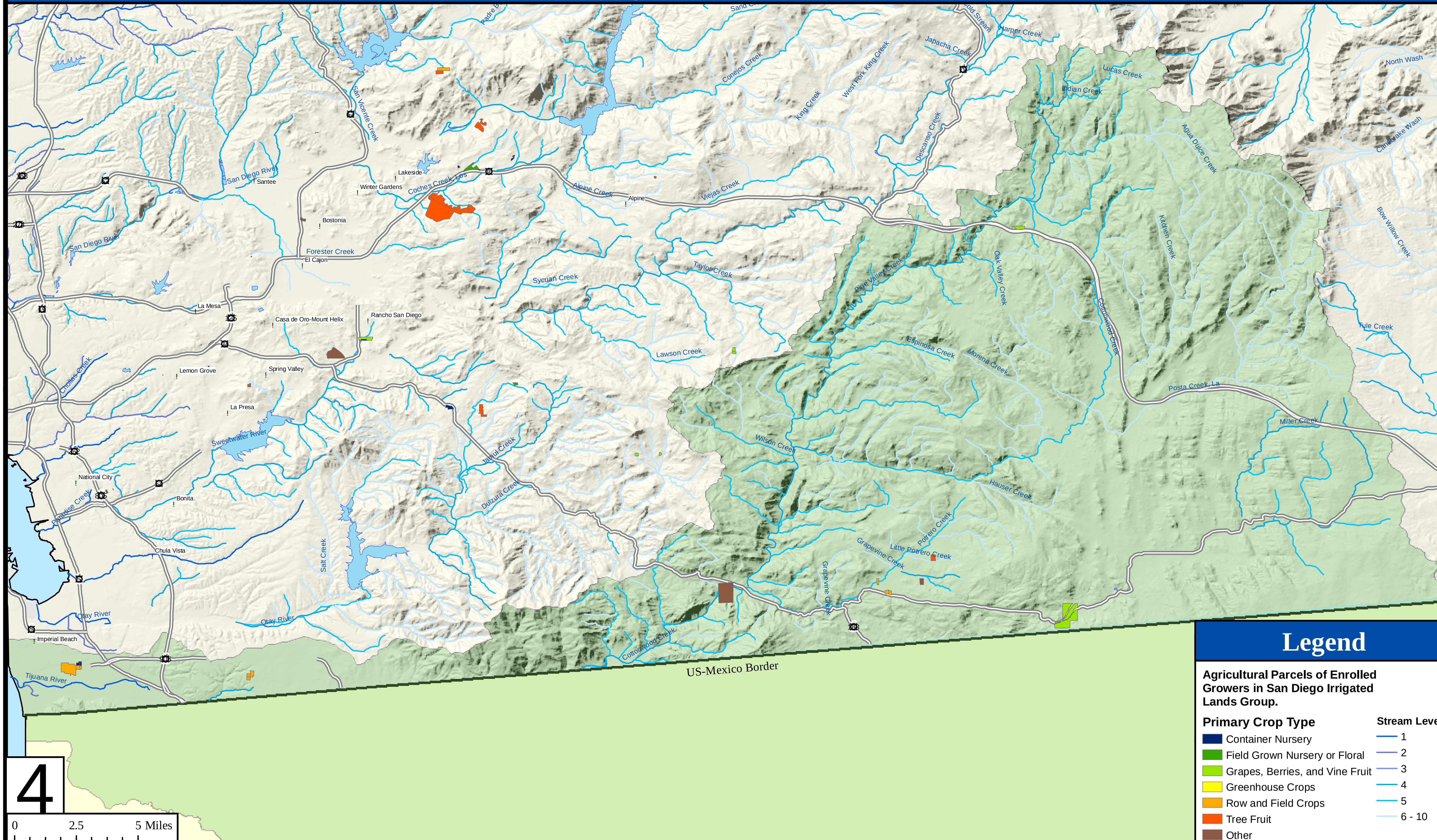


Figure 2.11 San Diego Region Irrigated Lands Group Tijuana Watershed



APPENDIX A

FIELD LOG SHEETS

FIELD EQUIPMENT CHECKLIST

SITE: ____

CLIENT CONTACT/PHONE NUMBER: _____________________________________

REGULATOR/PHONE NUMBER:______________________________________

PERSONAL EQUIPMENT AND SUPPLIES

___ First aid kit

___ Rain Gear and waders

___ Flashlight

___ Cell phone and chargers

___ Map

___ Work Gloves

___ other: _____________________________________

FIELD MEASUREMENT EQUIPMENT AND SUPPLIES

___ Field Log Sheets/Field Folders

___ Field monitoring equipment

___ Multiprobe Sensor Instrument and calibration equipment/solutions

___ Flow meter and wading rods

___ Measuring tape/measuring stick

___ other: _____________________________________

SAMPLING EQUIPMENT AND SUPPLIES

___ Proper number of sample container, including extras. Also bubble wrap and zip locks for containers.

___ Proper labels, including extras

___ COC Forms

___ Nitrile gloves and Tyveks

___ Coolers and ice or artificial ice

___ Decontamination equipment

___ Extra deionized water

___ Dipping pole and clean secondary containers

___ Sheet flow sampling device

___ Peristaltic pump, plus extra batteries

___ Clean sample tubing

___ other: ______________________________________

OTHER OFFICE/FIELD EQUIPMENT AND SUPPLIES

___ Copies of MRPP, QAPP and SOPs

___ Calculator

___ Camera, phone, and watch

___ Extra pens

___ Trash bags

___ other: ______________________________________

SWAMP Field Data Sheet (Water Chemistry & Discrete Probe) - EventType=WQ

Entered in d-base (initial/date) | Pg of Pgs

***StationID:** ___ ___ ___ ___ ___ ___ ___ ___ ___	*Date (mm/dd/yyyy): / /	*Group:	*Agency:
***Funding:** ___ ___ ___ ___ ___ ___ ___ ___	ArrivalTime: DepartureTime:	*SampleTime (1st sample):	*Protocol:
***ProjectCode:**	*Personnel:	*Purpose (circle applicable): WaterChem WaterTox Habitat FieldMeas	*PurposeFailure:

***Location**: Bank Thalweg Midchannel OpenWater	*GPS/DGPS	**Lat (dd.ddddd)**	**Long (ddd.ddddd)**	OCCUPATION METHOD: Walk-in Bridge R/V __________ Other
GPS Device:	**Target:**		-	STARTING BANK (facing downstream): LB / RB / NA
Datum: NAD83 Accuracy (ft / m):	***Actual:**		-	Point of Sample (if Integrated, then -88 in dbase)

Habitat Observations (CollectionMethod = Habitat_generic)

WADEABILITY: Y / N / Unk | BEAUFORT SCALE (see attachment): | DISTANCE FROM BANK (m): | STREAM WIDTH (m): | WATER DEPTH (m):

SITE ODOR: None,Sulfides,Sewage,Petroleum,Smoke,Other______

SKY CODE: Clear, Partly Cloudy, Overcast, Fog, Smoky, Hazy

WIND DIRECTION (from): N W E S

HYDROMODIFICATION: None, Bridge, Pipes, ConcreteChannel, GradeControl, Culvert, AerialZipline, Other LOCATION (to sample): US / DS / WI / NA

OTHER PRESENCE: Vascular,Nonvascular,OilySheen,Foam,Trash,Other___

PHOTOS (RB & LB assigned when facing downstream; RENAME to StationCode_yyyy_mm_dd_uniquecode):
1: (RB / LB / BB / US / DS / ##)
2: (RB / LB / BB / US / DS / ##)
3: (RB / LB / BB / US / DS / ##)

DOMINANT SUBSTRATE: Bedrock, Concrete, Cobble, Gravel, Sand, Mud, Unk, Other__________________

WATERCLARITY: Clear (see bottom), Cloudy (>4" vis), Murky (<4" vis)

PRECIPITATION: None, Fog, Drizzle, Rain, Snow

WATERODOR: None, Sulfides, Sewage, Petroleum, Mixed, Other_____

PRECIPITATION (last 24 hrs): Unknown, <1", >1", None

WATERCOLOR: Colorless, Green, Yellow, Brown

EVIDENCE OF FIRES: No, <1 year, <5 years

OVERLAND RUNOFF (Last 24 hrs): none, light, moderate / heavy, unknown

OBSERVED FLOW: NA, Dry Waterbody Bed, No Obs Flow, Isolated Pool, Trickle (<0.1cfs), 0.1-1cfs, 1-5cfs, 5-20cfs, 20-50cfs, 50-200cfs, >200cfs

Field Measurements (SampleType = FieldMeasure; Method = Field)

	DepthCollec (m)	Velocity (fps)	Air Temp (°C)	Water Temp (°C)	pH	O_2 (mg/L)	O_2 (%)	Specific Conductivity (uS/cm)	Salinity (ppt)	Turbidity (ntu)			
SUBSURF/MID/ BOTTOM/REP													
SUBSURF/MID/ BOTTOM/REP													
SUBSURF/MID/ BOTTOM/REP													
Instrument:													
Calib. Date:													

Samples Taken (# of containers filled) - Method=Water_Grab

Field Dup YES / NO: (SampleType = Grab / Integrated; LABEL_ID = FieldQA; create collection record upon data entry

SAMPLE TYPE: Grab / Integrated | COLLECTION DEVICE: Indiv bottle (by hand, by pole, by bucket); Teflon tubing; Kemmer; Pole & Beaker; Other ___________________

	DepthCollec (m)	Inorganics	Bacteria	Chl a	TSS / SSC	TOC / DOC	Total Hg	Dissolved Mercury	Total Metals	Dissolved Metals	Organics	Toxicity	VOAs
Sub/Surface													
Sub/Surface													

COMMENTS:

PW ENVIRONMENTAL
230 Dove Court, Santa Paula CA 93060
805-525-5563 fax 805-525-2896

FIELD REPORT

Page ____ of ____

Site:	Sampling Event: Wet Dry Date:		
Site Address:	Weather Conditions: Clear Partly Cloudy Cloudy Light Precipitation Raining		
	Visit Duration: Arrival Time: AM PM		Project Manager: Zack Moran
	Departure Time: AM PM		QA Officer: Bryn Home
Nearest Cross Street:	Site Contact:		Prepared By:

Field notes (describe activities, site conditions, runoff pattern, etc.):

Site Visitors (inspectors, regulators, utilities):	Agency/Company:	Title:	Phone Number:

This report presents opinion formed as a result of activity observations relating to environmental field work. PW relies on the contractor, as applicable, to comply with the plans and specifications throughout the duration of the project irrespective of the presence of PW's representative. PW's work does not include supervision or direction of the actual work of the contractor, contractor's employees, and agents. PW will not be responsible for job or site safety on this project, unless PW directed site activities or directed by contract agreement.

Attachments: ______________________

Distribution: ______________________

Signed: ______________________

APPENDIX B

STANDARD OPERATING PROCEDURES FOR WATER SAMPLE COLLECTION

STANDARD OPERATING PROCEDURES
SURFACE WATER SAMPLING

1.0 PREPARATION

Prior to mobilization for each sampling site, project personnel will prepare the necessary field equipment, verify proper bottle orders, and contact all necessary personnel. Due to the variability of the first wet season sampling event, the following items will be prepared two weeks prior to the start of the season:

- Order all necessary sample containers for each sampling event, and double check sample containers.
- Prepare sample labels.
- Prepare, calibrate, and decontaminate all equipment.
- Prepare and review all field logbooks, including the field log sheets.
- Review and confirm equipment checklist (Appendix A of this QAPP).
- Review SWAMP and SOP for sample collection, storage, and data collection with the sampling crew.
- Pre-select sites for each sampler, and review site specific concerns and site locations.

On the day of sampling, the following will be completed:

- Final confirmation of all equipment and laboratory sample containers.
- Verify all equipment is operating properly.
- Coordinate sample pickup with Weck.
- Conduct a final review with the sampling team of quality control procedures and specific site issues.

2.0 LABORATORY INTERACTION

Prior to each sampling season, orders will be placed with Weck for all sampling containers required for the first sampling event, along with all trip blanks, duplicates, and extra containers. All containers will be verified to have the proper preservatives for the analytical methods, if applicable, and are the proper sizes.

3.0 SAMPLE CONTAINER LABELING

All sample containers will be labeled prior to each monitoring event, to the extent possible. Extra labels will be provided in case field observations dictate a change in the sampling. All labels will contain the following information: site name, sample ID, date, time, sampling personnel, preservatives (if applicable), the laboratory conducting the analysis, and the analytical requirements.

4.0 SAMPLE COLLECTION

All samples will be collected in pre-cleaned sample containers supplied by the laboratory. All secondary containers and sampling equipment will be pre cleaned. Clean nitrile gloves will be used for sample collection, and will be changed as appropriate. Field personnel will adhere to the following protocol to minimize the potential for cross contamination:

- No eating or drinking during sample collection
- Nitrile gloves will be changed for each site
- Tobacco products are prohibited near the samples and sample locations
- Personnel will avoid coughing and sneezing near open sample containers
- Samples are not to be collected near a running vehicle.

The sampling crew will also take the necessary precautions to avoid rainwater or surface drip into the sampling containers, to the extent practical.

Grab samples will be collected at the point of the greatest flow, in the center of the stream channel, to the extent possible. The preferred method is to directly submerge the sample container, however, site-specific conditions and runoff patterns will dictate the type of grab sample collected. Grab samples will be collected directly into the appropriate containers, as outlined in the QAPP. The expected types of grab sample techniques are as follows.

a. *Direct Submersion*

   Labeled containers will be opened, submerged approximately mid stream, be filled, and then the lid will be secured. Clean nitrile gloves will be worn at all times. The sample will be immediately put on ice, and subsequent samples will be used following the same procedure. Sample containers with preservative agents WILL NOT use direct submersion sampling. After all samples have been collected, the COC form and the field log will be completed, and the samples will be delivered to the laboratory.

b. *Intermediate Container*

   In the case where direct submersion is not practical or the sample container contains a preservative, an intermediate sample container will be used. The intermediate sample container will be pre-cleaned prior to sample collection, and will be decontaminated in between sampling events. Clean nitrile gloves will be worn at all times. The container could consist of a bucket, a dipping stick, or something that consists of the same composition as the sample containers, depending on site-specific conditions. The intermediate container will be filled through direct submersion, and the sample will be transferred to the appropriate pre-labeled sample containers as quickly as possible. Each sample container will be placed on ice after the containers have been filled. After all samples have been collected, the COC form and the field log will be completed, and the samples will be delivered to the laboratory.

c. *Pumping*

In the case where direct submersion or intermediate container sampling is not applicable, a peristaltic pump will be used. A peristaltic pump will not be used to collect samples analyzed for ammonia. The peristaltic pump will use new sample tubing, and will be properly cleaned between sampling events. Clean nitrile gloves will be worn at all times. Precautions will be used to insure that the sample tubing does not come into contact with stream bed sediments any surfaces that are known not to be clean. One end of the tubing will be placed approximately mid-stream, in a place that will not collect suspended or settled solids. The other end of the tubing will be placed directly above the sample container to collect the appropriate amount of water. Each sample container will be placed on ice after the containers have been filled. After all samples have been collected, the COC form and the field log will be completed, and the samples will be delivered to the laboratory.

5.0 DIRECT MEASUREMENTS

Field measurements and observations will be made prior to samples being collected. Measurements of pH, temperature, dissolved oxygen, conductivity, and turbidity will be conducted using hand held monitoring devices that have been calibrated prior to the measurements. Field measurements will be monitored and calculated according to SWAMP procedures as outlined in Appendix C. Field observations will consist of stream odor, color, suspended materials, habitat observations, and other applicable information as deemed by field personnel. An example of a field-monitoring log is presented in Appendix A. Measurements will be taken at approximately mid-stream when possible. All measurements and observations will be entered into a field log sheet for each site, and will be transferred to an electronic database.

6.0 FIELD PROTOCOL

Field teams will consist of two persons each, and will mobilize for sampling events when weather conditions are appropriate. Sampling will be completed in daylight hours. Before departing, the number and types of sample containers will be verified. The technician will mobilize to the site, and record general information on the field log sheet. After locating the proper sampling location, the appropriate number of samples and duplicates will be collected. After all samples have been collected, the COC form will be completed and direct field measurements will be collected and recorded on the field log. Field observations will also be recorded on the field log sheet. The technician will then proceed to the next designated sampling site. After all sampling sites have been completed, the samples will be delivered to the appropriate laboratory.

APPENDIX C

STANDARD OPERATING PROCEDURES FOR FIELD MEASUREMENT

Marine Pollution Studies Laboratory – Department of Fish and Game (MPSL-DFG) Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in the Surface Water Ambient Monitoring Program (SWAMP)

The SOPs below are for reference and information purposes only, the documents are not required by the Surface Water Ambient Monitoring Program (SWAMP). Please see the SWAMP Quality Assurance Management Plan (http://www.swrcb.ca.gov/swamp/qamp.html) for more information regarding SWAMP QA/QC requirements.

Table of Contents

Field Measurements

Field Data Sheets

Field data sheets are used to record field observations, probe measurements, and water and sediment chemistry sampling. Field data sheets are provided through the Marine Pollution Studies Laboratory website at:
http://mpsl.mlml.calstate.edu/swdwnlds.htm
Click on the *Field Data Sheets* for the most recent versions. There are guidelines provided below to standardize what is recorded on all data sheets and that should be helpful in completing each form. The Beaufort Scale (see at the end of this document) is also used for specifications and equivalent wind speeds for water conditions. The entries discussed below and on the field data sheets are recorded at each sampling site.

Notes to Standardize SWAMP Field Data Sheets (For in the field use)

Upon arrival at a sampling site, record visual observations on the appearance of the water and other information related to water quality and water use.

Key Reminders to identify samples:

1. **Sample Time** is the SAME for all samples (Water, Sediment, & Probe) taken at the sampling event. Use time of FIRST sample as it is important for the chain of custody (COC).
2. **Left Bank/Right Bank**
   Left bank is defined as the bank to the left of the observer when facing downstream, and the *right bank* is to the right of the observer when facing downstream

FIELD OBSERVATIONS: (each one of these observations has a *Comment* field in the database so use comment space on data sheet to add information about an observation if necessary)

1. **DOMINANT SUBSTRATE**: if possible; describe DOMINANT substrate type; use UNK if you cannot see the dominant substrate type
2. **WADEABILITY**: in general, is the water body being sampled wadeable to the average person AT the POINT of SAMPLE
3. **BEAUFORT SCALE**: use scale 0-12; refer to scales listed at the end of this document.
4. **WIND DIRECTION**: records the direction from which the wind is blowing
5. **PICTURES:** Digital photos are taken to help document the actual sampling site. The convention is to take photos facing DOWNSTREAM, overlooking the site. Right bank and left bank are thus defined in this downstream-facing direction. Document any discrepancies from this convention. Only one photo is necessary, if both, left and right

bank, fit into one frame. Record all photos in the field data sheet space to record picture numbers given by camera; be sure to rename accordingly back in the office. All photos should be renamed and saved with the StationCode_yyyy_mm_dd_uniquecode (e.g. 123ABC123_2007_07_01_BBDS).

6. **SITE ODOR**: Note if hydrogen sulfide odor, musty odor, sewage odor, etc. is in the sampling reach
7. **SKY CODE**: Note recent meteorological events that may have impacted water quality
8. **OTHER PRESENCE**: VASCULAR refers to terrestrial plants or submerged aquatic vegetation (SAV) and NONVASCULAR refers to plankton, periphyton etc.
9. **PRECIPITATION**: Note if any precipitation is occurring during sampling
10. **PRECIPITATION LAST 24 HOURS**: Note how much precipitation has occurred within the last 24-h of sampling
11. **WATER ODOR**: Note if the sample water being collected has odor
12. **WATER CLARITY**: this describes the clarity of the water while standing creek side; clear represents water that is clear to the bottom, cloudy may not be clear to bottom but greater than 4" can be seen through the water column.
13. **WATER COLOR**: This is the color of the water from standing creek side
14. **OBSERVED FLOW**: Visual estimates in cubic ft/s.

SAMPLE DETAILS:

1. **EVENT TYPE**: Note the event type based which type of media is being collected
2. **SAMPLE TYPE**: GRAB samples are when bottles are filled from a single depth; INTEGRATED sample are taken from MULTIPLE depths and combined.
   a. GRAB: use 0.1 for subsurface samples; if too shallow to submerge bottle; depth =0
   b. INTEGRATED: -88 in depth sampled, record depths combined in sample comments
3. **SAMPLING CREW**: J. Smith, S. Ride (first person listed is crew leader)
4. **STARTING BANK**: Which side of the stream was accessed first. Bearings are always recorded looking downstream
5. **OCCUPATION METHOD**: What media was used to access the site
6. **TARGET LAT/LONG**: Refers to the existing station location that the sampling crew is trying to achieve; can be filled out prior to sampling
7. **ACTUAL LAT/ LONG**: is the location of the current sample event.
8. **SAMPLE LOCATION**: describes from where IN water body sample was taken: Can be combined; ex: bank/thalweg or midchannel /thalweg
9. **HYDROMODIFICATION:** Describe existing hydromodifications such as a grade control, drainage pipes, bridge, culvert
10. **HYDROMOD LOC**: if there was an IMMEDIATE (with in range potentially effecting sample) hydromodification; was sample taken upstream or downstream of modification; if there is no hydromodification, NA is appropriate
11. **STREAM DEPTH, WIDTH & DISTANCE FROM BANK**: describe in meters at point of sample. Distance from bank should be recorded from the starting bank

Field Data Logbook

A Field Data Logbook or a Field Folder is taken into the field on each sampling trip. The use of bound or loose-leaf notebooks is left up to the entity conducting the monitoring. A good safety precaution against the loss of a bound field data logbook is to photocopy the current pages upon returning from the field. These pages are kept on file at the specific sample collection entity's office. If a loose-leaf notebook is used, take care to remove original field data log sheets from the notebook and file in the office. Copies of the field data log sheets may be left in the notebook for future reference.

Field Data Logbooks (bound or loose leaf sheets) are maintained on file indefinitely in each regional office or contract laboratory office. They are never discarded, since the logbook may be the only written record of field measurements. Field Data Logbooks are reviewed periodically during SWAMP QA site visits. At this point, these field notes are not inclusive of the information that would be collected for biological assessment work, and several other data measurement types.

Flow

Sampling crews should be notified on reconnaissance forms if it is known that there is an operational United States Geological Survey (USGS) gage is located at or nearby a sampling site. If there is a USGS gage nearby, a gage height in feet is recorded and later converted to an instantaneous flow value and recorded in the logbook. The gage height is always to be reported to the USGS for conversion to flow. If a USGS gage is not available, a flow measurement should be taken, if requested. See Instantaneous Flow Measurement information starting on page 13 in this document. In addition, it is recommended that a flow severity value is recorded at each stream or river station that is not tidally influenced. See the Flow Severity section starting on page 13 of this document. Centroid velocity measurements may also be taken as a minimum acceptable rough characterization of the stream flow as requested, although this measurement is not to be recorded as a flow, since it is only a velocity measurement.

Record of Samples Collected for Purposes of Chemical Analysis

The general types of chemical samples to be collected are listed for each site, since this may vary from site-to-site (e.g., metals-in-water, pesticides-in-sediments, routine water quality). Analyses authorization forms are recommended since different authorized laboratories perform different chemical analyses. The method of preservation for each chemical sample is recorded, as appropriate.

Record of Data Submission

The *Logbook* field must indicate in some manner whether data recorded in the logbook has been transcribed onto data forms and submitted to the SWAMP data management staff.

Other Observations

Water Appearance Note general appearance (e.g., color, unusual amount of suspended matter, debris or foam)

Sediment Appearance Color, Odor and sediment composition should be noted.

Weather Note recent meteorological events that may have impacted water quality; (e.g., heavy rains, cold front, very dry, very wet)

Biological Activity Note excessive macrophyte, phytoplankton or periphyton growth. The observation of water color and excessive algal growth is very important in explaining high chlorophyll a values. Other observations such as presence of fish, birds and spawning fish are noted.

Watershed or Instream Activities Note instream or drainage basin activities or events that are impacting water quality (e.g., bridge construction, shoreline mowing, livestock watering upstream).

Record of Pertinent Observations Related to Water Quality and Stream Uses If the water quality conditions are exceptionally poor, note that standards are not met in the observations, (e.g., dissolved oxygen is below minimum criteria). Note uses (e.g., swimming, wading, boating, fishing, irrigation pumps, navigation). Eventually, for setting water quality standards, the level of use will be based on comments related to the level of fishing and swimming activities observed at a station.

Specific Sample Information Note specific comments about the sample itself that may be useful in interpreting the results of the analysis (e.g., number of sediment grabs, or type and number of fish in a tissue sample). If the sample was collected for a complaint or fish kill, make a note of this in the observation section.

Missing Parameters If a scheduled parameter or group of parameters is not collected, make some note of this in the comments.

Field Data Measurements

While collecting water samples (see Field Collection Procedures for Water Samples section), record appropriate field measurements. When field measurements are made with a multiparameter instrument, it is preferable to place the sonde in the body of water to be sampled and allow it to equilibrate in the dissolved oxygen (D.O.) mode while water samples are collected. Field measurements are made at the centroid of flow, if the stream visually appears to be completely mixed from shore to shore. *Centroid* is defined as the midpoint of that portion of the stream width which contains 50% of the total flow. For routine field measurements, the date, time and depth are reported as a grab. Measure Quality Objectives (MQO's) for field measurements are listed in appendix C of the SWAMP QAMP.

Recommended Depths for Conducting Field Data Measurements

Water Depth Less than 5 ft (<1.5 m)

If the water depth is less than 5 ft (1.5 m), grab samples for water are taken at approximately 0.1 m (4 in.), and multi-probe measurements are taken at approximately 0.2 m (8 in.). This is because all sensors have to be submerged, so 0.1 m would not be deep enough. But taking a grab sample at 0.2 m is not always feasible, as it is difficult to submerge bottles to that depth, and in many cases the bottle will hit the stream bottom.

Water Depth Greater than 5 ft (>1.5 m)

If the water depth at the sampling point exceeds 5 ft (1.5 m) in depth, a vertical profile of dissolved oxygen, temperature, pH and specific conductance are made using the multiparameter probe equipment. The depth of the sonde at the time of measurement is most accurately determined from the depth sensor on the multiparameter sonde rather than depth labels on the cable.

Vertical Depth Profiles and Depth-Integrated Sample Collection

If depth integration sampling is being conducted, or if vertical profile measurements are requested, multi-probe measurements are made starting at a depth of 0.2 m, and are then conducted at 1.0, 2.0, 3.0, 4.0, and 5.0 m depths after that until 5.0 m depth is reached. Beginning at 5.0 m, measurements are made every 5.0 m through depth profile.

Field data for multiparameter vertical depth profiles are recorded in final form on the SWAMP Field Data Sheets and submitted to the SWAMP data management staff.
Go to http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Water Temperature (^{O}C)

Water temperature data are recorded for each SWAMP visit in final form in a Field Data Logbook and submitted to the SWAMP data management staff.
See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Temperature Sampling Procedures

Temperature is measured in-stream at the depth(s) specified above. Measuring temperature directly from the stream by immersing a multiprobe instrument or thermometer is preferred.

Hand Held Centigrade Thermometer

If an electronic meter is not available, the temperature is measured with a hand-held, centigrade thermometer (Rawson, 1982).

- In wadeable streams, stand so that a shadow is cast upon the site for temperature measurement.

< Hold the thermometer by its top and immerse it in the water. Position the thermometer so that the scale can be read.

< Allow the thermometer to stabilize for at least one minute, then without removing the thermometer from the water, read the temperature to the nearest 0.1° C and record.

< Do not read temperature with the thermometer out of the water. Temperature readings made with modern digital instruments are accurate to within $\pm 0.1^{\circ}$ C.

Temperature Measurement from a Bucket
When temperature cannot be measured in-stream, it can be measured in a bucket-Nalgene or plastic. Care must be taken to insure a measurement representative of in-stream conditions.

The following conditions must be met when measuring temperature from a bucket:

< The bucket must be large enough to allow full immersion of the probe or thermometer.

< The bucket must be brought to the same temperature as the water before it is filled.

< The probe must be placed in the bucket immediately, before the temperature changes.

< The bucket must be shaded from direct sunlight and strong breezes prior to and during temperature measurement.

< The probe is allowed to equilibrate for at least one minute before temperature is recorded.

< After these measurements are made, this water is discarded and another sample is drawn for water samples which are sent to the laboratory.

pH (standard units)

pH data is recorded for each SWAMP visit in final form on the Field Data Sheets and submitted to the SWAMP data management staff. See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

pH Sampling Equipment
The pH meter should be calibrated according to the recommended procedures for calibration and maintenance of SWAMP field equipment. Calibration directions are listed in the manufactures field equipment operations manual. The pH function is pre and post calibrated every 24 h of use for multiparameter instruments.

pH Sampling Procedures
In-stream Method
Preferably, pH is measured directly in-stream at the depth(s) specified earlier in this document. Allow the pH probe to equilibrate for at least one minute before pH is recorded to the nearest 0.1 pH unit.

pH Measurement from a Bucket
When pH cannot be measured in-stream, it can be measured in a bucket-Nalgene or plastic. The following precautions are outlined above; “Temperature Measurement from a Bucket”.

Potential Problems

< If the pH meter value does not stabilize in several minutes, out gassing of carbon dioxide or hydrogen sulfide, or the settling of charged clay particles may be occurring (Rawson, 1982).

< If out gassing is suspected as the cause of meter drift, collect a fresh sample, immerse the pH probe and read pH at one minute.

< If suspended clay particles are the suspected cause of meter drift, allow the sample to settle for 10 min, then read the pH in the upper layer of sample without agitating the sample.

< With care, pH measurements can be accurately measured to the nearest 0.1 pH unit.

Dissolved Oxygen (mg/L)

Dissolved oxygen (D.O.) data is recorded for each SWAMP visit in final form on a Field Data Sheet and submitted to the SWAMP data management staff.
See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Dissolved Oxygen Sampling Equipment

The dissolved oxygen meter should be calibrated according to the recommended procedures for calibration and maintenance of SWAMP field equipment. Calibration directions are listed in the manufactures field equipment operations manual.

Multiprobe Instrument

Pre and post calibrate the D.O. sensor every 24 h and for elevations greater than 500 ft on the multiprobe instrument. Preferably, D.O. is measured directly in-stream at the depth(s) specified in the Field Measurements section above. The D.O. probe must equilibrate for at least 90 s before D.O. is recorded to the nearest 0.1 % saturation or mg/L. Care must be taken at profile stations to insure that the reading is stable for each depth. Since dissolved oxygen takes the longest to stabilize, record this parameter after temperature, conductivity and pH. If the D.O. probe has an operable, automatic stirrer attached, the D.O. probe does not have to be manually stirred. However, if the probe is not equipped with an automatic stirrer, manual stirring must be provided by raising and lowering the probe at a rate of 1 ft/s (0.3m/s) without agitating the water surface. If the stream velocity at the sampling point exceeds 1 ft/s, the probe membrane can be pointed upstream into the flow and manual stirring can be avoided (Rawson, 1982).

D.O. Measurement from a Bucket

When D.O. cannot be measured in-stream, it can be measured in a bucket-Nalgene or plastic, following precautions outlined in the Temperature Measurement from a Bucket listed above. During equilibration and reading, water should be moved past the membrane surface at a velocity of 1 ft/s (0.3 m/sec), either by automatic stirrer or manual stirring. If stirred manually in a bucket, the water surface is not agitated (Rawson, 1982).

24-Hour Average D.O. (if requested in special study)

Unattended 24-Hour D.O. Data Collection

Why Collect 24-Hour Data

Dissolved oxygen sampling for standards compliance is targeted to water bodies where low instantaneous D.O. levels indicate partial or nonsupport of designated aquatic life uses. Intensive monitoring is conducted with automated equipment that is preset to record and store field measurements hourly over one 24-h period. Four or more dissolved oxygen measurements may also be made manually at 4-6-h intervals over one 24-h period, as long as one is made near sunrise (0500-0900 h) to approximate the daily minimum. However, data collected with automated equipment is preferred.

When to Take Measurements

All 24-h D.O. monitoring events must be spaced over an index period representing warm-weather seasons of the year (approx March 15-October 15), with between one-half to two-thirds of the measurements occurring during the critical period (July 1-September 30). The ***critical period*** of the year is when minimum stream flows, maximum temperatures, and minimum dissolved oxygen concentrations typically occur in area streams. **A flow measurement must be taken at the time of deployment.** In a perennial stream, a 24-h data for standards compliance can not be used if the flow is less than the 7Q2. In perennial streams, the D.O. criterion to do not apply for flows under the 7Q2. A period of about one month must separate each 24-h sampling event. Additional samples may be collected outside the index period to further characterize a water body, but that information is generally not used for assessing standards compliance.

Frequency of Measurements

The measurement interval should be no more than once per 15 min and no less than once per hour.

Where to Take Measurements

For purposes of determining standards compliance with the 24-h average criteria, samples collected near the surface will be considered representative of the mixed surface layer. In deep streams, reservoirs, and tidally influenced water bodies, automated equipment is positioned between 1 foot (from the surface) to one-half the depth of the mixed surface layer. At least 10 24-h monitoring events (using the 24-h criteria and/or absolute minimum criteria) at each site within a 5-year period are recommended to provide adequate data for assessment.

When to Collect Other Routine Samples, if doing 24-hour D.O. measurements

Other routine field measurements and water samples should be collect at either the time of deployment, at the reference check, or when the multiprobe recording 24-h data is retrieved. When ever possible, flow must be measured at the 24-h site.

Priority for Scheduling 24-Hour Sampling Events

- 303d listed waterbodies
- Waterbodies with Concerns for DO problems (too few samples available for full use assessment).

- Occurrence of low D.O. concentrations observed during the day
- Waterbodies with trends indicating declining D.O. concentrations
- Waterbodies which would contribute to an Ecoregion data set

Data Reporting for 24-hour D.O. measurements
Dissolved oxygen values recorded over the 24-h period are summed and divided by the number of measurements to determine the average concentration, which is compared to the 24-h criterion. The lowest D.O. value from each 24-h set is compared to the minimum criterion. There will be occasions when a complete 24-h data set won't be possible. For example, if there are 18 measurements instead of 24, a time weighted diurnal average needs to be calculated. This can be easily done using GW Basic.

Support of assigned aquatic life use is based on 24-h D.O. average and minimum criteria for each monitoring event. Report the 24-h average D.O. value, number of measurements over a 24-h period, and the minimum, and maximum values. Report data as a time composite sample with a beginning and ending date and time, covering the 24-h period measured.

Specific Conductance (µS/cm)

Specific conductance should be recorded for each SWAMP visit in final form on a Field Data Sheet and submitted to the SWAMP data management staff.
See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Specific Conductance Sampling Equipment
The conductivity meter should be calibrated according to the recommended procedures for calibration and maintenance of SWAMP field equipment. Calibration directions are listed in the manufactures field equipment operations manual.

Specific Conductance Sampling Procedure
Preferably, conductivity is measured directly in-stream at the depth(s) specified earlier in this document. Allow the conductivity probe to equilibrate for at least one minute before specific conductance is recorded to three significant figures (if the value exceeds 100). The primary physical problem in using a specific conductance meter is entrapment of air in the conductivity probe chambers. The presence of air in the probe is indicated by unstable specific conductance values fluctuating up to $\pm$100 µS/cm. The entrainment of air can be minimized by slowly, carefully placing the probe into the water; and when the probe is completely submerged, quickly move it through the water to release any air bubbles.

If specific conductance cannot be measured in-stream, it should be measured in the container it can be measured in a bucket-Nalgene or plastic. The following precautions are outlined above; "Temperature Measurement from a Bucket".

Salinity (parts per thousand--ppt, or ‰)
The value for salinity is computed from chloride concentration or specific conductance. The calculation assumes a nearly constant ratio for major ions in an estuary when seawater is diluted

by river water. This assumption does not hold for cases where salinity is less than about three parts per thousand. Salinity determinations at such low values are only approximate. In estuarine waters, salinity is a relevant and meaningful parameter. Often the salinity may be low, approaching that of freshwater. Nevertheless, this is useful information. Determine if a station is estuarine from historical records (i.e., experiences cases where salinity is >2.0 ppt) and always report salinity at this station, regardless of the salinity during periods of high flow.

Salinity is measured directly in-stream at the depth(s) specified earlier in this document. Salinity data should be recorded for each SWAMP visit in final form on a Field Data Sheet and submitted to the SWAMP data management staff. See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Values between 2.0 ppt and 1.0 ppt should be reported as <2.0 ppt rather than the actual value and values <1.0 ppt should be reported as <1.0 ppt. The field instruments compute salinity from specific conductance and temperature, and display the value in parts per thousand. Report salinity values above 2.0 ppt to the nearest 0.1 ppt.

Secchi Disc Transparency (meters)--if requested in special study

Secchi disk transparency should be recorded for each SWAMP visit in final form on a Field Data Sheet and submitted to the SWAMP data management staff. See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Secchi Disk Sampling Equipment

< Secchi disk, 20 cm in diameter
< Measuring tape

Secchi Disk Transparency Sampling Procedures

Preferably, Secchi disk transparency is measured directly in-stream wherever conditions allow. The Secchi disk should be clean, weighted and suspended with chain, wire, or Dacron line (the line used to suspend the Secchi disk should not be nylon or cotton; stretching may cause erroneous readings). Another option is to attach the Secchi disk to a metal rod calibrated in metric units.

Average Turbidity

The Secchi disk should be lowered vertically in a location shielded from direct sunlight. Glare from the water's surface will affect the accuracy of the measurement. Don't wear sunglasses.

Slowly lower the disk until it disappears from view. The person viewing the disk should maintain an eye level of less than two meters above the water's surface. Note the depth at which the disk disappears from view.

Slowly raise the disk until it becomes visible. Note the depth at which the disk reappears.

Compute the mathematical average of the two depths noted and record the average value to two significant figures in the field logbook. The recorded average value is the Secchi disk transparency.

High Turbidity (Muddy Water)

In streams with very high turbidity, high velocity, and/or poor access, it may be necessary to measure Secchi disk transparency in a bucket. Fill the bucket from the centroid of flow being careful not to disturb the substrate.

Follow steps above for measuring the Secchi disk depth within 30 s after raising the filled bucket from the water's surface. Or, re-suspend the solids by stirring, then quickly make the measurement.

Record Secchi disk transparency to two significant figures.

Low Turbidity (Clear Water)

Some bodies of water will be so clear and shallow that it will not be possible to lower the Secchi disk until it disappears from view.

Measure and record the depth at the deepest point accessible. Report Secchi disk transparency as greater than the deepest depth measured.

Example (Low Turbidity): South Fork Rocky Creek is a small (<1 ft^3/s) clear stream. The stream in the vicinity of the sampling site was less than 1 m deep and the bottom was clearly visible everywhere. However, a pool was located in the stream next to a bridge. The maximum depth of the pool was 2.6 m at which depth the Secchi disk was still visible. Therefore, Secchi disk transparency for South Fork Rocky Creek was recorded as > 2.6 m.

Importance of Secchi Disk Data

Eutrophication, the natural aging process in reservoirs and lakes is accelerated by human activities which add nutrients to lakes, reservoirs, and the surrounding watersheds. Section 314 of the Clean Water Act (CWA) of 1987 requires all states to classify lakes and reservoirs according to trophic state. Although chlorophyll a is the most direct measure of algal biomass, other indices and programs utilize Secchi disk depth as the primary factor.

Turbidity Measurement with Turbidity Meter

Nephelometric Turbidity can be determined by measuring the amount of scatter when light is passed through a sample using a turbidity meter. The LaMotte 2020 Turbidity meter is a suitable instrument for example.

Meters should be calibrated using a standard close to the expected sample value.

For instructions on how to operate the instruments refer to the manufacturer's manual. Turbidity measurements can be executed together with water sampling. The turbidity sample has to be representative for the sampled water mass. Make sure that no gas bubbles are trapped in the vial for the reading and that the outside of the vial is wiped completely clean (i.e., meaning free of moisture, lint and fingerprints). Take several measurements to assure an accurate reading. Do not record values that vary greatly. If variations are small, record an average. If settling particles are present, record a reading before and one after settling. The meter might have to be recalibrated with a different standard, if the sample water readings are outside of the calibration standard limits.

Days Since Last Significant Precipitation

Significant precipitation is defined as any amount that visibly influences water quality. Water quality in small to medium streams and in the headwaters of many reservoirs is influenced by runoff during and immediately after rainfall events. This influence is site specific and poorly studied. As part of a new initiative to understand and regulate the adverse effects of runoff, SWAMP would like to associate recent rains or melted snow with ambient water quality, using a parameter defined as "days since last significant precipitation". Record the number of days, rounded to the nearest whole number, since a rain has occurred that, in the best professional judgment of monitoring personnel, may have influenced water quality. If it is raining when the sample is collected, or has rained within the last 24-h, report a value of <1. If it has been a long time since a significant rain, record this as greater than that particular value, for example >7 days. If confidence about the recent history of precipitation is low, draw a line through the space on the data form.

Flow Severity -- recommended new parameter

Flow severity should be noted for each SWAMP visit to <u>non-tidally influenced flowing streams</u> and submitted in the comments on the SWAMP Field Data Sheet. It should be recorded even if flow is visible but not measurable on that sampling visit. There are no numerical flow guidelines associated with flow severity. This is an observational measurement that is highly dependent on the knowledge of monitoring personnel. It is a simple but useful piece of information when assessing water quality data. For example, a bacteria value of 10,000 with a flow severity of 1 would represent something entirely different than the same value with a flow severity of 5. The six flow severity values are; 1=No Flow, 2= Low Flow, 3 = Normal Flow, 4 = Flood, 5 = High Flow, and 6 = Dry. The following are detailed descriptions of severity values:

1 **No Flow** When a flow severity of one (1 = no flow) is recorded for a sampling visit, then a flow value of zero ft^3/s should also be recorded for that sampling visit. **A flow severity of one (1) (no flow) describes situations where the stream has water visible in isolated pools.** There should be no obvious shallow subsurface flow in sand or gravel beds between isolated pools. Low flow does not only apply to streams with pools. It also applies to long reaches of bayous and streams that have no detectable flow but may have water from bank to bank.

2 **Low Flow** When stream flow is considered low a flow severity value of two (2) is recorded for the visit and the corresponding flow measurement is also recorded for that visit. In streams too shallow for a flow measurement but with detected water movement, record a value of < 0.10 cfs. Note: Use a stick or other light object to verified the direction of water movement (i.e., movement is downstream and not the affect of wind.) What is low for one stream could be high for another.

3 **Normal Flow** When stream flow is considered normal, a flow severity value of three (3) is recorded for the visit and the corresponding flow measurement is also be recorded for that visit. Normal is highly dependent on the stream. Like low flow, what is normal for one could be high or low for another stream.

4 and 5 **Flood and High Flow** Flow severity values for high and flood flows have long been established by EPA and are not sequential. Flood flow is reported as a flow severity of four (4) and high flows are reported as a flow severity of five (5). High flows would be characterized by flows that leave the normal stream channel but stay within the stream banks. Flood flows are those which leave the confines of the normal stream channel and move out on to the flood plain.

6 **Dry** When the stream is dry a flow severity value of six (6 = dry) is recorded for the sampling visit. In this case the flow is not reported. This will indicate that the stream is completely dry with no visible pools.

Flow information for over 200 USGS sites is available on the Internet. The address is **http://water.usgs.gov/index.html**. This is useful information in determining flow conditions prior to sampling. This information may be included in general observations.

Flow Measurement Method (Reporting)

The method (or instrument) used to measure flow is noted by reporting a method number. The method numbers are:

1- Flow Gage Station (USGS/IBWC)	3- Electric (ex. Marsh-McBirney)
2- Mechanical (ex. Pigmy meter)	4- Weir/Flume
5- Other (orange peel, etc.)	

Flow (ft^3/s)
If requested, flow data should be recorded for each monitoring visit to non-tidal, flowing streams. Flow data should be recorded in final form on a Field Data Sheet and submitted to the SWAMP data management staff. See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting. The following are two exceptions to the flow reporting requirement:

No Flow/ Pools If there is no flow at a stream site and accessible, isolated pools remain in the stream bed, collect and report the required field data and laboratory samples from the pools and report instantaneous flow. Under these conditions, flow (ft^3/s) should be reported as zero. The reported flow severity value should be one. Pools may represent natural low-flow conditions in some streams and the chemistry of these pools will reveal natural background conditions.

Dry If the stream bed holds no water, the sampling visit is finished. Report that the stream was "dry" in the observations and record a value of six (meaning "dry") for flow severity. No value is reported for flow since there is no water.

Flow Measurement

If a flow measurement is required at a site, measure and record flow after recording visual observations. The intent of measuring flow first is to delay collection of chemical and biological water samples with limited holding times. Care must be taken not to collect water samples in the area disturbed during flow measurement. There are several acceptable flow measurement methods that can be used.

U.S. Geological Survey (USGS) Gaging Station
Some SWAMP Stations are sampled at sites where the USGS maintains flow gaging equipment. On any type of sampling visit to a site that has a USGS flow gage, observe and record the gage height to the nearest hundredth of a foot in the field logbook. Upon return to the office, contact the USGS office responsible for maintaining the gage. USGS personnel can provide the flow value in cubic feet per second (ft^3/s) that corresponds to the gage height. Although SWAMP personnel may have a rating curve available to them, shifts associated with changes in the stream bed may occur over time. Always call the USGS to determine the shift. At some sites the shift changes frequently. At others, the relation between stream flow and gage height is almost unchanging. If a gage is no longer maintained by USGS, cross out the recorded gage height and be prepared to measure flow by another method on the return visit to that site.

Several factors may influence the accuracy of the USGS rating curves that are used to convert gage height to flow. If there is any doubt about the accuracy of a USGS gage height reading or flow rating curve, sampling personnel should measure the flow if possible.

Gage height may be indicated at a USGS gage by one of three methods:

Staff Gage

Staff gages are enameled steel plates (with the appearance of large measuring tapes) bolted to some stable structure. For example, staff gages may be bolted to concrete bridge abutments, pillars, or docks. The staff gage face is white with black lettering and gradations. The gradations shown are feet, tenths of a foot, and 0.02 of a foot. The point at which the water level crosses the staff gage should be recorded to the nearest hundredth of a foot.

Wire Weight Gage

Wire weight gages are locked, metal boxes with approximate dimensions of 15 in. long x 12 in. tall x 12 in. deep. Wire weight gages are usually affixed to bridge rails near mid-stream. They must be unlocked with a USGS key. The wire weight gages house a weight attached by wire cable to a graduated reel (gradations are tenths and hundredths of feet) with a counter at one end.

When the reel is released the weight can be gradually lowered until the bottom of the weight contacts the water surface. At the point of contact, the weight causes the water surface to ripple slightly. Maintaining the weight in that position, record the counter value to the nearest whole number and the point indicated by the stylus on the graduated reel to the nearest hundredth of a foot. Determine if the gage is the movable type that can be moved to multiple locations on the bridge. This type is common on braided streams. A correction value is stamped on the bridge near each point that the gage can be attached. Record the corrected value as the gage height in feet.

Bubble Gage

Bubble gages are locked in metal sheds that are approximately 4 ft wide x 4 ft deep x 6.5 ft tall. The gage houses are most frequently located on the shore near a bridge but sometimes are attached to bridge pillars near mid-stream or established on the stream bank far from any bridge. The gage house must be unlocked with a USGS key. Bubble gages in gage houses usually indicate the gage height in two or three locations. A counter attached to the manometer system indicates gage height in feet. Some gage houses have stilling wells that can be entered. Often there is a staff gage on the inside wall.

Most bubble gages are also equipped with digital recorders. Digital recorders consist of two white, coded discs, approximately 4 in. in diameter with a punch tape overlapping a portion of each disc. The discs are marked with 100 gradations. As the front of the digital recorder is viewed, the stylus at the disc on the left indicates height in feet. The stylus at the disc on the right indicates gage height in hundredths of feet. The gage height from both discs should be added and the number recorded in the field logbook as gage height to the nearest hundredth of a foot.

Many USGS metal sheds also contain a surface level recorder. This devise can be opened to determine how stable stream flow has been prior to the sampling event. Record observations concerning the flow hydrograph.

Instantaneous Flow Measurement

Water quality monitoring visits to sites where there are no nearby USGS flow gauges will require water quality monitoring personnel to measure flow, when requested by Regional Water Quality Control Boards (Regional Boards).

Flow Measurement Equipment

Flow meter

One of the following or an equivalent:

< Marsh-McBirney Electronic meter
< Montedoro-Whitney Electronic meter
< Price Pigmy meter (with timer and beeper)
< Price meter, Type AA (with Columbus weight)

Additional Equipment

< Top-setting wading rod (preferably measured in tenths of feet)(see Figure 1).
< Tape measure (with gradations every tenth of a foot).

Flow Measurement Procedure (USGS, 1969)

Select a stream reach with the following characteristics:

< Straight reach with laminar flow (threads of velocity parallel to each other) and bank to bank. These conditions are typically found immediately upstream of riffle areas or places where the stream channel is constricted.
< The site should have an even streambed free of large rocks, weeds, and protruding obstructions that create turbulence. The site should not have dead water areas near the banks, and a minimum amount of turbulence or back eddies.

Flat Streambed Profile (cross section)

Stretch the measuring tape across the stream at right angles to the direction of flow. When using an electronic flow meter, the tape does not have to be exactly perpendicular to the bank (direction of flow). When using a propeller or pigmy type meter, however, corrections for deviation from perpendicular must be made.

If necessary and possible, modify the measuring cross section to provide acceptable conditions by building dikes to cut off dead water and shallow flows, remove rocks, weeds, and debris in the reach of stream one or two meters upstream from the measurement cross section. After modifying a streambed, allow the flow to stabilize before starting the flow measurement.

Record the following information on the flow measurement form (see example Flow Measurement Forms at end of this document):

< Station Location and Station ID
< Date
< Time measurement is initiated and ended
< Name of person(s) measuring flow
< Note if measurements are in feet or meters
< Total stream width and width of each measurement section
< For each cross section, record the mid-point, section depth and flow velocity

Measuring the Stream Width
Measure and record the stream width between the points where the tape is stretched (waters edge to waters edge).

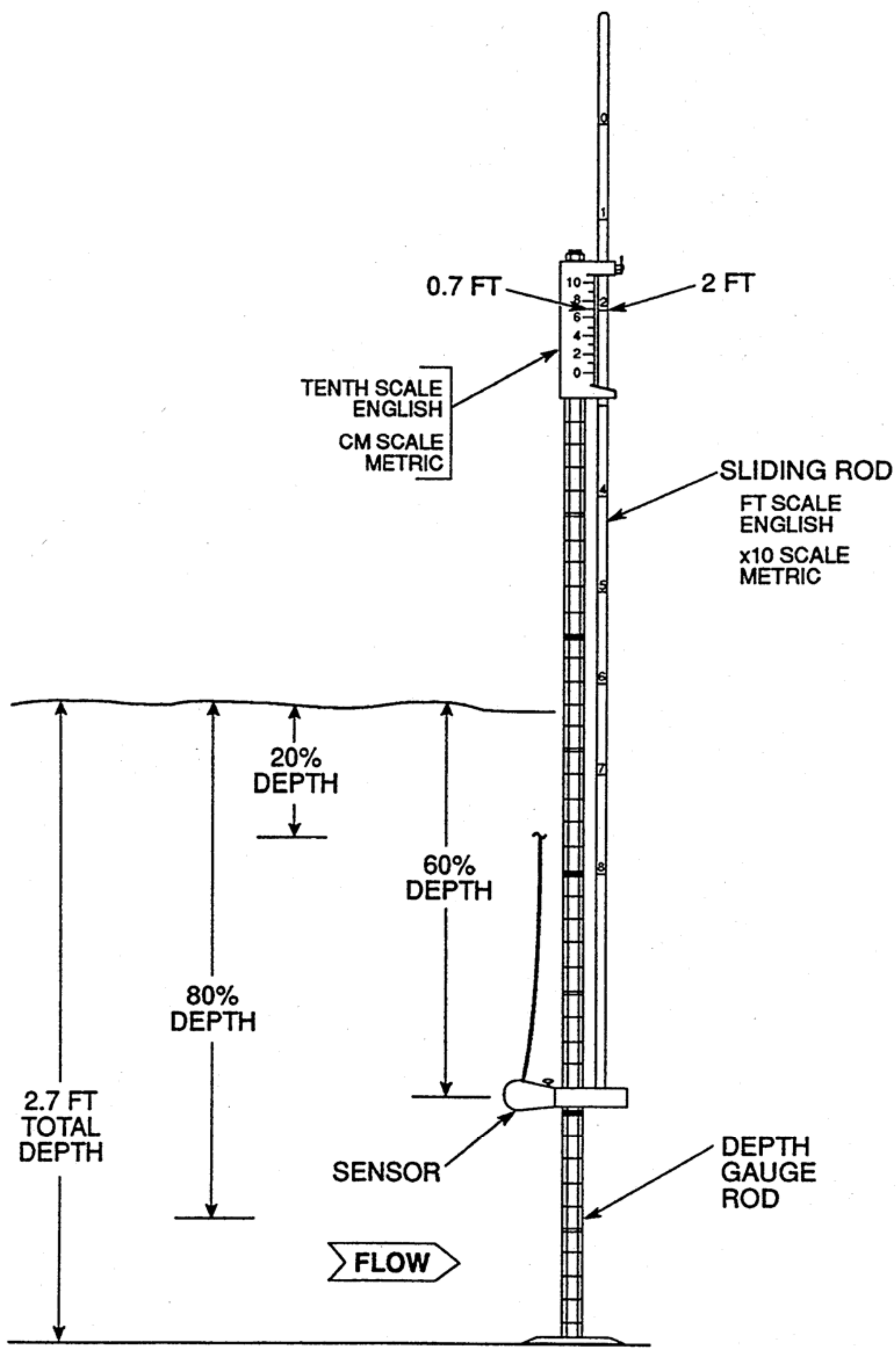
Determining the Number of Flow Cross Sections
Determine the spacing and location of flow measurement sections. Some judgment is required depending on the shape of the stream bed. Measurements must be representative of the velocity within the cross-section. If the stream banks are straight and the depth is nearly constant and the bottom is free of large obstructions, fewer measurements are needed, because the flow is homogeneous over a large section. Flow measurement sections do not have to be equal width. However, they should be unless an obstacle or other obstruction prevents an accurate velocity measurement at that point. ***No flow measurement section should have greater than 10% of the total flow.***

If the *stream width is less than 5 ft*, use flow sections with a width of 0.5 ft (See example 1 on page 23 of this document). If the *stream width is greater than 5 ft*, the minimum number of flow measurements is 10. The preferred number of flow measurement cross sections is 20-30 (See Example 2 on page 24 on this document). The total stream width is 26 ft with 20 measurements, section widths will be 1.3 ft (26/20 = 1.3).

Determining the Mid-Point of the Cross Section
To find the mid-point of a cross section, divide the cross section width in half. Using Example 2 (see forms at end of document);

- The total stream width is 26 ft with 20 cross sections and each cross section width is equal to 1.3 ft.
- Divide 1.3 ft in half and the mid-point of the first section is 0.65 ft. In this example the tape at waters edge is set at zero (0) ft.
- By adding 0.65 to zero the mid-point of the first section is 0.65 ft.
- Each subsequent mid-point is found by adding the section width (1.3 ft) to the previous mid-point. For example; MIDPOINT #1 is 0.65 + 0.0 = 0.65; MIDPOINT #2 is 0.65 + 1.3= 1.95 ft; MIDPOINT #3 is 1.95 + 1.3 = 3.25 ft and ....MIDPOINT # 20 is 24.05 +1.3.
- Place the top setting wading rod at 0.65 ft for the first measurement.
- Using a top setting wading rod, measure the depth at the mid-point of the first flow measurement section and record to the nearest 0.01 ft.

Figure 1. Top-Setting Wading Rod (Marsh-McBirney)



Adjusting the Sensor Depth at a Cross Section

Adjust the position of the sensor to the correct depth at each mid-point. The purpose of the top setting wading rod is to allow the user to easily set the sensor at 20%, 60%, and 80% of the total depth. The total depth can be measured with the *depth gage rod*. Each single mark represents 0.10 foot, each double mark represents 0.50 foot, and each triple mark represents 1.00 foot (see Figure 2).

For Depths < 2.5 Ft	If the depth is less than 2.5 ft, only one measurement is required at each measurement section. To set the sensor at 60% of the depth, line up the foot scale on the *sliding rod* with the *tenth scale*, located on top of the depth gage rod. If, for example, the total depth is 2.7 ft (as shown on Figure 2), then line up the 2 on the foot scale with the 7 on the tenth scale (Marsh-McBirney 1990).
For Depths > 2.5 Ft	If the depth is greater than 2.5 ft, two measurements should be taken at 20% and 80% of the total depth. To set the sensor at 20% of the depth, multiply the total depth by two. For example, if the total depth is 2.7 ft, the rod would be set at 5.4 ft (2.7 x 2). Line up the 5 on the sliding rod with the 4 on the tenth scale.
For Depths > 2.5 Ft (cont)	To set the sensor at 80% of the depth, divide the total depth by two. For example, the total depth is 2.7 ft the rod would be set at 1.35 ft (2.7/2). Line up the 1 on the sliding rod with the 0.35 on the tenth scale. The average of the two velocity measurements is used in the flow calculation. See page 2-36 for an example of a flow form recording measurements for depths greater than 2.5 ft. NOTE: The point where the rod is set for 20 and 80% of the depth will not equal values derived by calculating 20 and 80% of the total depth.

Measuring Velocity (this has typically been measured at 6/10 of the total depth, for velocity-only measurements)

< Position the meter at the correct depth and place at the mid-point of the flow measurement section. Measure and record the velocity and depth. The wading rod is kept vertical and the flow sensor kept perpendicular to the tape rather than perpendicular to the flow while measuring velocity with an electronic flow meter. When using a propeller or pigmy-type meter, however, the instrument should be perpendicular to the flow.

< Permit the meter to adjust to the current for a few seconds. Measure the velocity for a minimum of 20 s with the Marsh-McBirney and Montedoro-Whitney meters. Measure velocity for a minimum of 40 s (preferably 2 min with the Price and pigmy meters).

< When measuring the flow by wading, stand in the position that least affects the velocity of the water passing the current meter. The person wading stands a minimum of 1.5 ft downstream and off to the side of the flow sensor.

- A flow sensor, equipped with cable and weight may be used to measure flows where the water is too deep to wade. Follow the procedure involving meters attached to wading rods.
- Report flow values less than 10 ft^2/s to two significant figures. Report flow values greater than 10 ft^3/s to the nearest whole number, but no more than three significant figures.
- In cases where the flow is low and falling over an obstruction, it may be possible to measure the flow by timing how long it takes to fill a bucket of known volume.

Avoid measuring flow in areas with back eddies. The first choice would be to select a site with no back eddy development. However, this can not be avoided in certain situations. Measure the negative flows in the areas with back eddies. These negative values will be included in the final flow calculation.

Calculating Flow

To calculate flow, multiply the width x depth (ft^2) to derive the area of the flow measurement section. The area of the section is then multiplied by the velocity (ft/s) to calculate the flow in cubic feet per second (cfs or ft^3/sec) for that flow measurement section. When flow is calculated for all of the measurement sections, they are added together for the total stream flow (see Figure 2).

Q=Total Flow (or discharge), W=Width, D=Depth, V=Velocity.

$$Q = (W_1 * D_1 * V_1) + (W_2 * D_2 * V_2) + \ldots\ldots (W_n * D_n * V_n)$$

What to Do with Negative Values

<u>Do not</u> treat cross sections with negative flow values as zero. Negative values obtained from areas with back eddies should be subtracted during the summation of the flow for a site.

Flow Estimate (ft^3/s)

Flow estimate data may be recorded for a non-tidally influenced stream when it is not possible to measure flows by one of the methods described above. Flow estimates are subjective measures based on field personnel's experience and ability to estimate distances, depths, and velocities. If flow can not be measured at a routine non-tidal station, a new site should be selected where flow can be measured.

Flow Estimate Procedure

- Observe the stream and choose a reach of the stream where it is possible to estimate the stream cross section and velocity.
- Estimate stream width (ft) at that reach and record.
- Estimate average stream depth (ft) at that reach and record. Estimate stream velocity (ft/s) at that reach and record. A good way to do this is to time the travel of a piece of floating debris. If doing this method from a bridge, measure the width of the bridge. Have one person drop a floating object (something that can be distinguished from other

floating material) at the upstream side of the bridge and say start. The person on the downstream side of the bridge will stop the clock when the floating object reaches the downstream side of the bridge. Divide the bridge width by the number of seconds to calculate the velocity. The velocity can be measured at multiple locations along the bridge. These velocities are averaged. If this is done alone, watch for road traffic.

< Multiply stream width (ft) times average stream depth (ft) to determine the cross sectional area (in ft^2) which when multiplied by the stream velocity (in ft/s) and a correction constant, gives an estimated flow (ft^3/s).

<u>Example</u>*:* A stream sampler conducted a sampling visit to a stream while the flow meter was being repaired. The sampler looked at the creek downstream from the bridge and saw a good place to estimate flow. The stream width was around 15 ft. It appeared the average depth on this reach was about 0.75 ft. The sampler timed a piece of floating debris as it moved a distance of 10 ft in 25 s downstream over the reach. An estimated flow with a smooth bottom was calculated using the following formula.

Width x Depth x Velocity x A (correction factor)= estimated flow
15 ft (width) x 0.75 ft (depth) x 2.5 ft/s (velocity) x A =25 ft^3/s (cfs)

A is a correction constant: 0.8 for rough bottom and 0.9 for smooth bottom

Estimated flow should be reported to one or two significant figures.

Experienced field personnel are able to estimate flow to within 20% of actual flow for total flows less than 50 ft^3/s. The best way to develop this skill is to practice estimating flow before making measurements at all monitoring visits to non-tidally influenced flowing streams and then compare estimated flows with those obtained from USGS gages or from instantaneous flow measurements

Figure 2. Stream Flow (Discharge) Measurement

Example 1.
Stream Flow (Discharge) Measurement
Small Stream < 5 Ft Wide and #2.5 Ft Deep

Stream:___**_OAK CREEK**______________________________________Date:__**5/29/91**___ ______
Station Description:_____**at US Hwy 90A**________ ____________________________
Time Begin:__**1545**______Time End:__**1630**_______Meter Type:_**_Marsh-McBirney**_____________
Observers:_____**BK/MK**_______Stream Width*:____**5 ft**_____ Section Width:____**0.5 ft**_________ _
Observations:____

Section Midpoint (ft)	Section Depth (ft)	Observational Depth** Ft	Velocity At Point (ft/s)	Velocity Average (ft/s)	Area W x D (ft^2)	Discharge (Q) V x A (ft^3/s)
0.25	0.55			0.05		0.01375
0.75	0.80			0.11		0.044
1.25	0.85			0.27		0.42635
1.75	0.90			0.49		0.2205
2.25	1.10			0.58		0.275
2.75	1.50			0.72		0.540
3.25	1.20			0.76		0.456
3.75	0.90			0.76		0.342
4.25	0.75			0.44		0.165
4.75	0.30			0.00		0.00
					Total Discharge (3Q) (ft^3/s)	**2.4826**

$m^3/s \times 35.3 = ft^3/s$

Example 2.

Stream Discharge Measurement Example (Larger Stream > 5 Ft and #2.5 Ft Deep)

Stream:___**_RED RIVER**_______________________________________Date:__**5/28/91**___________

Station Description:_____**Post Oak Creek 40 m Below Sherman WWTP Outfall**__________________

Time Begin:__**1542**_____________Time End:__**1601**_____Meter Type:_**Marsh-McBirney**_________

Observers:_____**CM, EW, DO**_______Stream Width*:____**26 ft**___ Section Width:___**1.3 ft**_______

Observations:____

Section Midpoint (ft)	Section Depth (ft)	Observational Depth** ft	Velocity		Area W x D (ft^2)	Discharge (Q) V x A (ft^3/s)
			At Point (ft/s)	Average (ft/s)		
0.65	0.55			2.03	0.715	1.451
1.95	0.40			2.04	0.520	1.061
3.25	0.42			2.02	0.546	1.103
4.55	0.38			1.77	0.494	0.874
5.25	0.40			1.75	0.520	0.910
7.15	0.42			1.93	0.546	1.054
8.45	0.40			1.99	0.52	1.035
9.75	0.37			1.92	0.481	0.924
11.05	0.37			1.56	0.481	0.750
12.35	0.43			1.32	0.559	0.738
13.65	0.40			1.36	0.520	0.707
14.95	0.42			1.33	0.546	0.726
16.25	0.40			1.35	0.520	0.702
17.55	0.45			1.64	0.585	0.959
18.85	0.48			1.70	0.624	1.061
20.15	0.48			2.00	0.624	1.248
21.45	0.50			1.95	0.650	1.268
22.75	0.40			2.18	0.520	1.134
24.05	0.48			1.71	0.624	1.067
25.35	0.50			0.60	0.650	0.390
$m^3/s \times 35.3 = ft^3/s$			**Total Discharge (3Q) (ft^3/s)**			**19.162**

Example 3.

Stream Flow (Discharge) Measurement (Larger Stream > 5 Ft and >2.5 Ft Deep)

Stream:____ARROYO COLORADO______________________________Date:__**6/16/98**__________

Station Description:_____Downstream of Harlingen WWTP___________________________________

Time Begin:__**1400**______Time End:__**1445**_____Meter Type:_**__Marsh-McBirney**______________

Observers:_____**JD, CK**______ __Stream Width*:___**47.5 ft**___ Section Width:___**2.375 ft**________

Observations: *Note that the starting point is at 4.7 ft on the measuring tape and not zero.

Section Midpoint (ft)	Section Depth (ft)	Observational Depth** ft	Velocity At Point (ft/sec)	Velocity Average (ft/sec)	Area W x D (ft^2)	Discharge (Q) V x A (ft^3/s)
4.70	0.73			0.65	1.73	1.127
7.08	1.10			1.08	2.61	2.822
9.45	1.85			0.90	4.39	3.954
11.83	2.20			1.05	5.23	5.486
14.20	2.20			1.44	5.23	7.531
16.58	2.45			1.09	5.82	6.342
18.95	2.55	0.20 0.80	1.75 1.76	1.76	6.06	10.659
21.33	2.60	0.20 0.80	1.79 1.32	1.56	6.18	9.633
23.70	2.70	0.20 0.80	1.63 1.26	1.45	6.41	9.298
26.10	3.05	0.20 0.80	1.68 1.15	1.42	7.24	10.286
28.48	3.10	0.20 0.80	1.23 0.69	0.96	7.36	7.068
30.85	2.90	0.20 0.80	1.22 0.89	1.06	6.89	7.301
33.23	2.84	0.20 0.80	0.60 0.37	0.49	6.75	3.305
35.60	2.65	0.20 0.80	0.80 0.21	0.51	6.29	3.210
37.98	2.65	0.20 0.80	0.85 0.96	0.91	6.29	5.727
40.35	2.20			0.28	5.23	1.464
42.73	2.30			0.16	5.46	0.874
45.10	2.05			0.51	4.87	2.483
47.48	1.10			0.49	2.61	1.280
49.86	0.65			0.62	1.54	0.957

$m^3/s \times 35.3 = ft^3/s$

Total Discharge (3Q) (ft^3/s)

Stream Flow (Discharge) Measurement Form

Stream:____Date:____________

Station Description:____

Time Begin:__________ Time End:____________ Meter Type:_____________________

Observers:_________________Stream Width*:_____________ Section Width:__________

Observations:____

Section Midpoint (ft) (m)	Section Depth (ft) (m) (cm)	Observational Depth** ft-m-cm	Velocity		Area W x D (ft^2) (m^2)	Flow (Q) V x A (m^3/s) (ft^3/s)
			At Point (ft/s) (m/s)	Average (ft/s)(m/s)		

$m^3/s \times 35.3 = ft^3/s$

Total Flow (Discharge) (3Q) (ft^3/s)	

* Make a minimum of 10 measurements when the total width is > 5.0 ft, 20 measurements preferred.

** When water is < 2.5 ft deep take one measurement at each cross section. When water is > 2.5 ft deep, take two measurements at each cross section; one at 2 the total depth and the other at 2 x the total depth. Average the two velocity measurements. See SWAMP Procedures Manual for a detailed flow measurement method.

Summary of Significant Figures for Reporting Field Parameters

Parameter	Field Data Reporting Requirements
Water Temperature (^oC)	Report temperature to the nearest tenth of a degree. Round insignificant figures 0 through 4 down and 5 thru 9 up.
pH (s.u.)	Report pH to the nearest tenth of a pH standard unit.
D.O. mg/L **D.O.** (% saturation)	Report dissolved oxygen to the nearest tenth of a mg/L. Report % saturation to the nearest tenth of a percent
Specific Conductance (micro siemens/cm)	Report specific conductance to only three significant figures if the value exceeds 100. Do not report ORP which is displayed by some multiprobes.
Salinity (ppt)	Report salinity values above 2.0 ppt to the nearest tenth of a part per thousand. In estuarine waters report the actual values displayed by the multiprobe above 2.0 ppt and values less than 2.0 as <2.0 or <1.0 only. Determine if a station is estuarine (i.e., experiences cases where salinity is >2.0 ppt) and always report salinity at this station, regardless of the salinity during periods of high flow.
Secchi Disk (meters)	Report Secchi depth transparency in meters to two significant figures.
Days Since Last Significant Precipitation(days)	Report whole numbers. If it is raining when the sample is collected or has rained within the last 24 h, report a value of <1. If it has been over a week since a rainfall event, report a value of > 7.
Flow (ft^3/s)	Report instantaneous flow values less than 10 ft^3/s to two significant figures. Report flow values greater than 10 ft^3/s to the nearest whole number, but no more than three significant figures. When there is no flow (pools), report as 0.0. When there is no water, don't report a value, but report as "dry" in the observations.
Flow Severity (1-no flow, 2-low, 3-normal, 4-flood, 5-high, 6-dry)	When there is no flow (pools), report the severity as 1, and the instantaneous flow as 0.0 ft^3/s. If the stream is dry, record only flow severity, as a value of 6.

BEAUFORT SCALE: Specifications and equivalent speeds for use at sea

FORCE	EQUIVALEN SPEED 10 m above ground		DESCRIPTION	SPECIFICATIONS FOR USE AT SEA
	Miles/hour	knots		
0	0-1	0-1	Calm	Sea like a mirror
1	1-3	1-3	Light air	Ripples with the appearance of scales are formed, but without foam crests.
2	4-7	4-6	Light Breeze	Small wavelets, still short, but more pronounced. Crests have a glassy appearance and do not break.
3	8-12	7-10	Gentle Breeze	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered white horses.
4	13-18	11-16	Moderate Breeze	Small waves, becoming larger; fairly frequent white horses.
5	19-24	17-21	Fresh Breeze	Moderate waves, taking a more pronounced long form; many white horses are formed. Chance of some spray.
6	25-31	22-27	Strong Breeze	Large waves begin to form; the white foam crestsare more extensive everywhere. Probably some spray.
7	32-38	28-33	Near Gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.
8	39-46	34-40	Gale	Moderately high waves of greater length; edges of crests begin to break into spindrift. The foam is blown in well-marked streaks along the direction of the wind.
9	47-54	41-47	Severe Gale	High waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble, and roll over. Spray may affect visibility.
10	55-63	48-55	Storm	Very high waves with long over- hanging crests. he resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On he whole the surface of the sea takes on a white appearance. The 'tumbling' of the sea becomes heavy and shock-like. Visibility affected.

Last edited on 09 January, 1999 Dave Wheeler weatherman@zetnet.co.uk
Web Space kindly provided by Zetnet Services Ltd, Lerwick, Shetland.
http://www.zetnet.co.uk/sigs/weather/Met_Codes/beaufort.htm

Field Collection Procedures for Water Samples

Scope and Application

This protocol describes the techniques used to collect water samples in the field in a way that neither contaminates, loses, or changes the chemical form of the analytes of interest. The samples are collected in the field into previously cleaned and tested (if necessary) sample bottles of a material appropriate to the analysis to be conducted. Pre-cleaned sampling equipment is used for each site, whenever possible and/or when necessary. Appropriate sampling technique and measuring equipment may vary depending on the location, sample type, sampling objective, and weather. Trade names used in connection with equipment or supplies do not constitute an endorsement of the product.

Summary of Method

Appropriate sample containers and field measurement gear as well as sampling gear are transported to the site where samples are collected according to each sample's protocol. Water velocity, turbidity, temperature, pH, conductivity, dissolved oxygen as well as other field data are measured and recorded using the appropriate equipment. These field data measurement protocols are provided in the SWAMP Field Measurement SOP. Samples are put on ice and appropriately shipped to the processing laboratories. This procedure has been modified from the Texas Natural Resources Conservation Commission's Procedure Manual for Surface Water Quality Monitoring, with major input from the United State's Geological Survey's (USGS's) National Water Quality Assessment (NAWQA) Protocol for Collection of Stream Water Samples, for which due credit is herewith given.

WATER SAMPLE COLLECTION

Water chemistry and bacteriological samples, as requested, are collected at the same location. *Water samples are best collected before any other work is done at the site*. If other work (e.g., sediment sample collection, flow measurement or biological/habitat sample collection or assessment) is done after or downstream of the collection of water samples, it might be difficult to collect representative samples for water chemistry and bacteriology from the disturbed stream. Care must be taken, though, to not disturb sediment collection sites when taking water samples.

The following general information applies to all types of water samples, unless noted otherwise:

Sample Collection Depth

Sub-Surface Grab Sample Samples are collected at 0.1 m below the water surface. Containers should be opened and re-capped under water in most cases.

Depth-integrated Sample If a depth-integrated sample is taken, the sample is pumped from discrete intervals within the entire water column.

Surface Grab Sample Samples are collected at the surface when water depth is <0.1 m. Since there is a difference in water chemistry on the surface, compared to subsurface, surface water should be noted on the field data sheet as 0 m.

Where to Collect Samples

Water samples are collected from a location in the stream where the stream visually appears to be completely mixed. Ideally this would be at the centroid of the flow (*Centroid* is defined as the midpoint of that portion of the stream width, which contains 50% of the total flow), but depth and flow do not always allow centroid collection. For stream samples, the sampling spot must be accessible for sampling physicochemical parameters, either by bridge, boat or wading. Sampling from the shoreline of any water body (meaning standing on shore and sampling from there) is the least acceptable method, but in some cases is necessary.

In reservoirs, lakes, rivers, and coastal bays, samples are collected from boats at designated locations provided by Regional Water Quality Control Boards (Regional Boards).

Sampling Order if Multiple Media are Requested to be Collected

The order of events at every site has to be carefully planned. For example, if sediment is to be collected, the substrate can not be disturbed by stepping over or on it; water samples can not be taken where disturbed sediment would lead to a higher content of suspended matter in the sample. *For the most part, water samples are best collected before any other work is done at the site*. This information pertains to walk-in sampling.

Sample Container Labels

Label each container with the station ID, sample code, matrix type, analysis type, project ID, and date and time of collection (in most cases, containers will be pre-labeled). After sampling, secure the label by taping around the bottle with clear packaging tape.

Procedural Notes

For inorganic and organic water samples, bottles do not have to be rinsed if they are I-Chem 200 series or higher or ESS PC grade or higher. This means that the sample bottles are analyzed for contamination, and a certification of analysis is included with the bottles. Other sample containers are usually rinsed at least three times if the bottles do not meet these requirements. See filling instruction for each type of analyses if there is uncertainty. If applicable to the sample and analysis type, the sample container should be opened and re-capped under water.

Sample Short-term Storage and Preservation

Properly store and preserve samples as soon as possible. Usually this is done immediately after returning from the collection by placing the containers on bagged, crushed or cube ice in an ice chest. Sufficient ice will be needed to lower the sample temperature to at least 4 °C within 45 min after time of collection. Sample temperature will be maintained at 4 °C until delivered to the laboratory. Care is taken at all times during sample collection, handling and transport to prevent exposure of the sample to direct sunlight. Samples are preserved in the laboratory, if necessary, according to protocol for specific analysis (acidification in most cases).

Field Safety Issues

Proper gloves must be worn to prevent contamination of the sample and to protect the sampler from environmental hazards (disposable polyethylene, nitrile, or non-talc latex gloves are recommended, **<u>however, metals and mercury sample containers can only be sampled and handled using polyethylene gloves as the outer layer</u>**). Wear at least one layer of gloves, but two layers help protect against leaks. One layer of shoulder high gloves worn as a first (inside) layer is recommended to have the best protection for the sampler. Safety precautions are needed when collecting samples, especially samples that are suspected to contain hazardous substances, bacteria, or viruses.

Sample Handling and Shipping

Due to increased shipping restrictions, samples being sent via a freight carrier require additional packing. Although care is taken in sealing the ice chest, leaks can and do occur. Samples and ice should be bagged placed inside a large trash bag inside the ice chest for shipping. Ice should be double bagged to prevent melted ice water from leaking into the sample. The large trash bag can be sealed by simply twisting the bag closed (while removing excess air) and taping the tail down. Prior to shipping the drain plug of the ice chests have to be taped shut. Leaking ice chests can cause samples to be returned or arrive at the lab beyond the holding time.

Although glass containers are acceptable for sample collection, bubble wrap must be used when shipping glass.

Chain of Custody (COC) Forms

Every shipment must contain a complete Chain of Custody (COC) Form that lists all samples collected and the analyses to be performed on these samples.

Make sure a COC is included for every laboratory, every time you send a shipment of samples. Electronic COCs can also be emailed to the various laboratories but must be sent before the samples arrive at their destinations.
Include region and trip information as well as any special instructions to the laboratory on the COC.

The original COC sheet (not the copies) is included with the shipment (insert into ziplock bag) One copy goes to the sampling coordinator, and the sampling crew keeps one copy.

Samples collected should have the salinity (in ppt), depth of collection, and date/time collected for each station on every COC.

Write a comment on this form, if you want to warn the laboratory personnel about possibly hazardous samples that contain high bacteria, chlorine or organic levels.

Field QC Samples for Water Analyses

Field duplicates are currently submitted at an annual rate of 5%. Field travel blanks are required for volatile organic compounds at a rate of one per cooler shipped. Field blanks are required for trace metals (including mercury and methyl mercury), DOC, and volatile organic compounds in water at a rate of 5%. See Appendix C of the SWAMP QAMP for detailed Field QC requirements.

Field Site Data Sheets

Each visited field site requires a field observation completed SWAMP Field Data Sheet, even if no samples are collected (i.e. at a site which is found to be dry). If water and/or sediment samples are collected, all elements of the SWAMP Field Data Sheet must be completely filled out.

General Pre-Sampling Procedures

Instruments. All instruments must be in proper working condition. Make sure all calibrations are current. Multi-probe sondes should be pre-calibrated every morning prior to sampling and post-calibrated within 24 h of the original calibration. Conductivity should also be calibrated between stations if there is a significant change in salinity. Dissolved oxygen sensors should be re-calibrated if there is a 500 ft change in elevation.

Calibration Standards. Pack all needed calibration standards.

Sample Storage Preparations. A sufficient amount of cube ice, blue ice and dry ice as well as enough coolers of the appropriate type/size must be brought into the field, or sources for purchasing these supplies identified in advance.

Sample Container Preparation. After arriving at the sample station, pack all needed sample containers for carriage to the actual collection site, and label them with a pre-printed label containing Station ID, Sample Code, Matrix info, Analysis Type info, Project ID and blank fields for date and time (if not already pre-labeled).
Safety Gear. Pack all necessary safety gear like waders, protective gloves and safety vests.

Walk to the site. For longer hikes to reach a sample collection site, large hiking backpacks are recommended for transport of gear, instruments and containers. Tote bins can be used, if the sampling site can be accessed reasonably close to the vehicle.

GPS. At the sampling site, compare/record reconnaissance GPS reading with current site reading and note differences. GPS coordinates should be in Decimal Degrees (e.g. 38.12345 -117.12345).

COLLECTION OF WATER SAMPLES FOR ANALYSIS OF CONVENTIONAL CONSTITUENTS

In most streams, sub-surface (0.1 m below surface) water is representative of the water mass. A water sample for analysis of conventional constituents is collected by the grab method in most cases, immersing the container beneath the water surface to a depth of 0.1 m. Sites accessed by bridge can be sampled with a sample container-suspending device. Extreme care must be taken to avoid contaminating the sample with debris from the rope and bridge. Care must also be taken to rinse the device between stations. If the centroid of the stream cannot be sampled by wading, sampling devices can be attached to an extendable sampling pole.

In some cases, depth-integrated sampling is required, as requested by Regional Boards. This is useful when lakes or rivers are stratified and a sample is wanted that represents the entire water column. Depth-integrated sample collection is explained later in this document.

Conventional Water Constituents, Routinely Requested in SWAMP	Chloride, sulfate, nitrite, nitrate (or nitrate+nitrate), ortho-phosphate, fluoride, total phosphorus, ammonia, TKN, alkalinity, chlorophyll a.
Conventional Water Constituents, Occasionally Requested in SWAMP	Total Suspended Solids (TSS) or Suspended Sediment Concentration (SSC), Total Dissolved Solids (TDS--especially if total metals requested), Total Organic Carbon (TOC), Dissolved Organic Carbon (DOC), hardness (if trace metals analysis is requested).
Conventional Water Constituents Sample Volume	Due to the potential for vastly different arrays of requested analyses for conventional constituents, please refer to table at the end of this document, as well as the Sample Handling Requirements Tables in Appendix C of the QAMP, for information on the proper volume to collect for the various types of analyses.
Conventional Water Constituents Sample Container Type	Due to the potential for vastly different arrays of requested analyses for conventional constituents, please refer to table at the end of this document, as well as the Sample Handling Requirements Tables in Appendix C of the QAMP, for information on the proper type of sample containers.
Chlorophyll a Syringe Sample Method	**Chlorophyll a syringe method:** Chlorophyll a is sampled by forcing water with a 60-mL syringe through a filter holder containing a 25-mm glass microfiber filter. The 60-mL syringe and an in-line filter holder are rinsed three times with the ambient water before filtration. The syringe is then filled with 60 mL of ambient water. The filter holder is then removed and a 25-mm glass microfiber filter is placed inside. The filter holder is then screwed onto the syringe and the ambient water is then flushed through the filter. The filter holder is removed every time more water needs to be drawn into the syringe. The process is then repeated until the desired amount of Chlorophyll a is present (usually 60 to 360 mL depending on the water clarity). When filtering is complete the filter holder is opened and the filter is removed with tweezers without

touching the Chlorophyll a. The filter is then folded in half, then again, in half with the Chlorophyll a inside the folds. The folded filter is then wrapped in aluminum foil and placed in an envelope labeled with the site information and the volume filtered. The envelope is then immediately placed on dry ice until transferred to the lab.

APPENDIX D

CHAIN OF CUSTODY FORMS

Weck Laboratories, Inc.
Analytical Laboratory Services - Since 1964

14859 East Clark Avenue : Industry : CA 91745
Tel 626-336-2139 ♦ Fax 626-336-2634 ♦ www.wecklabs.com

CHAIN OF CUSTODY RECORD

STANDARD

Page 1 Of 1

CLIENT NAME:

PROJECT:

ADDRESS:

PHONE:
FAX:
EMAIL:

PROJECT MANAGER

SAMPLER

SPECIAL HANDLING

- [ ] Same Day Rush 150%
- [ ] 24 Hour Rush 100%
- [ ] 48-72 Hour Rush 75%
- [ ] 4 - 5 Day Rush 30%
- [ ] Rush Extractions 50%
- [ ] 10 - 15 Business Days
- [ ] QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

ANALYSES REQUESTED

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.											COMMENTS

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Attacked	Y / N
Preserved at Lab	Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA=Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY
OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION

COC version 042707

APPENDIX E

LABORATORY QUALITY ASSURANCE MANUAL
WECK LABORATORIES, INC.

Weck Laboratories, Inc.
Environmental and Analytical Services - Since 1964

Quality Assurance Program Manual

Facility Name:	**Weck Laboratories, Inc.**
Location:	**14859 E. Clark Ave., Industry, CA 91745**
Telephone:	**626-336-2139**

Revision 19
EFFECTIVE DATE: October 2, 2009
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Approved by:

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1 INTRODUCTION

Weck Laboratories is an independent testing laboratory specializing in environmental analytical services. The company was founded in 1964 and it is organized as a California corporation.

The purpose of the Weck Laboratories Quality Assurance Program is to operate under standardized QA procedures, to provide guidance to all personnel and it is designed to continually monitor the reliability of test results, ensuring that they fall within acceptable limits, and provide guidelines for the implementation of corrective action when necessary.

This Quality Assurance Manual is a summary document that outlines the policies and operational procedures and the laboratory management system associated with work carried out at its permanent facility in the City of Industry, California, as well as at sites away from its permanent facilities, or in associated temporary or mobile facilities. It is intended to ensure the high quality of analytical services that the Laboratory is committed to provide to its clients. This Manual contains references to other supporting documents also related to the Quality Assurance Program, such as SOPs, QC acceptance limits, MDL studies, Performance Evaluation Results and Policy documents.

The QA Manual and its supporting documents are reviewed annually to ensure that they reflect current laboratory practices and are in agreement with current regulations.

All policies and procedures have been structured in accordance with the NELAC standards and applicable requirements, regulations, guidance, and technical standards from the USEPA and State regulatory agencies. This manual, which also incorporates the requirements of ISO 17025, has been prepared in accordance with the guidance documents listed in section 19.

If more stringent standards or requirements than the specified in this Manual are included in a mandated test method or by regulation, such requirements must be met. If it is not clear which requirements are more stringent, the standard from the method or regulation is to be followed.

This Quality Manual, SOPs and related documentation describe the quality system for Weck Laboratories, Inc.

1.1 Mission Statement

Weck Laboratories provides qualitative and quantitative data for use in critical decisions relating to the protection of the public and the environment. The data used for such purposes must be scientifically valid, defensible and of known and documented quality. All environmental testing activities are carried out in such a way as to meet the requirements of the current NELAC Standard and to satisfy the needs of the client, the regulatory authorities or organizations providing recognition.

It is our goal to provide our clients with the best possible services, in terms of quality of laboratory work, honesty in our procedures and reporting, efficiency in our turnaround time and reasonable prices for our services and at the same time satisfy the needs of the regulatory authorities and organizations providing recognition.

Top management of the laboratory is totally committed to the attainment of the best possible quality of data and instructs and educates the staff on this company policy.

All the necessary resources and materials shall be provided to the personnel of the laboratory in order to meet and/or improve the quality requirements of NELAC and consequently of ISO 9001 and 9002, of the analytical methods performed at the lab and any special requirements from clients.

1.2 Services provided

The services provided by this facility are the following:

- Organic chemical analyses
- Inorganic chemical analyses
- Trace metal analyses
- Microbiological analysis limited to total coliform, fecal coliform and standard plate count.
- Physical analyses
- Field services (sampling and simple field determinations)

The technical and service requirements for all requests to provide analyses are thoroughly evaluated before commitments are made to accept the work. This includes a review of facilities and instrumentation, staffing, and any special QC or reporting requirements to ensure that analyses can be performed within the expected schedule. All measurements are made using published reference methods or methods developed by Weck Laboratories. Competence with all methods is demonstrated according to the procedure described in Appendix 9 prior to use.

1.3 Proficiency Testing

Weck Laboratories, Inc. analyzes Proficiency Testing samples at a frequency established by the current regulations, typically two times per year, from an approved PT provider that meets the requirements specified in chapter 2 of the current NELAC standard. The specific analytes and matrices analyzed are based on the current scope of the laboratory services and are documented in a laboratory SOP on PT samples analyses.

The goal for PT results is obtaining 100% of all analytes within acceptable limits. When there are results out of the acceptance range, corrective action is initiated to prevent the error from reoccurring. A report with the documentation of the corrective action is also filed.

1.4 Ethics policy

Weck Laboratories, Inc. has developed a proactive program for prevention and detection of improper, unethical or illegal actions. A main component of this program is the periodic training and communications that the employees receive from management about the ethics policy and the utmost importance of an honest and ethical behavior in all activities performed at the laboratory.

Proper ethical conduct in the laboratory is strictly enforced. The Company’s Code of Ethics (Appendix 2) is presented to current and prospective employees in both the QA manual and the Employee Handbook.

The Data Integrity Plan, which includes the description of the data integrity procedures, serves to combine the elements currently in place and document further procedures to ensure our compliance with requirements in the NELAC standard and from other regulatory agencies.

These procedures include the following elements:

- data Integrity training
- signed data integrity documentation for all laboratory employees
- in-depth, periodic monitoring of data integrity
- data integrity procedure documentation.

The data integrity procedures are signed and dated by senior management. These procedures and the associated implementation records are properly maintained and made available for assessor review. The data integrity procedures are annually reviewed and updated if necessary by management.

The Data Integrity Plan also provides a mechanism for confidential reporting of data integrity issues in the laboratory. A primary element of the mechanism is to assure confidentiality and a receptive environment in which all employees may privately discuss ethical issues or report items of ethical concern. In instances of ethical concern, the mechanism also includes a process whereby laboratory management is to be informed of the need for any further detailed investigation.

Each employee is required to understand and sign a Data Integrity Agreement, contained in the Data Integrity Plan document. The Laboratory Ethics seminar that is presented as a refresher to current employees on an annual basis and as part of the hiring process for new employees include elements describing examples of improper and illegal actions, how to identify appropriate and inappropriate laboratory and instrument manipulation practices, guidance for manual integration practices and consequences of unethical or improper behavior.

Punishment for improper, illegal or unethical activities range from suspension to termination, depending on the degree and nature of the unethical activity.

Employees are required and encouraged to bring up to management any improper activities they detect or are suspicious of. Any incident reported is immediately investigated by the management and the person or persons involved are subject to disciplinary actions.
The Management shall also monitor the program for detecting improper, unethical or illegal action by performing internal proficiency testing (single or double blind), reviewing of analytical data post-analysis, performing electronic data audits using special software as Mint Miner® and providing an open door policy for employees to report any suspicious activity without fears.

In order to assist the laboratory technical personnel in performing their duties without detrimental influences, it is the policy of the Company that the laboratory be impartial and that it and its personnel are free from any undue commercial, financial and other pressures which might influence or adversely affect their normal performance having an impact on the quality of the work they produce or their technical judgment. By this policy all laboratory personnel dedicated to technical activities should not be influenced by, or involved in any financial or commercial matter while performing laboratory work. If any employee feels that he or she might be under any kind of pressure as described above, the Laboratory Director must be notified immediately. Additionally, the Laboratory will not engage in any activities that may endanger the trust in its independence of judgment and integrity in relation to its environmental testing.

2 QUALITY POLICY

2.1 QA objectives for measuring data

The objective of the Quality Assurance Program is to monitor the reliability of the analytical data produced by the Laboratory and to implement effectively the quality control procedures and operations defined for each analysis. The purposes of this program are:

- Provide data that is scientifically valid, defensible, and of known and documented quality in accordance with standards developed by the National Environmental Laboratory Accreditation Conference (NELAC) and any applicable state or EPA regulations or requirements.
- Ensure that analytical results fall between acceptable control limits.
- Provide mechanisms for corrective action when necessary.
- Establish standardized practices to provide consistency in the generation of data.
- Define the quality of each analytical system in terms of accuracy, precision and sensitivity.
- Identify in the early stages possible problems that may affect data quality.

2.2 Resources

The resources of Weck Laboratories are instrumental in implementing this policy. Highly trained personnel, including chemists and related scientists continue their education by attending seminars and technical meetings; instrumentation that is continuously upgraded to maintain the state-of-the-art in analytical instruments; and a facility currently consisting of 22,000 sq. ft. of laboratory area distributed in a manner that minimizes laboratory contamination.

3 DESCRIPTION OF THE QAP MANUAL

3.1 Terminology

°C: Degrees Celsius.
AA: Atomic Absorption.
Accreditation body: Authoritative body that performs accreditation.
Aliquot: A discrete, measured, representative portion of a sample taken for analysis.
Analyte: The specific chemicals or components for which a sample is analyzed; it may be a group of chemicals that belong to the same chemical family, and which are analyzed together**.**
ANSI/ASQC: American National Standards Institute/American Society for Quality Control.
ASQC: American Society for Quality Control.
ASTM: American Society for Testing and Materials.
Assessment: The evaluation process used to measure the performance of effectiveness of a system and its elements against specific criteria. It includes any of the following: audit, performance evaluation, peer review, inspection, or surveillance.
Atomization: A process in which a sample is converted to free atoms.

Audit: A documented investigative evaluation used to determine the degree of compliance with established procedures and guidelines, applied to specific analytical processes.
BFB: Bromofluorobenzene.
BNA: Base, neutral and acid.
BOD: Biochemical Oxygen Demand.
BS: Blank Spike, equivalent to LFB and LCS.
BTEX: Benzene, toluene, ethyl benzene and xylene.
CA: Corrective Action, the measures taken to correct a situation that is out of the control limits set by QC procedures.
CAL: Calibration standard, a solution prepared from the dilution of stock standard solutions. The CAL solutions are used to calibrate the instrument response with respect to analyte concentration.
Calibration Range: The range of values (concentrations) between the lowest and highest calibration standards of a multi-level calibration curve. For metals analysis with a single-point calibration, the low-level calibration check standard and the high standard establish the linear calibration range, which lies within the linear dynamic range.
CARB: California Air Resources Board.
CAS: Chemical Abstract Service.
CATC: Cyanide amenable to chlorination.
CCC: Calibration check compound.
CFR: Code of Federal Regulations.
Chain of Custody: An unbroken trail of accountability that verifies the physical security of samples, data and records.
CI: Chemical ionization.
Client: Any individual or organization for whom items or services are furnished or work performed in response to defined requirements and expectations.
CLP: Contract Laboratory Program.
COC: Chain of Custody.
COD: Chemical oxygen demand**.**
Congener: A member of a class of related chemical compounds (e.g., PCBs, PCDDs).
Consensus Standard: A standard established by a group representing a cross-section of a particular industry or trade, or a part thereof.
Continuing calibration verification (CCV): The verification of the initial calibration that is required during the course of analysis at periodic intervals. Continuing calibration verification applies to both external standard and internal standard calibration techniques, as wells as to linear and non-linear calibration models.
CRDL: Contract Required Detection Limit.
CV: Coefficient of variation.
CVAA: Cold Vapor Atomic Absorption Spectroscopy.
DBPs: Disinfection by-products.
Definitive Data: Analytical data of known quality, concentration, and level of uncertainty. The levels of quality and uncertainty of the analytical data are consistent with the requirements for the decision to be made. Suitable for final decision-making.
Detection Limit (DL): The lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration at the 99% level of confidence. At the DL, the false positive rate (Type I error) is 1%.
DFTPP: Decafluorotriphenylphosphine.

Digestion: A process in which a sample is treated (usually in conjunction with heat) to convert the sample to a more easily measured form.
Dissolved: The concentration of analyte in an aqueous sample that will pass through a 0.45 µm membrane filter assembly prior to sample acidification.
DLR: Detection Limit for Reporting purposes, established by the California Department of Health Services for potable water analysis.
DOC: Demonstration of capability.
DOE: Department of Energy.
DOT: Department of Transportation.
DOD: Department of Defense.
DQIs: Data Quality Indicators.
DQOs: Data Quality Objectives.
DRO: Diesel-range organics.
Duplicate: The analysis or measurement of the variable of interest performed identically on two subsamples of the same sample. The results of duplicate analysis are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.
ECD: Electron capture detector.
EDD: Electronic data deliverable.
El: Electron impact ionization.
ELAP: Environmental Laboratory Accreditation Program.
Eluent: A solvent used to carry the components of a mixture through a stationary phase.
Elute: To extract; specifically, to remove (adsorbed material) from an adsorbent by means of a solvent.
Elution: A process in which solutes are washed through a stationary phase by a movement of a mobile phase.
Environmental Data: Any measurement or information that describe environmental processes, locations, or conditions; ecological or health effects and consequences; or the performance of environmental technology.
Environmental Monitoring: The process of measuring or collecting environmental data.
EPA: United States Environmental Protection Agency.
False Negative: An analyte incorrectly reported as absent from the sample, resulting in potential risks from their presence.
False Positive: An item incorrectly identified as present in the sample, resulting in a high reporting value for the analyte of concern.
FIA: Flow-injection analysis.
FID: Flame-ionization detector.
Finding: An assessment conclusion referenced to a NELAC Standard and supported by objective evidence that identifies a deviation from a NELAC requirement. An assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive or negative and is normally accompanied by specific examples of the observed condition and may be linked to a specific requirement.
FPD: Fame photometric detector.
GC/MS: Gas chromatography/mass spectrometry.
GFAA: Graphite Furnace Atomic Absorption Spectroscopy.
GPC: Gel-permeation chromatography.
GRO: Gasoline-range organics.
HAAs: Haloacetic acids.
HAN: Haloacetonitrile.

HDPE: High Density Polyethylene.
Holding Times: The maximum times that samples may be held prior to analysis and still be considered valid or not compromised. The time elapsed from the time of sampling to the time of extraction or analysis, or from extraction to analysis, as appropriate.
Homologue: One in a series of organic compounds in which each successive member has one more chemical group in its molecule than the next preceding member. For instance, CH_3OH (methanol), C_2H_5OH (ethanol), C_3H_7OH (propanol), C_4H_9OH (butanol), etc., form a homologous series.
HPLC: High Performance Liquid Chromatography.
HRGC: High Resolution Gas Chromatography.
HRMS: High Resolution Mass Spectrometry.
IC: Ion Chromatography.
IC/MS/MS: Ion Chromatography-Tandem Mass Spectrometry.
ICP: Inductively Coupled Plasma spectrometry.
ICP-MS: Inductively coupled plasma-mass spectrometer.
ICV: Initial calibration verification.
ICS: Interference check sample.
IDL: Instrument Detection Limit.
IEC: Interelement correction factor.
Interference, spectral: Occurs when particulate matter from the atomization scatters the incident radiation from the source or when the absorption or emission of an interfering species either overlaps or is so close to the analyte wavelength that resolution becomes impossible.
IPC: Instrument Performance Check Solution - A solution of the method analyte, used to evaluate the performance of the instrument system with respect to a defined set of method criteria.
ISE: Ion-selective electrode.
ISO/IEC: International Standards Organization/International Electrotechnical Commission.
Isomer: One of two or more compounds, radicals, or ions that contain the same number of atoms of the same elements but differ in structural arrangement and properties. For example, hexane (C_6H_{14}) could be n-hexane, 2-methylpentane, 3-methylpentane, 2,3-dimethylbutane, 2,2-dimethylbutane.
LCL: Lower Control Limit.
LCS: Laboratory control sample (equivalent to LFB).
LC/MS/MS: Liquid Chromatography-Tandem Mass Spectrometry.
LD1 and LD2: Laboratory Duplicates - Two aliquots of the same sample taken in the laboratory and analyzed separately with identical procedures. Analyses of LD1 and LD2 indicate precision associated with laboratory procedures, but not with sample collection, preservation, or storage procedures.
LDR: Linear Dynamic Range - The concentration range over which the instrument response to an analyte is linear.
LFB: Laboratory Fortified Blank - An aliquot of LRB to which known quantities of the method analytes are added in the laboratory. The LFB is analyzed exactly like a sample, and its purpose is to determine whether the methodology is in control and whether the laboratory is capable of making accurate and precise measurements.
LFM: Laboratory Fortified Sample Matrix (LFM) – Also known as Matrix Spike. An aliquot of an environmental sample to which a known quantity of the method analyte is added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentration of the analyte in the sample matrix must be determined in a separate aliquot and the measured value in the LFM corrected for background concentration.
LIMS: Laboratory information management system.

Limit of Detection (LOD): An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte- and matrix-specific and may be laboratory-dependent. The smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.
Limits of Quantitation (LOQ): The minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The lowest concentration that produces a quantitative result within specified limits of precision and bias. The LOQ is set at or above the concentration of the lowest initial calibration standard. Also known as Practical Quantitation Limit or PQL and Method Reporting Limit or MRL.
LLE: Liquid-liquid extraction.
LRB: Laboratory Reagent Blank - An aliquot of reagent water or other blank matrices that are treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, and internal standards that are used with other samples. The LRB is used to determine if the method analyte or other interferences are present in the laboratory environment, reagents, or apparatus.
LWL: Lower Warning Limit.
Management: Those individuals directly responsible and accountable for planning, implementing, and assessing work.
Management System: System to establish policy and objectives and to achieve those objectives.
Matrix Spike (MS): Also known as spiked sample or fortified sample, it is a sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.
Matrix Spike Duplicate (MSD): Also known as fortified sample duplicate, a second replicate matrix spike prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte.
Method Detection Limit: One way to establish a Limit of Detection, defined as the minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.
Method of Standard Additions (MSA): A set of procedures adding one or more increments of a standard solution to sample aliquots of the same size in order to overcome inherent matrix effects. The procedures encompass the extrapolation back to obtain the sample concentration. (This process is often called spiking the sample.)
MSDS: Material Safety Data Sheet.
MS/MS: Multistage mass spectrometry or tandem mass spectrometry.
NELAC: National Environmental Laboratory Accreditation Conference.
NELAP: National Environmental Laboratory Accreditation Program.
NIOSH: National Institute for Occupational Safety and Health.
NIST: National Institute for Standards and Technology.
Nonconformance: An indication or judgment that a product or service has not met the requirement of the relevant specifications, contract, or regulation; also the state of failing to meet the requirements.
NPD: Nitrogen-phosphorus detector.
NPDES: National Pollutant Discharge Elimination System.
OCP: Organochlorine pesticides.
OSHA: Occupational Safety and Health Administration.
PAH: Polynuclear Aromatic Hydrocarbons (or PNA).
PBMS: Performance Based Measurement System.
PCBs: Polychlorinated biphenyls.

PCDD: Polychlorinated dibenzo-p-dioxins.
PCDF: Polychlorinated dibenzofurans.
PID: Photoionization detection.
PQL: Practical Quantitation Limit.
PT: Proficiency Testing.
RF: Response Factor.
QA: Quality Assurance.
QAP: Quality Assurance Program.
Quality Assurance (Project) Plan (QAPP): A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved.
QC: Quality Control.
QCS: Quality Control Sample - A solution of the method analyte of known concentration, which is used to fortify an aliquot of LRB or sample matrix. The QCS is obtained from a source external to the laboratory and different from the source of the calibration standards. It is used to check either laboratory or instrument performance.
Quantitation Range: The range of values in a calibration curve between the LOQ and the highest successfully analyzed initial calibration standard. The quantitation range lies within the calibration range.
Reporting Limit (RL): A client-specified lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.
Retention Time (RT): The time between sample injection and the appearance of a solute peak at the detector.
RPD: Relative percent difference.
RSD: Relative standard deviation.
Sample: Portion of material collected for analysis, identified by a single, unique alphanumeric code. A sample may consist of portions in multiple containers, if a single sample is submitted for multiple or repetitive analysis.
Sampling and Analysis Plan (SAP): See Quality Assurance Project Plan.
Second-source calibration verification (ICV): A standard obtained or prepared from a source independent of the source of standards for the initial calibration. Its concentration should be at or near the middle of the calibration range. It is done after the initial calibration.
SCAQMD: South Coast Air Quality Management District.
SI: International System of Units.
Signal to Noise Ratio: The signal carries information about the analyte, while noise is made up of extraneous information that is unwanted because it degrades the accuracy and precision of an analysis and also places a lower limit on the amount of analyte that can be detected. In most measurements, the average strength of the noise is constant and independent of the magnitude of the signal. Thus, the effect of noise on the relative error of a measurement becomes greater and greater as the quantity being measured (producing the signal) decreases in magnitude.
SIM: Selected-ion monitoring.
SOC: Synthetic organic chemical.
SOP: Standard Operating Procedure.
SPCC: System Performance Check Compounds.
SPE: Solid-phase extraction.
SPME: Solid-phase microextraction.
SRM: Standard Reference Material.
Standard: (Chemical) Standard samples are comprised of a known amount of standard reference material in the matrix undergoing analysis. A standard reference material is a certified reference material

produced by the US National Institute of Standards and Technology (NIST) and characterized for absolute content, independent of analytical test method.
SUR: Surrogate compound.
SVOA: Semivolatile organics analysis.
Target Analytes: Analytes specifically named by a client (also called project-specific analytes).
TCD: Thermal conductivity detector.
TCDD: Tetrachlorodibenzodioxin.
TCDF: Tetrachlorodibenzofuran.
TCLP: Toxicity Characteristic Leaching Procedure.
TDS: Total dissolved solids (total filterable residue).
TEM: Transmission electron microscopy.
TIC: Tentatively identified compounds.
TKN: Total Kjeldahl Nitrogen.
TOC: Total Organic Carbon.
TOX: Total Organic Halides.
TPH: Total petroleum hydrocarbon.
TRPH: Total recoverable petroleum hydrocarbon.
TSS: Total suspended solids (total non-filterable residue).
Tuning: A check and/or adjustment of instrument performance for mass spectrometry as required by the method.
UCL: Upper Control Limit.
UV: Ultraviolet.
UV/VIS: Ultraviolet/visible-light.
UWL: Upper Warning Limit.
VOA: Volatile Organic Analyte.
VOCs: Volatile organic compound(s).
WET: Waste Extraction Test (California leaching test).
WET: Whole effluent toxicity.
Work Cell: A well-defined group of analysts that together perform the method analysis. The members of the group and their specific functions within the work cell must be fully documented.
WP: Water Pollution Performance Evaluation Samples.
WS: Water Supply Performance Evaluation Samples.
ZHE: Zero-headspace extraction.

Other terminology commonly used can be found in the glossary section of the NELAC standards.

3.2 Scope

The purpose of the Quality Assurance Program (QAP) described in this manual is to ensure the integrity of the data produced by the laboratory. The QAP encompasses all aspects of the analytical process. The management of Weck Laboratories, Inc. is committed to provide analytical and environmental services of the highest possible quality in order to satisfy the requirements of the regulatory agencies and to meet or exceed our clients' expectations.

This commitment is transmitted to all levels of our organization. Employees and associates are encouraged to constantly improve the quality of their work.

3.3 Fields of Testing

The analytical activities that will be described in this manual are divided into the following main groups:

- Environmental testing involving analysis of drinking water, wastewater, soil and hazardous waste. The analysis of environmental samples follows primarily the methodology approved by the California Department of Health Services under the Environmental Laboratory Accreditation Program and other regulatory agencies.
- Industrial Hygiene analysis of metals and organics in air filters and sorbent tubes following primarily NIOSH published methods.
- Analysis of air samples follows the methodology of the California Air Resources Board, the SCAQMD and other agencies.

3.4 Management of the QAP Manual

The Quality Assurance Program is constantly monitored, reviewed and evaluated. The Quality Assurance Officer is the primary person in charge of updating, revising and distributing this QAP Manual. The Laboratory Director and Technical Directors also have input in the upgrade of the Manual. The revision process takes place when needed if there is a change in some of the processes described, and it is also reviewed and re-approved yearly, if no changes are needed. After the revision is completed, the manual is approved for release by the QA Officer and by the Management. After it is submitted, some time is allowed for training of the personnel in the changes introduced if any. The Dates of submittal and the effective date are in the cover page of the document.

4 DESCRIPTION OF THE LABORATORY

4.1 Identification

Dr. Friedrich J. Weck founded Weck Laboratories, Inc. in 1964 as a consulting and contract laboratory dedicated to independent analytical testing and research activities. Over the years the Laboratory's primary activity shifted to environmental analytical chemistry.

The company is a California Corporation established in 1981. The address of the Laboratory facility is 14859 East Clark Avenue, City of Industry, California, 91745, located north of the 60 Freeway, Seventh Avenue exit.

4.2 Fields of Activity

Weck Laboratories offers a full range of environmental testing, including drinking water, wastewater, groundwater, soil, hazardous waste, ambient air and industrial hygiene testing. The types of analyses performed include both organic & inorganic chemical, physical and bacteriological tests, distributed between two buildings located at the facility.

4.3 Organizational Structure

The different positions within the laboratory have job descriptions that are maintained in the Human Resources department. The organization chart of Weck Laboratories, Inc. can be found in Appendix 3.

5 STAFF

5.1 Management Personnel

The managerial and technical personnel have the authority and resources needed to carry out their duties and to identify the occurrence of departures from the quality system or from the procedures for performing environmental tests and/or calibrations, and to initiate actions to prevent or minimize such departures.

Technical management has overall responsibility for the technical operations and for the provision of the resources needed to ensure the required quality of laboratory operations. Deputies are appointed for key managerial personnel, including the technical director(s) and QA Officer, to perform their duties in case of prolonged absences.
The following laboratory management staff is considered key staff:

- President/CEO - Laboratory Director
- Technical Directors
- Section Supervisors
- Quality Assurance Officer
- IT Manager
- Administration Manager
- Client Service Manager
- Project Managers

The reporting relationship between key personnel and other staff is detailed in the Organization Chart (Appendix 3) and Job descriptions of positions found in the Personnel Records.

The following are the responsibilities and activities within the QAP in which the key and management personnel are engaged:

<u>Laboratory Management</u>

- Defining the minimal level of experience and skills necessary for all positions in the laboratory
- Ensuring that all technical laboratory personnel have demonstrated capability in the activities for which they are responsible
- Ensuring that the training of its personnel is kept up-to-date
- Documenting all analytical and operational activities
- Supervising all personnel
- Ensuring that all sample acceptance criteria are verified and that samples are logged into the sample tracking system and properly labeled and stored
- Performing with the other management staff an annual Management System Review
- Documenting the quality of all data reported by the laboratory
- Ensuring that the laboratory has the appropriate resources and facilities to perform requested work
- Ensuring that corrective actions relating to findings from the internal audit are completed; and

- Nominating deputies when the Technical Directors or QA Officer are absent
- Developing a proactive program for prevention and detection of improper, unethical or illegal actions and operating in accordance with the Laboratory's documented ethics policy
- Ensuring that only those outside support services and supplies that are of adequate quality to sustain confidence in the laboratory's tests are used
- Commitment to meet customer requirements and whenever possible exceed their expectations
- Commitment to operate in accordance with statutory and regulatory requirements

QA Officer

The QA Officer is responsible for the Quality System of the laboratory and its implementation. He or she has direct access to the highest level of management (President/Laboratory Director) and to the Technical Directors to resolve any dispute involving data quality.

The specific functions and characteristics of the QA Officer are the following:

- Serve as the focal point for QA/QC and be responsible for the oversight and/or review of quality control data
- Have functions independent from laboratory day-to-day operations for which he or she has quality assurance oversight
- Be able to evaluate data objectively and perform assessments without any outside influence
- Have documented training and/or experience in QA/QC procedures and be knowledgeable in the quality system as defined under NELAC
- Have a general knowledge of the analytical tests methods for which data review is performed
- Arrange for or conduct internal audits on the entire technical operation annually
- Notify laboratory management of deficiencies and non-compliance items in the quality system and monitor corrective action
- Be responsible for implementing, maintaining, and improving the quality system
- Ensuring that all personnel understand their contributions to the quality system
- Ensuring communication takes place at all levels within the laboratory regarding the effectiveness of the quality system
- Evaluating the effectiveness of training
- Using available tools, such as audit and surveillance results, control charts, proficiency testing results, data analysis, corrective and preventive actions, customer feedback, and management reviews in efforts to monitor trends and continually improve the quality system
- The QA Officer has sufficient authority to stop work as deemed necessary in the event of serious QA/QC issues.

Technical Directors

The full time individuals who have overall responsibility for the technical operation of the laboratory. There are four technical directors for the specific areas of the laboratory: Chemical Organic Analyses, Chemical Inorganic Analyses, Microbiological Analyses and Radiochemistry. The daily activities and responsibilities of the Technical Directors are the following:

- Certifying that personnel with appropriate educational and/or technical background perform all tests for which the laboratory is accredited
- Monitoring standards of performance in quality control and quality assurance.
- Monitoring the validity of the analyses performed and data generated in the laboratory to assure reliable data
- Ensuring that sufficient number of qualified personnel are employed to supervise and perform the work of the laboratory
- Providing educational direction to laboratory staff
- Exercising day-to-day supervision of laboratory operations for the corresponding department

The Technical Directors of Weck Laboratories meet the requirements specified in Section 4.1.1.1 of the NELAC Standards.

Resumes of management personnel are in Appendix 1.

5.2 Personnel Qualifications

The technical staff is responsible for sample analysis and identification of corrective actions. The staff reports directly to the Laboratory Director or Lab Manager. All personnel are responsible for complying with all quality assurance/quality control (QA/QC) requirements that pertain to their organizational/ technical function. As documented in the employee records, each employee has the experience and education to adequately demonstrate knowledge for their particular function and the general knowledge of laboratory operations, analytical test methods, QA/QC procedures and records management.

The laboratory management shall ensure the competence of all who operate specific equipment, perform environmental tests, evaluate results, and sign test reports and calibration certificates. When using staff that are undergoing training, appropriate supervision shall be provided. Personnel performing specific tasks shall be qualified on the basis of appropriate education, training, experience and/or demonstrated skills, as required.

5.3 Personnel Training

Each employee is required to read, understand, and to use the current versions of the established Standard Operating Procedures and Analytical Method Protocols, which relates to his/her job responsibilities. The Training records show evidence of the revisions of the SOPs the employees have reviewed. Each employee demonstrates initial proficiency by following the procedure described in Appendix 9 of this manual, and demonstrates continued proficiency on a yearly basis by acceptable performance on Laboratory Control Samples (LCS), successful analysis of blind samples or by analyzing in parallel a sample analyzed by a trained or re-trained analyst. The training records of the analysts are organized by analyst and kept with personnel files. They include initial and continuing training, continuing education, participation in technical conferences or seminars and internal training activities.

Initial training for new employees is performed by experienced personnel with management guidance and includes the observation of the QC procedures described in this manual.

The company has a policy that encourages all technical personnel to participate in technical seminars and meetings involving innovative analytical technologies, new instrumentation and software applied to environmental testing. Records of this participation are maintained in the personnel files. The management of the laboratory shall formulate the goals with respect to the education, training and skills of the laboratory personnel.

The personnel performing analytical and related tasks at the laboratory must be employed by, or under contract to, the laboratory. Where contracted and additional technical and key support personnel are used, the laboratory shall ensure that such personnel are supervised and competent and that they work in accordance with the laboratory's quality system.

The laboratory shall maintain current job descriptions for all personnel who manage, perform, or verify work affecting the quality of the environmental tests. The job descriptions shall include the following:

- Duties relative to scheduling and performing tests and evaluating results;
- Duties relative to the development, validation, and approval of new methods or method modifications;
- Required experience, qualifications, and training
- Managerial duties.

The management shall authorize specific personnel to perform particular types of sampling, environmental test, to issue test reports and calibration certificates, to give opinions and interpretations and to operate particular types of equipment. The laboratory shall maintain records of the relevant authorization(s), competence, educational and professional qualifications, training, skills and experience of all technical personnel, including contracted personnel. This information shall be readily available and shall include the date on which authorization and/or competence is confirmed.

Records on the relevant qualifications, training, skills and experience of the technical personnel shall be maintained by the laboratory, including records on demonstrated proficiency for each laboratory test method.

6 LABORATORY CAPABILITIES AND ACCREDITATIONS

Weck Laboratories, Inc. analyzes water, soil, hazardous waste and air samples. The following are the type of analysis performed:

- Drinking Water and Groundwater

  - Sampling: Production wells and monitoring wells
  - Inorganic: Trace metals, physical parameters, wet chemistry
  - Organic: Volatile, semi-volatile, pesticides, herbicides
  - Bacteriological: Total and fecal coliforms, Heterotrophic Plate Count

- Waste Water

- Sampling: Composite samplers, grabs.
- Inorganic: Metals, physical parameters, wet chemistry
- Organic: Volatile, semi-volatile, pesticides, herbicides
- Bacteriological: Total and fecal coliforms, Heterotrophic Plate Count

• Hazardous Waste and Soil

- Characteristics: Physical properties, leaching tests
- Organic: Volatile, semi-volatile, pesticides, herbicides
- Inorganic: Metals, wet chemistry

• Industrial Hygiene

- Indoor Air Analysis: Air filters (metals)
- Sorbent tubes (organics)

The different analytical techniques and methods performed at the laboratory are described in the laboratory specific SOPs.

The Laboratory is accredited by various regulatory agencies to perform environmental testing. Current accreditations are listed in appendix 11.

The instrumental analytical capabilities of Weck Laboratories, Inc. include the following:

• **Sampling and field equipment**

24 hours composite samplers for water.
Flow measurement instruments
Water quality kits
Encore samplers for soil
Immunoassay determinations

• **Inorganic analysis**:

ICP-AES
ICP-MS
ICP-MS Flow Injection Analysis (hydride generation)
Cold Vapor Atomic Absorption
Cold Vapor Atomic Fluorescence
Cold Vapor Atomic Florescence with Gold Amalgamation
UV-visible spectrometry
Ion Chromatography
IC/MS/MS
Ion Selective Electrodes

• **Organic Analysis**

Purge and Trap equipment for direct purging of soils
Purge and Trap for water
Automated SPME
GC/MS for volatile organics
GC/MS for semi volatile organics
GC/MS/MS (tandem Mass spectrometry)
GC/MS with Chemical Ionization positive ion and negative ion
GC with FID,NPD,ECD,PID,TCD
LC/MS/MS for UCMR 2, EDC/PPCPs & Perchlorate
HPLC with post-column derivatization and UV-Visible and Fluorescence detectors.
TOX
TOC
Infrared analysis

A complete list of laboratory instrumentation is in Appendix 4.

7 QUALITY ASSURANCE OBJECTIVES

The overall QA objective of Weck Laboratories, Inc. is to develop and implement procedures for laboratory analysis, chain-of-custody, and reporting that will provide results, which are of known and documented quality. Data Quality Indicators (DQIs) are used as qualitative and quantitative descriptors in interpreting the degree of acceptability or utility of data. The principal DQIs are precision, bias (accuracy), representativeness, comparability, completeness and detection limits. The DQIs are used as quantitative goals for the quality of data generated in the analytical measurement process. This section summarizes how specific QA objectives are achieved. The specific application of these various activities are contained in the method SOPs.

7.1 Precision

Precision is a measure of the degree to which two or more measurements are in agreement.

Precision is assessed through the calculation of relative percent differences (RPD) and relative standard deviations (RSD) for replicate samples. For analyses that have detectable levels of analytes (for example inorganic analyses), laboratory precision is usually assessed through the analysis of a sample/sample duplicate pair and field duplicate pairs. For analyses that frequently show no detectable levels of analytes (e.g., organic analyses), the precision is usually determined through the analysis of matrix spike/matrix spike duplicates (MS/MSD) and field duplicate samples.

7.2 Accuracy

Accuracy (Bias) is the degree of agreement between an observed value and an accepted reference or true value.

Accuracy is assessed by the analysis of blanks and through the adherence to all sample handling, preservation and holding times. Laboratory accuracy is further assessed through the analysis of MS/MSD, external quality control check samples, laboratory control samples (LCS and LCSD) and surrogate compounds spikes.

7.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point process condition, or an environmental condition within a defined spatial and/or temporal boundary.

Representativeness is ensured by using the proper sampling techniques, proper analytical procedures, appropriate methods; meeting sample holding times and analyzing field duplicate samples.

7.4 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

Laboratory completeness is a measure of the amount of valid measurement obtained from all the measurement taken in the project. The laboratory completeness objective is that the generation of valid data for all samples be greater than 95 percent.

7.5 Comparability

Comparability is an expression of the confidence with which one data can be compared to another.

Comparability is achieved by the use of routine analytical methods, achieving holding times, reporting results in common units, use of consistent detection levels, and consistent rules for reporting data.

7.6 Detection Limits

Method Detection Limits (MDLs) are determined for all analytes as specified in the NELAC standards. From these, Reporting Limits (RLs) are obtained. See section 12.2 for more detailed information.

8 SAMPLING

Most samples processed at the laboratory are collected by clients or their representatives. When required, Weck Laboratories can provide technical assistance for sample collection and handling and can prepare appropriate sample containers with preservatives.

Weck Laboratories field personnel conduct sampling of wastewater and potable water for projects that require this service. Our personnel do not perform industrial hygiene sampling.

In order to assure the quality of the entire analytical process, Weck Laboratories works closely with field personnel employed by the client to meet general QA criteria and if available specific criteria as per the QAPP.

When performing sampling activities related to environmental testing, the laboratory sampling personnel follows the corresponding SOPs. Copies of the SOPs are kept at the field for reference.

The procedures to obtain subsamples, such as obtaining sample aliquots, are documented in each analytical SOP that requires it.

Where the client requires deviations, additions or exclusions from the documented sampling procedure, these are recorded in detail in the case narrative of the work order and reported with the analytical report. They are also communicated to the appropriate personnel.

In the instances that the laboratory does not perform the sampling and whenever possible all sampling information, such as name of sampler, company that employs the sampler, sampling procedure, etc. is recorded in the sampling section of each work order and reported to the client. All other pertinent sampling information and relevant data for operations relating to sampling that forms part of the environmental testing that is undertaken is also recorded and reported with the analytical report.

9 SAMPLE HANDLING

This section summarizes policies and practices for sample handling. Further details are contained in the corresponding SOPs.

9.1 Sample Tracking

Weck Laboratories, Inc. uniquely identifies each sample to be tested, to ensure that there can be no confusion regarding identity. The sample identification system includes identification for all samples, sub-samples and subsequent extracts and/or digestates. A unique identification (ID) code is placed on each sample container.

9.2 Review of Requests, Tenders and Contracts

When a request, tender or contract is received by the Laboratory, the Management or designated staff member will review and ensure that the requirements, including the methods to be used, are adequately defined, documented and understood and that the laboratory has the capability and resources to meet the requirements. The purpose of this review of capability is to establish that the laboratory possesses the necessary physical, personnel and information resources, and that the laboratory’s personnel have the skills and expertise necessary for the performance of the tests in question. The review may encompass results of earlier participation in interlaboratory comparisons or proficiency testing and/or the running of trial environmental test or calibration programs using samples or items of known value in order to determine uncertainties of measurement, detection limits of confidence limits, or other essential quality control requirements. The current accreditation status of the laboratory is also reviewed. The laboratory then informs the client of the results of this review if it indicates any potential conflict, deficiency, lack of appropriate accreditation status, or inability on the laboratory’s part to complete the client’s work. Another item to review is whether or not the appropriate test method is selected and capable of meeting the clients' requirements.

The management or designated staff will discuss and resolve any differences between the request or tender and the contract before any work commences in order to assure that each contract is acceptable both to the laboratory and the client. A contract may be any written or oral agreement to provide a client with environmental testing or other laboratory services.

Records of reviews, including any significant changes, shall be maintained. Records shall also be maintained of pertinent discussions with a client relating to the client's requirements or the results of the work during the period of execution of the contract.

For review of routine and other simple tasks, the date and the identification (e. g. the initials) of the person in the laboratory responsible for carrying out the contracted work are considered adequate.

For repetitive routine tasks, the review need be made only at the initial enquiry stage or on granting of the contract for on-going routine work performed under a general agreement with the client, provided that the client's requirements remain unchanged. For new, complex or advanced environmental testing, a more comprehensive record should be maintained.

The review shall also cover any work that is subcontracted by the laboratory.

The client shall be informed of any deviation from the contract. If a contract needs to be amended after work has commenced, the same contract review process shall be repeated and any amendments shall be communicated to all affected personnel.

If there is any suspension of accreditation, revocation of accreditation, or voluntary withdrawal of accreditation during the time the contract is in effect, this must be reported to the client.

9.3 Sample Acceptance Policy

The following are the requirements for sample acceptance. Data from any samples, which do not meet the policy here specified, are noted in the laboratory report defining the nature and substance of the variation:

- Proper, full, and complete documentation, including the sample identification, the location, date and time of collection, collector’s name, preservation type, sample type and any special remarks concerning the sample. This information must be fully documented in the chain of custody record. See Appendix 5.
- Unique identification of samples using durable labels completed in indelible ink on all sample containers.
- Use of appropriate sample containers and preservatives as per table in Appendix 6.
- All samples have adequate holding time to be analyzed (Appendix 6).
- If no previous special arrangements were made, parameters that are “field” analysis (i.e. pH, residual chlorine, etc.) will be analyzed within 24 hours from arrival at the laboratory. Samples that arrive at the laboratory after 4 PM on Friday or on the weekend will be analyzed no later than the next business day after receipt (Monday unless a holiday).
- Adequate sample size for all analysis requested.
- Special instructions and additional information required to perform the analysis properly (i.e., time, flow rate, etc.).
- Procedures that are used when samples show signs of damage or contamination.
- Samples received at the required temperature (usually $\leq 6\ ^{o}C$, but above freezing) or with evidence of chilling process started (received “on ice”) if they were collected the same day as received at the lab.

If any of the above requirements are not met, the client is notified immediately, and the irregularity is documented:

- If the client acknowledges the irregularity and instructs the laboratory to continue with analysis this is documented and samples accepted.
- If the client does not acknowledge the irregularity the samples are rejected.
- If the irregularity is noted in samples submitted for bacteriological analysis for compliance purposes, the samples are rejected without exception.

When a request for a new project is received involving multiple samples or tests that have a short holding time the Management is notified. The Management staff with the assistance of the appropriate technical personnel evaluates the project and calculates the resources needed to complete it within the turn around time required and the holding times, taking into consideration the volume of work in house and/or expected.

If it is determined that the new project will not affect the proper completion of jobs already in house and that the laboratory has the resources (personnel, equipment and facilities) necessary to accommodate the new project, this is accepted.

If the Management or any of the technical staff involved thinks that the new job will create problems in terms of reduced quality of work, completion out of specified or required time, or any other detrimental situation, the new project is not accepted and the client notified. If there are alternatives, such as postponement, modification of sampling schedules or partial subcontracting to another lab in order to accommodate the project, this is proposed to the client.

9.4 Sample Receipt Protocol

Upon receipt, the condition of the sample, including any abnormalities or departures from standard condition is recorded. All samples, which require thermal preservation, are considered acceptable if the arrival temperature is within the acceptable range. Samples that are hand delivered to the laboratory immediately after collection may not meet these criteria. In these cases, the samples will be considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice. The temperature at which the samples are received is measured and recorded in the documents and in the LIMS.

Where applicable, Weck Laboratories, Inc. verifies chemical preservation using readily available techniques, such as pH or free chlorine, prior to or during sample preparation or analysis. The results of all checks are recorded.

When there is any doubt as to the sample's suitability for testing or if the sample does not meet any of the above criteria or if irregularities are noted, the client is notified immediately, and the irregularity is documented. If the client acknowledges the irregularity and instructs the laboratory to continue with analysis this is also documented. If the client does not acknowledge the irregularity the samples are rejected. If the irregularity is noted in samples submitted for bacteriological analysis for compliance purposes, the samples are rejected without exception.

The sample identification number is affixed to all sample containers and worksheets are prepared for the different types of analyses requested. When there are different containers or sub-samples belonging to one sample for multiple tests, the fraction name is indicated on the sample bottle by a suffix letter or other means. Alternatively, pre-labeled bottles containing the required tests are also provided.

9.5 Storage conditions

Samples that require thermal preservation are stored under refrigeration, as specified in the corresponding SOP or analytical method, which is typically just above the freezing temperature to 6 ^{o}C. Samples are stored in a manner that prevents cross contamination, normally they are separated based on matrix, analysis and level of known contamination. Other samples are kept in specific areas while they are being tested. Evidence samples are stored in secured and controlled access areas.

9.6 Custody of Samples and Documentation

The Chain-of-Custody procedures begin when the sample is collected. At that time, a COC form is prepared, containing all the information about the sample (project name, sample identification, date and time of collection, name of person performing the sampling, matrix type, tests requested, number of containers, field measurements, and all other pertinent information).

The person who does the sampling must sign the COC record. The relinquishing and receiving parties must also sign the COC, indicating the date and time this operation was performed.

If the client submits the sample to the laboratory, a copy of the COC form is given to the client as evidence of receipt, while the other two copies are kept at the laboratory.

For samples received in sealed ice chests by commercial freight companies (UPS, FedEx), copies of shipping papers are attached to the COC form for future reference. The person receiving the sample also makes a notation of the type of shipment on the COC.

Access to all samples and sub-samples is controlled. The laboratory area is maintained secured and is restricted to authorized personnel only.

When full Legal/Evidentiary Chain of Custody protocols are required, COC records are used to establish an intact, continuous record of the physical possession, storage and disposal of sample containers, collected samples, sample aliquots, and sample extracts or digestates, The COC records account for all time periods associated with the samples. The COC records identify all individuals who physically handled individual samples. The COC forms remain with the samples during transport or shipment. If shipping containers and/or individual sample containers are submitted with sample custody seals, and any seals are not intact, the lab shall note this on the chain of custody. Other documents pertaining to the transport of the samples, such as receipts from common carriers are kept as part of the documentation. When evidentiary samples, subsamples, digestates or extracts are transferred to another party they are subject to the requirements of legal chain of custody. These samples are kept in a locked area or refrigerator with the key in possession of the designated sample custodian.

9.7 Sample disposal

Samples are retained for thirty days from report date unless otherwise instructed by the client or if the samples are part of litigation or have been received under legal/evidentiary requirements, in which case the disposal of the physical sample is accomplished with the concurrence of the affected legal authority. After the retention period samples are either returned to the client or properly disposed of according to federal and state laws and regulations.

10 CALIBRATION PROCEDURES AND FREQUENCY

10.1 Measurement Traceability

10.1.1 General

Whenever applicable, calibration of analytical support equipment and instruments and the overall program of calibration and/or verification is designed and operated so as to ensure that measurements are traceable to national standards of measurement.

All equipment used for environmental tests and/or calibrations, including equipment for subsidiary measurements (e.g., for environmental conditions) having a significant effect on the accuracy or validity of the result of the environmental test or sampling shall be calibrated before being put into service and on a continuing basis. The calibration of such equipment is performed according to the established program and procedure. This includes balances, thermometers, and control standards. The program also includes a system for selecting, using, calibrating, checking, controlling and maintaining measurement standards, reference materials used as measurement standards, and measuring and test equipment used to perform environmental tests.

10.1.2 Specific Requirements

The calibration of equipment shall be designed and operated so as to ensure that calibrations and measurements made by the laboratory are traceable to the International System of Units (SI). The traceability is established for measuring instruments to the SI by means of an unbroken chain of calibrations or comparisons linking them to relevant primary standards of the SI units of measurement. The link to SI units may be achieved by reference to national measurement standards. National measurement standards may be primary standards, which are primary realizations of the SI units or agreed representations of SI units based on fundamental physical constants, or they may be secondary standards which are standards calibrated by another national metrology institute. When using external calibration services, traceability of measurement shall be assured by the use of calibration services from laboratories that can demonstrate competence, measurement capability and traceability.

There are certain calibrations that currently cannot be strictly made in SI units. In these cases calibration shall provide confidence in measurements by establishing traceability to appropriate measurement standards such as the use of certified reference materials provided by a competent supplier to give a reliable physical or chemical characterization of a material and the use of specified methods and/or consensus standards that are clearly described and agreed by all parties concerned. Participation in a suitable program of interlaboratory comparisons is required where possible.

The requirements above specified do not apply when it has been established that the associated contribution from the calibration contributes little to the total uncertainty of the test result. When this situation arises, the laboratory shall ensure that the equipment used can provide the uncertainty of measurement needed.

Where traceability of measurements to SI units is not possible and/or not relevant, the same requirements for traceability to, for example, certified reference materials, agreed methods and/or consensus standards, are required.

- The overall program of calibration and/or verification and validation of equipment shall be designed and operated so as to ensure that measurements made by the laboratory are traceable to national standards of measurement.
- Calibration certificates shall indicate the traceability to national standards of measurement and shall provide the measurement results and associated uncertainty of measurement and/or a statement of compliance with an identified metrological specification. The laboratory shall maintain records of all such certifications.
- Where traceability to national standards of measurement is not applicable, the laboratory shall provide satisfactory evidence of correlation of results, for example by participation in a suitable program of interlaboratory comparisons, proficiency testing, or independent analysis.

Calibration certificates obtained by the laboratory shall indicate the traceability to national standards of measurement and shall provide the measurement results and associated uncertainty of measurement and/or a statement of compliance with an identified metrological specification. The laboratory shall maintain records of all such certifications.

Where traceability to national standards of measurement is not applicable, the laboratory shall provide satisfactory evidence of correlation of results, for example by participation in a suitable program of interlaboratory comparisons, proficiency testing, or independent analysis, if any is available.

10.2 Reference Standards and Reference Materials

Reference standards of measurement (such as Class S or equivalent weights or traceable thermometers) are used for calibration only and for no other purpose, unless it can be shown that their performance as reference standards would not be invalidated. Reference standards are subjected to in-service checks between calibrations and verifications. Reference standards shall be calibrated before and after any adjustment.

Where traceability of measurements to SI units is not possible or not relevant, the same requirements for traceability to, for example, certified reference materials, agreed methods and/or consensus standards, are required. The laboratory shall provide satisfactory evidence of correlation of results, for example by participation in a suitable program of interlaboratory comparisons, proficiency testing, or independent analysis.

Reference materials that require re-certification are submitted promptly to a qualified certification body can provide traceability to national standards of measurement.

Reference materials shall, where commercially available, be traceable to SI units of measurement, or to certified reference materials. Where possible, traceability shall be to national or international standards of measurement or to national or international standard reference materials. Internal reference materials shall be checked as far as is technically and economically practicable.

Checks needed to maintain confidence in the status of reference, primary, transfer or working standards and reference materials are carried out according to defined procedures and schedules recommended by the manufacturer or maintenance organization.

The procedures employed for safe handling, transport, storage and use of reference standards and reference materials in order to prevent contamination or deterioration and in order to protect their integrity, are the ones recommended by the manufacturer or other organization involved in the maintenance of such materials/standards.

10.3 General Requirements

Each calibration is dated and labeled with or traceable to the method, instrument, analysis date, and each analyte name, concentration and response (or response factor). Sufficient information is recorded to permit reconstruction of the calibration. Acceptance criteria for calibrations comply with method requirements or are established and documented.

10.4 Analytical Support Equipment

Analytical support equipment includes but it is not limited to: balances, ovens, refrigerators, freezers, incubators, water baths, temperature measuring devices (including thermometers and thermistors), thermal/pressure sample preparation devices and volumetric dispensing devices (such as Eppendorf®, or automatic dilutor/dispensing devices) if quantitative results are dependent on their accuracy, as in standard preparation and dispensing or dilution into a specified volume. All such support equipment is:

- Maintained in proper working order. The records of all activities including service calls are kept.
- Calibrated or verified annually using NIST traceable references when available, over the entire range of use. The results of such calibration must be within the specifications required in the application for which the equipment is used, if not, the equipment is either removed from service until repaired or a correction factor is applied to it, if applicable.

Raw data records shall be retained to document equipment performance.

Prior to use on each working day, balances, ovens, refrigerators, freezers, incubators and water baths are verified for the expected use range using NIST traceable references (where possible). The acceptability for use or continued use is according to the needs of the analysis or application for which the equipment is being used. Mechanical volumetric dispensing devices (except Class A glassware and microsyringes) are checked for accuracy quarterly.

For chemical tests the temperature, cycle time, and pressure of each run of autoclaves is documented by the use of appropriate chemical indicators or temperature recorders and pressure gauges. For biological tests that employ autoclave sterilization see SOP MIS031.

10.4.1 Balances and reference weights

Laboratory balances are serviced and calibrated once a year by a third party specialist, Watson Bros. Weck Laboratories has a contract with Watson Bros., by which they automatically come for balance inspection and calibration every year. The calibration or service is performed more frequently if a problem is suspected or observed by visual inspection. Class S reference weights are not used beyond one year from most recent calibration date.

10.4.2 Thermometers

All thermometers are checked annually against a NIST traceable reference thermometer, which is submitted for certification on annual basis.

10.4.3 Monitoring of Temperature

All refrigerators and freezers used for storage of samples and standards or reagents are monitored for temperature daily. The incubators used for bacteriological analysis are monitored twice a day for temperatures and the incubator for BOD is monitored daily. The temperatures are entered in charts posted on each unit that also include the initials of the person performing the checks and the acceptance ranges. When a temperature is out of compliance in any refrigerator, freezer or incubator, immediate action is taken to correct the problem.

Some support instruments such as ovens and water bath for fecal coliforms are not in use every day, so temperature is checked only for the days they are actually in operation.

10.5 Initial Instrument Calibration (ICAL) and Continuing Calibration Verification (CCV)

All instruments are calibrated in accordance with the respective SOPs and/or method of analysis. The typical calibration procedure consists of an initial calibration, performed by running a series of standards and calculating the response by using either the response factors or by linear or polynomial regression analysis. This is followed by a calibration verification. All calibration procedures are thoroughly documented.

When an initial instrument calibration is not performed on the day of analysis, it is verified by analyzing CCVs standards using the following criteria, unless something different is specified in the corresponding SOPs or QAPP:

- The concentration of the CCV standard shall be from the low-calibration standard to the midpoint of the calibration range;
- The source of the CCV standard should be the same as the source for the initial calibration standard(s); and
- The baseline for evaluating the CCV is the initial calibration curve, except for the evaluation of retention times in organic chromatographic methods, which may be based on comparison with the retention times in the initial CCV.

When the method specifies that CCVs shall be run at specific sample intervals, the count of these samples shall be of field samples only.

When a CCV fails to fall within acceptance limits then CCVs and all samples analyzed since last successful calibration verification are re-analyzed. If reanalysis is not possible, the client is notified prior to reporting data associated with a noncompliant CCV and if data are reported, appropriate qualifiers are used and if further clarification is needed this is explained in the case narrative. The exception to this is when a CCV fails with high bias, but the field samples remain not detected.

In all cases, the validity of the standards used in the initial calibration is verified using an independently prepared calibration verification solution. For all chemical determinations in which standards are involved for calibration, it is the policy of the company to use a secondary reference material (second source) obtained from a second manufacturer or lot if the lot can be demonstrated from the manufacturer as prepared independently from other lots. Traceability shall be to a national standard, when commercially available. If not commercially available, it can be prepared in-house. This secondary reference can be an LCS or other standard run to verify the integrity of the primary standard. Ideally, the secondary reference will be prepared identically to the calibration standards (i.e. if the calibration standard is directly injected without preparation, then directly injecting the reference standard removes any biases present by any field sample preparation steps).

When project-specific or method-specific requirements do not exist:

- The initial calibration verification shall be successfully completed prior to analyzing any samples;
- The use of a standard from a second lot is acceptable when only one manufacturer of the standard exists (note: manufacturer refers to the producer of the standard, not the vendor); and
- The concentration of the second source standard shall be at or near the midpoint of the calibration range. Acceptance criteria for the initial calibration verification must be at least as stringent as those for the continuing calibration verification.

Specific analyses' calibrations are checked more frequently. Some instruments, such as TOX analyzers have built-in calibration features. The internal calibration of these instruments is monitored daily for accuracy.

Some calibration curves for spectrophotometric methods are very stable over a long period of time, however it is the policy of the Laboratory to perform a new initial calibration curve even if the continuing calibration check meets specified criterion, in any of the following events:.

- At least every three years
- When the instrument is moved to a different location
- If any maintenance that can affect the calibration has been performed
- If the analysts judges it necessary for special projects or different range of calibration

Spectrophotometers are also subject to wavelength calibration which it shall be performed at least annually, according to the procedure described by the manufacturer in the instrument manual or other documentation.

All results are calculated based on the response curve from the initial calibration and generally not quantitated from any continuing instrument calibration verification unless otherwise required by regulation, method, or program. The results are bracketed by calibration standards which cover the entire quantitation range for each analyte. Any data reported below the lower-limit of quantitation is considered to have an increased quantitative uncertainty and consequently it is reported using defined qualifiers or flags or explained in the case narrative. The highest calibration standard is the highest concentration for which quantitative data are to be reported. Any data reported above this highest standard is considered to have an increased quantitative uncertainty and it is reported as an estimated value using the defined data qualifiers or explained in the case narrative, unless the sample can be diluted and re-run within the limits of the initial calibration curve.

The following is the criteria used for the acceptance of an initial calibration, unless specified differently in the analytical methods:

- Use the average response factor (RF) if the percent relative standard deviation (%RSD) of the points is less than 20%. In this case, linearity through the origin is assumed.
- If the %RSD is greater than 20%, linearity through the origin cannot be assumed and a linear regression, a weighed linear regression or a non-linear regression can be used. The acceptance criteria for linear regression are a coefficient of correlation (r) equal or greater than 0.99 and for non-linear regression the coefficient of determination (COD) must be equal or greater than 0.98. In both cases, the curve is not to be forced through the origin nor is the origin used as another point. The sample results must be within the first and last standards.
- The number of data points to construct the initial calibration curve shall be obtained from the analytical method employed. If no criteria are specified, the laboratory shall construct initial calibration curves using a minimum of five calibration points for organic analytes and three calibration points for inorganic analytes and IH samples. All reported target analytes and surrogates (if applicable) shall be included in the initial calibration. Reported results for all target analytes shall be quantified using a multipoint calibration curve; surrogates are calibrated according to each analytical method requirements, unless there are project specific requirements in which case these are followed. It is not permitted to exclude calibration points unless there is technical justification for it.
- The lowest standard shall be at or below the reporting limit for the method and at or below the regulatory limit/decision level if known by the laboratory.
- The lowest calibration standard must be above the detection limit. Noted exceptions: for turbidity analysis and for instrument technology (such as ICP or ICP/MS) with validated techniques from manufacturers or methods employing standardization with a zero point and a single point calibration standard:

    - Prior to the analysis of samples the zero point and single point calibration must be analyzed and the linear range of the instrument must be established by analyzing a series of standards, one of which must be at the lowest quantitation level.
    - Zero point and single point calibration standard must be analyzed with each analytical batch.
    - A standard corresponding to the lowest quantitation level must be analyzed with each analytical batch and must meet established acceptance criteria.
    - The linearity is verified at a frequency established by the method and/or the manufacturer.
    - If a sample within an analytical batch produces results above its associated single point standard then one of the following should occur:
        - analyze reference material at or above the sample value that meets established acceptance criteria for validating the linearity; dilute the sample such that the result falls below the single point calibration concentration (when sufficient sample volume permits);
        - Report the data with an appropriate data qualifier and/or explain in the case narrative.
        - For metals analysis with a single-point calibration, a sample result may be reported up to 90% of the linear dynamic range (LDR). All samples exceeding this value must be diluted to within the LDR.

If the initial calibration fails, the analysis procedure is stopped and evaluated. For example, a second standard may be analyzed and evaluated or a new initial calibration curve may be established and verified. In all cases, the initial calibration must be acceptable before analyzing samples. If samples can not be reanalyzed, data associated with an unacceptable initial instrument calibration must be reported with appropriate data qualifiers.

When an initial calibration is not performed on the day of the analysis, a calibration verification check standard is analyzed at the beginning and at the end of each batch. An exception to this policy is for internal standard methods (e.g., most organic methods). For these analyses, the calibration check is only analyzed at the beginning of the analytical sequence or analytical batch. The concentration of this calibration check is specified in each method SOP and whenever possible is varied within the established calibration range.

Sufficient raw data records are retained electronically as printouts to permit reconstruction of the continuing instrument calibration verification, e.g., test method, instrument, analysis date, each analyte name, concentration and response, calibration curve or response factor, or unique equations or coefficients used to convert instrument responses into concentrations. Continuing calibration verification records explicitly connect the continuing verification data to the initial instrument calibration by listing in the quantification report the initial calibration file that was used for the calculation.

When intermediate checks are needed to maintain confidence in the calibration status of the equipment, these checks shall be carried out according to each Standard Operating Procedure for the analytical method.

Where calibrations give rise to a set of correction factors, the laboratory shall have procedures to ensure that copies (e.g., in computer software) are correctly updated.

If the continuing instrument calibration verification results obtained are outside established acceptance criteria, corrective actions are performed. If routine corrective action procedures fail to produce a second consecutive (immediate) calibration verification within acceptance criteria, the following options are available:

- Demonstrate performance after corrective action with two consecutive successful calibration verifications
- Perform a new initial instrument calibration.

If acceptable performance has not been demonstrated, sample analyses shall not occur until a new initial calibration curve is established and verified. However, sample data associated with an unacceptable calibration verification may be reported as qualified data under the following special conditions:

- When the acceptance criteria for the continuing calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported.
- When the acceptance criteria for the continuing calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level or if the samples are not for regulatory compliance and accurate values are not required by the customer.

11 TEST METHODS AND STANDARD OPERATING PROCEDURES

The methods and procedures used at the laboratory are the appropriate ones for all environmental tests within its scope. These include sampling, handling, transport, storage and preparation of samples, and, where appropriate, an estimation of the measurement uncertainty as well as statistical techniques for analysis of environmental test and/or calibration data.

The methods used at the laboratory, including methods for sampling, must meet the needs of the client and are appropriate for the environmental tests it undertakes. These analytical procedures currently in use are based on the methodology approved by the EPA, the California Department of Health Services, the AIHA, and other regulatory agencies.

In some cases, Weck Laboratories can perform analyses that are not specifically described in the guidelines cited above. In these cases, the following approach is taken:

- Review other sources of test methods such as AOAC, ASTM, Pesticide Manual, etc., to find a suitable method for the matrix and analyte in question.
- Produce a modification of a standard test procedure for similar parameter or matrix
- Develop a special method in house suitable for the particular problem

For these special situations the analytical procedure is discussed with the client and performed upon the client’s approval. Whenever possible, the same QA/QC guidelines as for standard methods are used, but the laboratory may deviate from these guidelines if necessary.

The Laboratory in some instances must deviate from prescribed environmental test methods; if this occurs the deviation is documented, technically justified, authorized, and accepted by the client.

The Laboratory maintains Standard Operating Procedures (e.g., SOPs, Laboratory Method Manual) that accurately reflect all phases of current laboratory activities such as assessing data integrity, corrective actions, handling customer complaints, and all test methods. The SOPs provide all information needed to perform the different analytical tasks in accordance with regulatory requirements and in a consistent and controlled manner following the guidelines described in this QAP manual. All technical SOPs (e.g., sample preparation, analytical procedures, sample storage, sample receipt, etc.) are reviewed for accuracy and adequacy annually and whenever method procedures change, and updated as appropriate. Copies of all SOPs, both electronic and paper, are accessible to all personnel. Each SOP has an alphanumeric code that indicates the section it belongs, the number that identifies it, the revision number, the effective date and the signature of the QA Officer, Technical Director or Laboratory Director.

If other documents besides laboratory generated SOPs (i.e. equipment manuals, copies of published methods, etc.) are used as Standard Operating Procedures, they must be written in a way that they can be used as written and any changes, including the use of a selected option must be documented and included in the laboratory’s SOP manual. For DoD related work, where published methods are specified as required for a project, requirements contained within that method shall be followed and any modifications to existing method requirements will require project-specific approval by DoD personnel.

SOPs are written in a standardized format and with standardize contents, as indicated in SOP MIS048.

A current list of the Standard Operating Procedures in use is in Appendix 7.

11.1 Test Methods

11.1.1 Source of Methods

The sources of Methods used at the laboratory are the following:

- Methods published in international, regional or national standards are preferably used, ensuring that the latest valid edition of a standard is used unless it is not appropriate or possible to do so. When necessary, the standard shall be supplemented with additional details to ensure consistent application.
- When the use of specific methods for a sample analysis are mandated or requested, only those methods shall be used.
- When the client does not specify the method to be used or where methods are employed that are not required, as in the Performance Based Measurement System approach, the methods shall be fully documented and validated, and be available to the client and other recipients of the relevant reports. The laboratory shall select appropriate methods that have been published either in international, regional or national standards, or by reputable technical organizations, or in relevant scientific texts or journals, or as specified by the manufacturer of the equipment. In some cases Laboratory-developed methods or methods adopted by the laboratory might be used if they are appropriate for the intended use and if they are validated. The client shall be informed as to the method chosen.
- The client is informed when the method proposed by the client is considered to be inappropriate or out of date.

The Laboratory in some instances will develop methods for its own use; in this case this is considered a planned activity and will be assigned to qualified personnel equipped with adequate resources. Plans shall be updated as development proceeds and effective communication amongst all personnel involved shall be ensured.

When it is necessary to use methods not covered by standard methods, these shall be subject to agreement with the client and shall include a clear specification of the client's requirements and the purpose of the environmental test and/or calibration. The method developed shall have been validated appropriately before use.

For multi-analyte methods, the laboratory uses a standard set of target analytes but those target analytes identified by the client on a project specific basis will be analyzed. If project-specific information is not available, then the standard list of analytes or the list published in the method will be used.

Most methods in use at the laboratory are described in the following publications:

- Tests Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, current edition,
- Methods for Chemical Analysis of Water and Wastewater, EPA-600/4-79-020.
- Standard Methods for the Examination of Water and Wastewater, current approved edition, APHA, AWWA, WPCF.
- Criteria for Identification of Hazardous and Extremely Hazardous Wastes, California Code of Regulations Title 22.
- Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater EPA-600/4-82-057.
- Recommended Methods of Analysis for the Organic components required for AB1803, 5th Edition Revised April 1986.

- Draft Method for Total Petroleum Hydrocarbons and Total Organic Lead, LUFT Methods, California Department of Health Services.
- Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water - EPA 500 series.
- NIOSH Manual of Analytical Methods, US Department of Health and Human Services.
- Laboratory Methods of Analysis for Enforcement samples, SCAQMD, 1986.
- Stationary Source Test Methods, Air Resources Board, 1990.
- OSHA Analytical Methods Manual, 2nd Ed., U.S. Dept. of Labor, 1990.

Reference methods for all analytical procedures are kept in the Laboratory Office. Copies of specific methods are also in the corresponding sectors where the analyses are performed.

11.1.2 Validation of Methods

Validation is the confirmation by examination and the provision of objective evidence that the particular requirements for a specific intended use are fulfilled.

The laboratory shall validate non-standard methods, laboratory-designed/developed methods, standard methods used outside their intended scope, and amplifications and modifications of standard methods to confirm that the methods are fit for the intended use. The validation shall be as extensive as is necessary to meet the needs of the given application or field of application using quality control procedures and acceptance criteria that are consistent with those of similar standard methods or technology. At a minimum, quality control procedures must address:

- Calibration;
- Interferences/contamination;
- Analyte identification;
- Selectivity;
- Sensitivity;
- Precision and Bias.

The laboratory shall record the results obtained, the procedure used for the validation, and a statement as to whether the method is fit for the intended use.

The range and accuracy of the values obtainable from validated methods (e. g. the uncertainty of the results, detection limit, selectivity of the method, linearity, limit of repeatability and/or reproducibility, robustness against external influences and/or cross-sensitivity against interference from the matrix of the sample/test object), as assessed for the intended use, shall be relevant to the clients' needs and in most cases it requires prior approval from the client.

The minimum requirements for method validation are the ones specified in Appendix C.3 of NELAC chapter 5.

11.1.3 SOPs for Sample Management

These SOPs describe the receipt, handling, scheduling, and storage of samples.

Sample receipt and handling – These procedures describe the precautions to be used in opening sample shipment containers and how to verify that chain of custody has been maintained, examine samples for damage, check for proper preservatives and temperatures, and log samples into the laboratory sample streams.

Sample scheduling – These procedures describe the sample scheduling in the laboratory and includes procedures used to ensure that holding time requirements are met.

Sample storage – These procedures describe the storage conditions for all samples, verification and documentation of daily storage condition, and how to ensure that custody of the samples is maintained while in the laboratory.

11.1.4 SOPs for Reagent/Standard Preparation

These SOPs describe how to prepare standards and reagents. Information concerning specific grades of materials used in reagent and standard preparation, appropriate glassware and containers for preparation and storage, and labeling and record keeping for stocks and dilutions is included.

11.1.5 SOPs for General Laboratory Techniques

These SOPs describe all essentials of laboratory operations that are not addressed elsewhere. These techniques include glassware cleaning procedures, operation of analytical balances, pipetting techniques, and use of volumetric glassware, among others.

Procedures for test methods describing how the analyses are actually performed in the laboratory are specified in method SOPs. These SOPs for sample preparation, cleanup and analysis are based on publications listed in Section 11.1 above or on internally developed methods validated according to EPA's Performance-Based Measurement System.

The elements included or referenced in the SOPs, when applicable are the following:

11.1.1 Identification of the test method
11.1.2 Applicable matrix or matrices
11.1.3 Method detection limit
11.1.4 Scope and application, including components to be analyzed
11.1.5 Summary of the method
11.1.6 Definitions
11.1.7 Interferences
11.1.8 Safety
11.1.9 Equipment and supplies
11.1.10 Reagents and standards
11.1.11 Sample collection, preservation and handling
11.1.12 Quality control
11.1.13 Calibration and Standardization
11.1.14 Procedure
11.1.15 Calculations
11.1.16 Method Performance
11.1.17 Pollution prevention
11.1.18 Data assessment and acceptance criteria for quality control measures

11.1.19 Corrective actions for out-of-control data
11.1.20 Contingencies for handling out-of-control or unacceptable data
11.1.21 Waste management
11.1.22 References
11.1.23 Tables, Diagrams, flowcharts and data verification checklists.

11.1.6 SOPs for Equipment Calibration and Maintenance

These SOPs describe how to ensure that laboratory equipment and instrumentation are in working order. These procedures include calibration procedures and schedules, maintenance procedures and schedules, maintenance logs, services agreements for all equipment, and spare parts available in-house. Calibration and maintenance of laboratory equipment and instrumentation are in accordance with manufacturers' specifications or applicable test specifications.

12 QUALITY CONTROL DETERMINATIONS

12.1 General

The quality control procedures are used for monitoring the validity of environmental tests undertaken. The resulting data is recorded in a computerized database contained within the LIMS system which permits the monitoring of trends and the application of statistical techniques for the reviewing of the results. This monitoring includes among other parameters the use of certified reference materials and/or internal quality control using secondary reference material, participation in interlaboratory comparisons and proficiency-testing programs, replicate tests using the same or different methods, retesting of retained samples and correlation of results for different characteristics of a sample (for example, total phosphate should be greater than or equal to orthophosphate).

Quality control samples are processed in the same manner as field samples. They are analyzed and reported with their associated field samples. If QC results are outside method-specified or project-specified criteria, a corrective action is implemented to correct the problem and prevent incorrect results from being reported, or if no error is encountered to report the samples with appropriate qualifiers.
For additional guidance on batch-specific QC samples, refer to the Quality Assurance Matrix contained in the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP).

12.2 Essential QC determinations

The data acquired from QC determinations are used to estimate the quality of analytical data, to determine the need for corrective action in response to deficiencies, and to interpret results after corrective action procedures are implemented. Each method SOP includes a QC section, which addresses the minimum QC requirements for the procedure. The internal QC checks may differ slightly for each individual procedure but in general are described below. The acceptance limits and corrective actions for these QC checks are described in Section 15 and 16 of this manual.

The quality control protocols specified in each analytical method and method SOP are followed, as well as the essential standards outlined in Appendix D of NELAC Chapter 5 or mandated methods or regulations (whichever are more stringent). When it is not apparent which is more stringent the QC in the mandated method or regulations is to be followed.

All quality control measures are assessed and evaluated on an on-going basis, and quality control acceptance criteria is used to determine the usability of the data. The procedures for the development of acceptance/rejection criteria where no method or regulatory criteria exist have been established (See Section 9.3, Sample Acceptance Policy)

12.2.1 Blanks – Negative Controls

Method Blanks or LRBs are performed at a frequency of one per preparation batch of samples per matrix type. The result of this analysis is one of the QC measures to be used to assess batch acceptance.

The method blank is used to assess the preparation batch for possible contamination during the preparation and processing steps. The method blank is processed along with and under the same conditions as the associated samples to include all steps of the analytical procedure.

The method blank is analyzed at a minimum of 1 per preparation batch or one every 20 environmental samples, whichever is more frequent. The method blank shall consist of a matrix that is similar to the associated samples and is known to be free of the analytes of interest.

Blanks and negative controls are used in microbiological analysis on regular basis. They consist of blanks, sterility checks and known negative cultures. The detailed description is contained in the corresponding SOP.

Blanks are prepared and analyzed in the following situations, or whenever there is a need to obtain further information:

- A blank is extracted for every batch and type of matrix for analysis of semi-volatile organics by GC, GC/MS or HPLC.
- A blank is carried through all the digestion procedures for analysis of metals by AA, ICP or ICP-MS for every batch of samples and type of matrix for each instrument used.
- A blank is carried through the leaching procedures (TCLP, EP TOX, and WET) using the same extraction fluid, bottles and agitators as the samples.
- System/Reagent blanks are analyzed at the beginning of the day prior to calibration, after a high level standard, after changing matrix and after samples that are known or suspected to be very concentrated.
- Reagent blanks are analyzed for all wet chemistry determinations involving titrations or colorimetry and their value are subtracted from the reading of the samples, if appropriate.
- Blanks for mobility procedures (TCLP, ZHE, EP TOX, and WET) are analyzed by the appropriate method.
- Additional field and trip blanks are prepared and analyzed where required or whenever requested by the client

Sometimes the blanks may show detectable amounts of target analytes. In these cases the source of the contamination must be investigated and measures taken to correct, minimize or eliminate the problem if:

- The blank contamination is at or above the reporting limit and exceeds a concentration greater than 1/10 of the measured concentration of any sample in the associated sample batch or

- The blank contamination exceeds the concentration present in the samples and is greater than 1/10 of the specified regulatory limit.
- The blank contamination otherwise affects the sample results as per the test method requirements or the individual project data quality objectives.
- For DoD samples, in addition to the above, the method blank will be considered contaminated for a particular target analyte if it concentrations exceeds ½ the reporting limit unless is a common laboratory contaminant such as acetone, methylene chloride, MTBE, zinc and aluminum, among others.

If the method blank is contaminated as described above, then the affected samples shall be reprocessed in a subsequent preparation batch, except when sample results are below the detection limit or LOD. If insufficient sample volume remains for reprocessing, the results shall be reported with appropriate data qualifiers.

12.2.2 Reproducibility and Recovery Determinations – Positive Controls

For the determination of accuracy and precision of the analytical methods, the techniques of fortified blanks, matrix spike/ matrix spike duplicate, sample duplicates and surrogate spiking are used on a regular basis. The frequency is dictated by each analytical method or Standard Operating Procedure (minimum 1 per batch of 20 samples). The results obtained are compared with current acceptance limits (Appendix 8) and recorded in the LIMS. For methods that do not specify the acceptance criterion, this is statistically obtained from data generated at the lab.

For microbiological determination of total and fecal coliforms positive checks are included with each batch analyzed. A more detailed description is included in the corresponding SOP.

12.2.2.1 Duplicates

Matrix duplicates are defined as replicate aliquots of the same sample taken through the entire analytical procedure. The results from this analysis indicate the precision of the results for the specific sample using the selected method. The matrix duplicate provides a usable measure of precision only when target analytes are found in the sample chosen for duplication and it is performed on replicate aliquots of actual samples, usually of unknown composition.
The frequency of the analysis of matrix duplicates may be determined as part of a systematic planning process (e.g., Data Quality Objectives) or as specified by the mandated test method. Duplicate analysis is also performed when unusual or suspicious results are obtained or when a higher degree of confidence in the analytical result is desired.

The routine analysis of field duplicates is often impractical (many analytes are frequently not detected) or not possible (not enough sample provided), so the evaluation of precision for most methods is accomplished by comparing the results obtained for matrix spike and matrix spike duplicate determinations (Section 12.1.2.3), rather than analysis of field duplicate samples. This is preferred since in many cases samples with frequent “not detected” results yield no useful information for statistical determinations of precision.

The results from matrix duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD) or another statistical treatment (e.g., absolute differences). The calculation of the RPD is detailed in Section 12.2.2.5.

Results are compared to the acceptance criteria as published in the mandated test method. Where there are no established criteria, internal criteria developed at the laboratory is used, which consists on using a minimum of 20 data points and calculating the maximum acceptable RPD based on 3 standard deviations of the historical values. For matrix duplicates results outside of established criteria corrective action shall be documented or the data reported with appropriate data qualifying codes.

12.2.2.2 Laboratory Control Sample (LCS)

Laboratory Control Samples are also known as LFBs or Blank Spikes and are defined as a quality system matrix, free from the analytes of interest, spiked with verified known amounts of analytes from a source independent of the calibration standards or a material containing known and verified amounts of analytes. The LCS is used to evaluate the performance of the total analytical system, including all preparation and analysis steps. Results of the LCS are compared to established criteria and, if found to be outside of these criteria, indicates that the analytical system is “out of control”. Any affected samples associated with an out of control LCS shall be reprocessed for re-analysis or the results reported with appropriate data qualifying codes. Note: Samples that are not detected (ND) may be reported with an LCS that failed with high bias, but any qualifier may only be used for two consecutive batches before the problem must be corrected.

At least one LCS is analyzed per preparation batch. Exceptions would be for those analytes for which no spiking solutions are available such as total suspended solids, total dissolved solids, total volatile solids, total solids, pH, color, odor, temperature, dissolved oxygen or turbidity. In those instances for which no separate preparation method is used (example: volatiles in water) the batch shall be defined as environmental samples that are analyzed together with the same method and personnel, using the same lots of reagents, not to exceed the analysis of 20 environmental samples.

The LCS is a quality system matrix, known to be free of analytes of interest, spiked with known and verified concentrations of analytes. The matrix spike (Sect. 12.2.2.3) may be used in place of this control as long as the acceptance criteria are as stringent as for the LCS. Alternatively the LCS may consist of a media containing known and verified concentrations of analytes or as Certified Reference Material (CRM). All analyte concentrations shall be within the calibration range of the methods.

The components to be spiked shall be as specified by the mandated test method or other regulatory requirement or as requested by the client. In the absence of specified spiking components the laboratory shall spike per the following:

- For those components that interfere with an accurate assessment such as spiking simultaneously with technical chlordane, toxaphene and PCBs, the spike should be chosen that represents the chemistries and elution patterns of the components to be reported.
- For those test methods that have extremely long lists of analytes, a representative number may be chosen. The analytes selected should be representative of all analytes reported. The following criteria shall be used for determining the minimum number of analytes to be spiked. However, the laboratory shall insure that all targeted components are included in the spike mixture over a 2-year period.

a) For methods that include 1-10 targets, spike all components.

b) For methods that include 11-20 targets, spike at least 10 compounds or 80% of the total, whichever is greater.
c) For methods with more than 20 targets, spike at least 16 components.

The results of the individual batch LCS are calculated in percent recovery as specified in Sect.12.2.2.5. The individual LCS is compared to the acceptance criteria as published in the mandated test method. Where there are no established criteria, internal criteria are generated based on recoveries of past LCSs. To determine these criteria, at least 30 data points generated under the same analytical process are used and the upper and lower acceptance limits are calculated as the "Mean + 3 SD" and "Mean – 3 SD" respectively, where SD is the standard deviation. These statistically derived limits must:

- Meet the limits specified by the project or as stated in the method, if available;
- Should be updated on an annual basis, or as stated in the method, and re-established after major changes in the analytical process (e.g., new instrumentation);
- Should not exclude failed LCS recovery data and statistical outliers from the calculation, unless there is a documented and scientifically valid reason .

Control charts generated from the LIMS are used to detect trends and prevent out-of-control conditions. Control limits are continually monitored for shifts in mean recovery, changes in standard deviation, and development of trends.

A LCS that is determined to be within the criteria effectively establishes that the analytical system is in control and validates system performance for the samples in the associated batch. Samples analyzed along with a LCS determined to be "out of control" should be considered suspect and the samples reprocessed and re-analyzed or the data reported with appropriate data qualifying codes.

If a large number of analytes are in the LCS, it becomes statistically likely that a few will be outside control limits. This may not indicate that the system is out of control, therefore corrective action may not be necessary. Upper and lower marginal exceedance (ME) limits can be established to determine when corrective action is necessary. A ME is defined as being beyond the LCS control limit (3 standard deviations), but within the ME limits. ME limit is 4 standard deviations around the mean. The number of allowable marginal exceedances is based on the number of analytes in the LCS. If more analytes exceed the LCS control limits than is allowed, or if any one analyte exceeds the ME limits, the LCS fails and corrective action is necessary. This marginal exceedance approach is relevant for methods with long lists of analytes. It will not apply to target analyte lists with fewer than 11 analytes. Certain projects, such as DoD work do not allow any target analyte to exceed its LCS control limits, even marginally and if this happens the batch is considered not acceptable .

The number of allowable marginal exceedances is as follows:

1) >90 analytes in LCS, 5 analytes allowed in ME of the LCS control limit;
2) 71-90 analytes in LCS, 4 analytes allowed in ME of the LCS control limit;
3) 51-70 analytes in LCS, 3 analytes allowed in ME of the LCS control limit;
4) 31-50 analytes in LCS, 2 analytes allowed in ME of the LCS control limit;
5) 11-30 analytes in LCS, 1 analytes allowed in ME of the LCS control limit;
6) <11 analytes in LCS, no analytes allowed in ME of the LCS control limit;

Marginal exceedances must be random. If the same analyte exceeds the LCS control limit repeatedly (i.e. 2 out of 3 consecutive LCS), it is an indication of a systemic problem. The source of the error must be located and corrective action taken.

The procedure to monitor the application of marginal exceedance allowance to the LCS to ensure random behavior consist of establishing a data base with all exceedances and compare the analytes affected on quarterly basis to verify is not the same analyte having the problem.

12.2.2.3 Matrix Spikes and Matrix Spike Duplicates

The procedure to determine the effect of the sample matrix on method performance is by analyzing with each preparation batch matrix spikes, matrix spikes duplicates sample duplicates and surrogates, which are designed as data quality indicators for a specific sample using the designated test method. These controls alone are not used to judge laboratory performance.

Matrix specific QC samples indicate the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. The information from these controls is sample/matrix specific and would not normally be used to determine the validity of the entire batch.

The frequency of the analysis of matrix specific samples is determined as part of a systematic planning process (e.g., Data Quality Objectives) or as specified by the required mandated test method or SOP and it is at a minimum, one per batch of 20 samples or less, per matrix type.

The components to be spiked are the ones specified by the mandated test method or laboratory SOP. Matrix spikes are not performed for analytes for which spiking solutions are not available such as, solids determinations (total suspended, total dissolved, total volatile), pH, color, odor, temperature, dissolved oxygen, BOD, COD or turbidity.

The selected sample(s) for spiking are to be rotated among client samples, as much as possible, so that various matrix problems may be noted and/or addressed. The spiked samples are then analyzed as the other samples in the batch and the recoveries calculated and compared with acceptance limits. Results are recorded in the LIMS, where the analysts or QA Officer can track and manage the results for QC samples. For industrial hygiene samples, unused sample collection media is used for spiking. Samples that are labeled equipment blanks, field blanks or trip blanks must not be used for matrix spiking. All efforts shall be made to obtain additional sample aliquots for matrix spiking; when bottles are prepared in house, additional containers are provided for matrix spikes. If the sample containers are prepared by the client or provided by a third party, good communication should be established with all parties involved in order to obtain enough sample aliquots to perform matrix spiking for all test methods required. If, in spite of all efforts made, there are no extra samples received for matrix spiking, a pair of LCS/ LCS duplicate is analyzed for assessing accuracy and precision.

Any permit specified analytes, as specified by regulation or client requested analytes shall also be included. If there are no specified components, the laboratory shall spike per the following:

- For those components that interfere with an accurate assessment such as spiking simultaneously with technical chlordane, toxaphene and PCBs, the spike should be chosen that represents the chemistries and elution patterns of the components to be reported.

- For those test methods that have extremely long lists of analytes, a representative number may be chosen using the following criteria for choosing the number of analytes to be spiked, but alternating them in order to ensure that all targeted components are included in the spike mixture over a 2 year period.
- For methods that include 1-10 targets, spike all components;
- For methods that include 11-20 targets, spike at least 10 components or 80% of the total, whichever is greater;
- For methods with more than 20 targets, spike at least 16 components.

Some project may require MS/MSD to be performed on their samples (i.e. DoD) in which case these are used for the entire batch if it also contains samples from other clients.

The requirements for MS/MSD are not applicable to all methods (e.g., asbestos, certain air-testing samples, classic chemistry, and industrial hygiene samples). If adequate sample material is not available, then the lack of MS/MSDs shall be noted in the case narrative. Additional MS/MSDs may be required on a project-specific basis.

The results from matrix spike/matrix spike duplicate are primarily designed to assess the precision and accuracy of analytical results in a given matrix and are expressed as percent recovery (%R) and relative percent difference (RPD). The calculations are performed as specified in Sect.12.2.2.5. Results are compared to the acceptance criteria as published in the mandated test method. Where there are no established criteria, the laboratory established internal criteria determined as described in Sect. 12.2.2.2 for LCSs.

Some projects may have specific criteria such as DoD that require that the results of all MS/MSDs must be evaluated using the same acceptance criteria used for the LCS.

Poor performance in a matrix spike generally indicates a problem with the sample composition, and not the laboratory analysis and is reported to the client whose sample was used for the spike with the appropriate data qualifiers or in the case narrative to assist in data assessment.

12.2.2.4 Surrogates

For GC and GC/MS analysis, surrogate standards are added to all samples, blanks and QC samples, prior to sample preparation/extraction, for all organic chromatography test methods except when the matrix precludes its use or when a surrogate is not available. Surrogates are compounds that are very similar in their chemical and chromatographic characteristics as the target compounds but are not present in environmental samples, or at least they are not part of the target compounds list.

Results from recoveries of surrogate standards are compared with acceptance values, which may be mandated by the method, specified in the project by the client or lab generated. Acceptance limits generated at the laboratory are established based on a minimum of 30 valid data points by calculating the mean and standard deviation, the upper limit is set at “mean + 3SD” and the lower limit at “Mean – 3SD”.

Surrogates outside the acceptance criteria are evaluated for the effect indicated for the individual sample results. A corrective action is initiated which is guided by the data quality objectives or other site specific requirements. Results reported from analyses with surrogate recoveries outside the acceptance criteria include appropriate data qualifiers.

12.2.2.5 Equations used for calculations

The following equations are used in the calculation of recovery and RPD:

From duplicate sample:

$$RPD = \frac{S_a - S_b}{((S_a + S_b) \div 2)} x100\%$$

Where: S_a = First sub-sample analyzed
S_b = Second sub-sample analyzed

From MS/MSD analysis:

$$RPD = \frac{R_a - R_b}{((R_a + R_b) \div 2)} x100\%$$

Where: R_a = Amount of analyte found in Matrix Spike.
R_b = Amount of analyte found in Matrix Spike Duplicate

Recovery of matrix spikes:

$$\text{Re cov ery} = \frac{SSR - SR}{CA} x100\%$$

Where: SSR = Results of spiked sample
SR = Results of sample (unspiked)
CA = Concentration of spike added

Surrogate recoveries:

$$\%\ \text{Re cov ery} = \frac{ConcentrationFound}{ConcentrationAdded} x100\%$$

Where: Concentration found = Result obtained after analysis
Concentration added = Amount of surrogate spiked

12.2.2.6 Quality Control Charts

Quality Control charts can be generated at any time from data stored in the LIMS for recoveries of matrix spikes, LCSs, surrogates and RPD and they are a valuable tool to monitor in real time the performance of the analytical method, providing a graph with the mean and upper and lower warning and acceptance limits (2 and 3 standard deviation respectively).

12.2.3 External References and Control Samples

External Reference Samples or QCS are obtained from various sources are analyzed on a regular basis, minimum quarterly. Reference samples simulating matrix and analytes of interest are purchased from Environmental Resource Associates, Inc. or other NIST approved vendors, and analyzed for drinking water, wastewater, hazardous waste and priority pollutants.

Interlaboratory comparisons are run whenever possible, as well as intralaboratory comparisons by analyzing an analyte by different analytical methods.

12.3 Method Detection Limit and Reporting Limits

In general the laboratory utilizes a test method that provides a Limit of Detection (LOD) that is appropriate and relevant for the intended use of the data. LODs are determined by the protocol in the mandated test method or applicable regulation, e.g., Method Detection Limit (MDL) and all sample-processing steps of the analytical method are included. If the protocol for determining detection limits is not specified, the selection of the procedure must reflect instrument limitations and the intended application of the test method.

The MDL is defined as the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.

For analytes for which spiking is a viable option, detection limits are determined by a Method Detection Limit (MDL) study for each common matrix (water and soil/solid) by the procedure described in 40CFR Part 136, Appendix B. This procedure consists of spiking seven or more aliquots of the matrix with each compound of interest, at a concentration between 3 and 5 times the estimated MDL. These spiked samples are subject to the entire analytical process and analyzed. The MDL is calculated as follows:

$$MDL = S \times t$$

Where: S = Standard deviation of the seven replicates.
t = Student’s “t” value for 99% confidence for the corresponding number of degrees of freedom. For 7 replicates this number is 3.14.

The method detection limit is initially determined for the compounds of interest in each method and in each matrix (aqueous or soil/solid). Laboratory pure reagent water and Ottawa sand are used as matrices for aqueous and soil/solid matrix respectively.

The detection limit is initially determined for the compounds of interest in each test method in a matrix in which there are neither target analytes nor interferences at a concentration that would impact the results. Detection limits are repeated each time there is a change in the test method that affects how the test is performed, or when a change in instrumentation occurs that affects the sensitivity of the analysis.
The MDL studies are documented in spreadsheets created for that purpose. The documentation includes the matrix type, date of analysis, analyst name or initials, instrument used, values obtained and calculations. The raw data and supporting documents are retained, either attached to the spreadsheet used for calculation or filed by date with the general raw data.

The validity of the LOD shall be confirmed by qualitative identification of the analyte(s) in a QC sample in each quality system matrix containing the analyte at no more than 2-3X the LOD for single analyte tests and 1-4X the LOD for multiple analyte tests. This verification must be annually performed (for NELAC work, quarterly for DoD work) on every instrument that is to be used for analysis of samples and reporting of data.

A LOD study is not required for any component for which spiking solutions or quality control samples are not available such as temperature, or, when test results are not to be reported to the LOD (versus the limit of quantitation or working range of instrument calibration), according to Appendices D.1.2, D.4.5, D.5.4, and D.6.6 of NELAC chapter 5, 2003. Where an LOD study is not performed, the laboratory may not report a value below the Limit of Quantitation.

The Limit of Quantitation (LOQ) is often referenced as Reporting Level (RL) or Practical Quantitation Limit (PQL). The LOQ is normally set at 10 times the standard deviation. This is equivalent to multiply the MDL (obtained for 7 replicates) by 3.18 and rounding to the nearest 1, 2 or 5. In other cases, for certain methods the reporting limit is obtained by multiplying the MDL by another factor (between 2 and 10). The reporting limit for each analyte in each method is referenced in the corresponding SOP. Some projects may require special LOQs, different of those specified in the SOPs; this can be done providing that the new LOQ is supported by the Limit of Detection or MDL, the concentration level is included in the calibration, and is confirmed for each analyte of concern by analyzing a standard at the LOQ level or near and obtaining a recovery between 50 and 150% of the true value.

Certain projects require reporting all detected analytes, even below the reporting limit; in this case, when an analyte is detected but it is below the PQL, it is reported with a “J” flag indicating that the concentration is only estimated.

The LOQ must be set within the calibration range prior to sample analysis and at a minimum, it must be verified annually (for NELAC work) or quarterly (for DoD work).

The laboratory procedure for establishing the LOQ must empirically demonstrate precision and bias at the LOQ. The LOQ and associated precision and bias must meet client requirements and must be reported. If the method is modified, precision and bias at the new LOQ must be demonstrated and reported

Unless the analytical method specifies otherwise, the LOQ is confirmed for each analyte of concern by analyzing a standard at the LOQ level or near and obtaining a recovery between 50 and 150% of the true value. This confirmation is not performed for any component or property for which spiking solutions or quality control samples are not commercially available or otherwise inappropriate (e.g., pH).

In certain cases the recovery of each analyte must be within the established test method acceptance criteria or client data quality objectives for accuracy.

In some cases project-specific reporting limits are used, when the DQOs mandate a different reporting limit than the RLs used routinely by Weck Laboratories.

For potable water analysis, the Detection Limit for Reporting purposes (DLRs) is used instead of the actual MDLs or RLs. For this matrix the calculated MDL must not be greater than the DLR. DLRs are verified on regular basis by including the lowest calibration point at or below the DLR.

12.4 Selectivity

Absolute retention time and relative retention time aid in the identification of components in chromatographic analyses and to evaluate the effectiveness of a column to separate constituents. Acceptance criteria for retention time windows are documented in the corresponding method SOP or in the SOP ORG074.

A confirmation shall be performed to verify the compound identification when positive results are detected on a sample from a location that has not been previously tested by the laboratory. Such confirmations shall be performed on organic tests such as pesticides, herbicides, or acid extractable or when recommended by the analytical test method except when the analysis involves the use of a mass spectrometer. Confirmation is required unless stipulated in writing by the client. The confirmation is documented in the bench sheets and/or the LIMS.

When reporting data for methods that require analyte confirmation using a secondary column or detector, project-specific reporting requirements shall be followed. If project-specific requirements have not been specified, the reporting requirements in the method are followed. If the method does not include reporting requirements, the results from the primary column or detector are reported, unless there is a scientifically valid and documented reason for not doing so.

Results that are unconfirmed, or for which confirmation was not performed, shall be identified in the test report, using appropriate data qualifier flags, and explained in the narrative. The laboratory shall use method-specified acceptance criteria for analyte confirmation. If method-specific criteria do not exist, the analyte confirmation is performed as specified in SOP MIS052.

Other procedures for evaluating selectivity are described in the analytical methods, which may include mass spectral tuning, ICP inter-element interference checks, sample blanks, spectrochemical absorption or fluorescence profiles, co-precipitation evaluations, and electrode response factors. Acceptance criteria for mass spectral tuning are contained in the corresponding SOPs.

12.5 Demonstration of Method Capability

Prior to acceptance and use of any method, satisfactory initial demonstration of method performance is required. The initial demonstration of method performance is performed each time there is a significant change in instrument type, personnel or test method and includes verification of method sensitivity, precision, and bias in each quality system matrix of concern. “Change” refers to any change in personnel, instrument, test method, or sample matrix that potentially affects the precision and bias, sensitivity, or selectivity of the output (e.g., a change in the detector, column type, matrix, or other components of the sample analytical system, or a method revision). The process is described in Appendix 9. A Certification Statement is completed for each analyst documenting that this activity has been performed (Appendix 9). The associated records supporting the activity are also retained at the laboratory and they are available to reproduce the analytical results summarized in the Certification Statement.

The demonstration of method capability consists of performing the analysis on a clean quality system matrix, which has been spiked with the compounds of interest or purchased from a certified vendor.
For analysis that require the use of a specialized “work cell” (a group consisting of analysts with specifically defined tasks that together perform the test method), the group as a unit performs the IDC. The supporting documentation is also kept at the laboratory.

When a work cell is employed, and the members of the cell change, the new employee works with experienced analysts in the specialty area and this new work cell demonstrates acceptable performance through acceptable continuing performance checks, such as laboratory control samples. This continued performance check is documented and the four preparation batches following the change in personnel is monitored to ensure that none of the batches result in the failure of any batch acceptance criteria (method blank and laboratory control sample). If there is a failure, the demonstration of capability is repeated. When the entire work cell is changed or replaced, the new work cell repeats the demonstration of capability (Appendix 9).

When a work cell(s) is employed the performance of the group (work cell) is linked to the training records of the individual members of the work cell. Each member of the work cell must demonstrate proficiency in his/her area(s) of responsibility. A work cell may not be defined as a group of analysts who perform the same step in the same process (for example, extractions for Method 8270) represented by one analyst who has demonstrated proficiency for that step.

A continuing demonstration of capability (DOC) is also performed for methods used. The continuing DOC, as the initial DOC, includes verification of method sensitivity, precision, and bias in each quality system matrix of concern by performing a quarterly Limit of Detection (LOD) verification to verify method sensitivity and a Limit of Quantitation (LOQ) verification quarterly (for DoD work) or annually (for NELAC work), to verify precision and bias at the LOQ. LCS and other QC samples are used to verify precision and bias of the quantitation range.

For test methods that have been in use by the laboratory before July 1999, and there have been no significant changes in instrument type, personnel or test method, the continuing demonstration of method performance and the analyst's documentation of continued proficiency is considered acceptable. Records are kept on file to demonstrate that a demonstration of capability is not required.

For new methods that need to be implemented, a validation procedure is documented before they are used in the laboratory. Appropriate method validation techniques include the following:

- Testing of reference standards or reference materials;
- Comparison of results to those achieved using other validated, standard methods
- Interlaboratory comparisons.

When the above techniques are not feasible, the following options are used:

- Systematic assessment of factors that could influence the result; and/or
- Assessment of the precision and bias of the result based on the science of the method and practical experience.

12.6 Performance and Proficiency Testing Programs

The following are the proficiency testing programs in which the laboratory currently participates on regular basis:

- Drinking water analysis: WS Studies
- Wastewater analysis: WP studies
- Hazardous waste and soil

- Bacteriological Performance Evaluation Study.
- Radiochemistry

The Proficiency Testing samples are purchased from NIST approved vendors, as per NELAC regulations.

For DoD related work, PT samples are obtained from a Proficiency Testing Oversight Body (PTOB)/Proficiency Testing Provider Accreditor (PTPA)-approved PT Provider.

The PT samples are analyzed and the results returned electronically to the PT Provider by the closing date of the study, which is no later than 45 calendar days from study opening. All PT samples are handled (i.e., managed, analyzed, and reported) by the laboratory management and individual analysts in the same manner as real environmental samples utilizing the same staff, methods as used for routine analysis of that analyte, procedures, equipment, facilities, and frequency of analysis. When analyzing a PT sample, the same calibration, laboratory quality control and acceptance criteria, sequence of analytical steps, number of replicates and other procedures are employed as used when analyzing routine samples.

In addition to the required PT studies, the laboratory participates in other special PT programs managed by government agencies or private entities.

12.7 Additional Quality Control Checks

The laboratory shall assure that the test instruments consistently operate within the specifications required of the application for which the equipment is used.

Glassware shall be cleaned to meet the sensitivity of the test method. The cleaning and storage procedures that are not specified by the test method are documented in the method SOPs or in SOP MIS028 for cleaning protocols.

Whenever possible, additional QC checks are performed such as running a sample using different techniques and different standards (EPA Method 602 & EPA Method 624), correlations between COD, BOD and TOC; TDS & Specific Conductivity, balance between cations and anions on water analysis, etc.

12.8 Estimation of Uncertainty of Measurement

A procedure to estimate the uncertainty of measurement for all analytical methods used at the laboratory has been established.

In certain cases the nature of the test method may preclude rigorous, metrologically and statistically valid, calculation of uncertainty of measurement. In these cases the laboratory shall attempt to identify all the components of uncertainty and make a reasonable estimation, and shall ensure that the form of reporting of the result does not give a wrong impression of the uncertainty. Reasonable estimation shall be based on knowledge of the performance of the method and on the measurement scope and shall make use of, for example, previous experience and validation data.

The need of estimating uncertainty will be considered satisfied where a well-recognized test method specifies limits to the values of the major sources of uncertainty of measurement and specifies the form of presentation of calculated results and the test method and reporting instructions are followed appropriately.

When estimating the uncertainty of measurement, all uncertainty components which are of importance in the given situation shall be taken into account using appropriate methods of analysis.

The estimation of uncertainty will be performed only on the portion of measurement that is under the control of the laboratory. The test reports shall include a statement of the estimated uncertainty of measurement only when required by client instruction. If a specific project requires measurement uncertainty to be reported, the laboratory shall report the estimated uncertainty based on project-specific procedures or, if not available, any other scientifically valid and documented procedures. The estimated measurement uncertainty can be expressed as a range (±) around the reported analytical results at a specified confidence level. In-house, statistically-derived LCS control limits based on historical LCS recovery data may be reported as an estimate of the minimum laboratory contribution to measurement uncertainty at a 99% confidence level.

13 DATA REDUCTION, VERIFICATION AND REPORTING

13.1 Laboratory worksheets - Raw data documentation

Upon acceptable receipt of samples by the laboratory, sample worksheets are generated for the required testing. These worksheets are distributed to the respective laboratory departments. A paperless system has been implemented for some departments, in which case paper worksheets are not generated at this stage but analysts can obtain information about pending samples and holding times from the LIMS.

The data that are being obtained, such as weights, extraction volumes, calculations, etc. are recorded in the worksheets or in the LIMS. “Bench sheets” are generated either from the data entered in the LIMS or manually for all raw data being produced.

After raw data is entered in the corresponding worksheets and run logs, it is initialed by the analyst and saved chronologically for future review. All electronic raw data is stored in magnetic tapes or CDs.

13.2 Data Reduction and Review

Some instruments have a computerized data reduction and calculation, such as GC/MS, HPLC, GC and ICP. The protocols to perform these tasks are described in the corresponding SOPs and the computer programs used for data reduction are validated before use and checked periodically by manual calculations.

Internal data review consists of a tiered or sequential system of verification, consisting of at least three tiers, with each check performed by a different person. The three tiers include a 100% review of the entire data package and completion of corresponding Data Review Checklist the analyst, then a 100% verification review by a technically qualified person, such as a supervisor or another chemist, experienced in that particular method or procedure, who checks for proper integration of peaks, identification of compounds, QC, etc. The third review is mainly an administrative one, to check for accuracy and completeness, typically performed by the Project Manager in charge of that project. The procedures used for performing the data review are detailed in the SOP MIS018.

If a discrepancy is noted in any stage of the reviewing process, the package is returned to the primary analyst for corrective action. For analyses that do not have automatic data reduction, the analyst performs the necessary calculations to obtain the final result, and then the results are reviewed as indicated above.

All information used in the calculations (e.g., raw data, calibration files, tuning records, results of standard additions, interference check results, sample response, and blank or background correction protocols) as well as sample preparation information (e.g., weight or volume of sample used, percent dry weight for solids, extract volume, dilution factor used) are recorded in order to enable reconstruction of the final result.

As described in Section 16, the results of the quality control sample analysis are reviewed, and evaluated before data are reported.

After the results are entered into the LIMS, the third tier is completed and if no discrepancies are encountered they are released for reporting.

If electronic audit trail functions are available, they must be in use at all times, and associated data must be accessible. If the instrument does not have an audit trail, the integrity of the data is documented as described in SOP MIS043 Implementation of the Business Ethics and Data Integrity Policy.

13.3 Report Format and Contents

After the data is entered in the LIMS and approved, a report or "Certificate of Analysis" is generated from the information contained in the LIMS database. The certificate of analysis, containing the results of each test, or series of tests, is then submitted with all supporting documentation to the Project Manager for signature. Other authorized signatory personnel include the Lab Technical Director, QA Officer or Lab Manager. The signature could be either in the form of "wet signature" or "electronic signature" which is stored in the LIMS database.

The analytical report, of which the Chain of Custody Document is part, contains the following information, at a minimum:

- Header with complete laboratory information.
- Unique identification of each page and an indication of the total number of pages included in the report
- Client's information (Company name, address, contact person, etc.)
- Project name or number
- Lab ID number assigned to the sample (unique identification number).
- Description and unambiguous identification of the sample(s) including the client identification code.
- Sample login information (date, time and initials of person that received the sample)
- Sampling information (date, time, name of sampler)
- If the laboratory collected the sample, reference to sampling procedure.
- Analysis performed.
- Results obtained with reporting units
- Date of preparation and analysis

- Time of preparation and/or analysis for tests with holding times of equal or less than 72 hours when required to demonstrate that the test was performed within holding times (the time of preparation/analysis can be entered in the case narrative section of the report).
- Name of method used for preparation and analysis
- Minimum Reporting Level or PQL
- Identification of results for any sample that did not meet sample acceptance requirements.
- Signature of authorized person (Lab Manager, Lab Director, etc.)
- Any additional information that is important to be reported.
- Any deviations from, additions to, or exclusion from SOPs; any conditions that may have affected the quality of results and any failures (such as failed quality control), including the use and definitions of data qualifiers (appendix 12).
- Measurements, examinations and derived results, supported by tables, graphs, sketches and photographs as appropriate, and any failures identified; identification of whether data are calculated on dry weight basis; identification of the reporting units such as ug/l or mg/kg
- Clear identification of all test data provided by outside sources, such as subcontracted laboratories, clients, etc.
- Clear identification of numerical results with values below the RL (J qualifier).

Exceptions to this standard approach for reporting are allowed with the approval of the QA Manager and should be documented; for DoD related work, both date and time of preparation and analysis are considered essential information, regardless of the length of the holding time, and shall be included as part of the laboratory report. If the time of the sample collection is not provided, the laboratory must assume the most conservative time of day (i.e., earliest).

Any result not obtained in accordance with the approved method and the lab QA Plan by use of proper lab technique, must be documented as such in the case narrative section of the Certificate of Analysis.

Material amendments to a test report after issue are made only in the form of a further document, or data transfer including the statement “Supplement to Certificate of Analysis, identification number”.

Clients are notified promptly, in writing, of any event such as the identification of defective measuring or test equipment that cast doubt on the validity of results given in any test report or amendment to a report.

Test results are certified to meet all requirements of the NELAC standards, or reasons are provided if they do not. After signed, the Certificates of Analysis are sent to the client by US mail. In some cases the report is submitted by facsimile, electronically or electromagnetically. In this last case, all reasonable steps are taken to preserve confidentiality and the data is only sent to fax numbers or email addresses properly authorized by the client. Hard copies are submitted by US Mail.

13.4 Records

Records provide the direct evidence and support for the necessary technical interpretations, judgments, and discussions concerning laboratory results. These records, particularly those that are anticipated to be used as evidentiary data, provide the historical evidence needed for later reviews and analyses. Records must be legible, identifiable, and retrievable, and protected against damage, deterioration or loss. All records referenced in this section are retained for a minimum of ten years.

The laboratory has established and maintain procedures to control all documents that form part of its quality system (internally generated or from external sources), such as regulations, standards, other normative documents, environmental test and/or calibration methods, as well as drawings, software, specifications, instructions and manuals. Documents include policy statements, procedures, specifications, calibration tables, charts, textbooks, posters, notices, memoranda, software, drawings, plans, etc. These may be on various media, whether hard copy or electronic, and they may be digital, analog, photographic or written.

A procedure has been established to review and approve for use by authorized personnel prior to issue, all documents issued to personnel in the laboratory as part of the quality system. The procedure also establishes a document control system and the policy to be followed with invalid and/or obsolete documents.

Laboratory records generally consist of bound notebooks with pre-numbered pages, official laboratory worksheets, personnel qualifications and training forms, facilities, Corrective Action reports, PT records, equipment maintenance and calibration forms, chain-of-custody forms, sample analysis request forms, and analytical change request forms. All records are recorded in indelible ink and retained for ten years. Records that are stored or generated by computers have hard copy or write protected backup copies. Electronic records are supported by the hardware and software necessary for their retrieval.

Any documentation changes are corrected by drawing a single line through the change so that it remains legible and is initialed by the responsible individual, along with the date of change and reason. The correction is written adjacent to the error. Strip-chart recorder or computer printouts are signed by the person who performed the instrumental analysis. If corrections need to be made in computerized data, a system parallel to the corrections for handwritten data is used.

In the event the Laboratory is sold, all past records shall be transferred to the custody of the new legal owner or operator of the Laboratory.

This management however shall maintain responsibility and accountability for laboratory work performed prior to the transfer. A written statement to this effect shall be provided.
The new owner/operator shall be accountable and liable for all work performed after the transfer date and he/she shall provide a written statement to that effect.

In the case the laboratory goes out of business, the present management shall maintain custody of all records and make them available to clients for a period of ten years.

Laboratory records include the following:

13.4.1 Standard Operating Procedures

SOPs are controlled documents. They are reviewed on regular basis and if there are any revisions, these are distributed to all affected individuals to ensure implementation of changes. All revisions of SOPs are archived for historical reference, per regulatory or client requirements.

13.4.2 Equipment Maintenance Documentation

Documents detailing the receipt and specification of analytical equipment are retained. A history of the maintenance record of each system serves as an indication of the adequacy of maintenance schedules and parts inventory. As appropriate, the maintenance guidelines of the equipment manufacturer are followed. When maintenance is necessary, it is documented in either standard forms or in logbooks.

13.4.3 Calibration Records and Traceability of Standards/Reagents

The frequency, conditions, standards, reagents and records reflecting the calibration history of a measurement system are recorded. These include but are not limited to the source of standards and reagents, receipt, preparation and use.

The overall program of calibration and/or verification and validation of equipment is designed and operated so as to ensure that measurements made by the laboratory are traceable to national standards of measurement.

Calibration certificates indicate the traceability to national standards of measurement and provide the measurement results and associated uncertainty of measurement and/or a statement of compliance with an identified metrological specification. The laboratory maintains records of all such certifications.
Where traceability to national standards of measurement is not applicable, the laboratory will provide evidence of correlation of results by participation in a suitable program of interlaboratory comparisons, proficiency testing, independent analysis or other suitable means.

13.4.4 Sample Management

A record of all procedures to which a sample is subjected while in the possession of the laboratory is maintained, including the personnel involved in each activity. These include records pertaining to:

- Sample preservation including appropriateness of sample container and compliance with holding time requirements.
- Sample identification, receipt, acceptance or rejection and log-in
- Sample storage and tracking including shipping receipts, transmittal forms, and internal routing and assignment records.
- Disposal of hazardous samples including the date of sample or sub-sample disposal and name of responsible person.
- Automated sample handling systems

13.4.5 Original Data

The raw data and calculated results for all samples is maintained in laboratory notebooks, logs, bench sheets, files or other sample tracking or data entry forms. Instrumental output is stored in a computer file and/or a hard copy report. These records include:

- Laboratory sample ID code
- Date of analysis
- Instrumentation identification and instrument operating conditions/parameters
- Analysis type and sample preparation information, including sample aliquots processed, cleanup, and separation protocols.
- All manual, automated, or statistical calculations

- Confirmatory analysis data, when required to be performed
- Review history of sample data
- Analyst's or operator's initials/signature
- All data generated, except those that are generated by an automated data collection system, are recorded directly, promptly and legibly in permanent ink.
- Date of analysis and extraction as well as time if the Hold Time is 72 hours or less.

13.4.6 QC Data

The raw data and calculated results for all QC samples and standards are maintained in the manner described in 13.4.5. Documentation allows correlation of sample results with associated QC data. Documentation also includes the source and lot numbers of standards for traceability. QC samples include, but are not limited to, control samples, method blanks, matrix spikes and matrix spike duplicates.

13.4.7 Correspondence

Correspondence pertinent to a project is kept and placed in the project files.

13.4.8 Deviations

When a deviation from a documented policy occurs, including SOPs, analytical methods, QA/QC criteria, etc., the laboratory notifies the client of this in the Certificate of Analysis under the case narrative section or in a supplemental report indicating the deviation and the reasons for it.

All deviations from SOPs are reviewed and approved by the QA Officer or Technical Director.

When mistakes occur in records, each mistake is crossed out, leaving it legible, and the correct value and initials of person making the correction are entered alongside.

When corrections are due to reasons other than transcription errors, the reason for the correction is documented.

13.4.9 Final Reports

Copies of final reports are kept in each client's file, along with supporting documentation.

13.4.10 Administrative Records

The following are maintained:

- Personnel qualifications, experience and training records
- Initial and continuing demonstration of proficiency for each analyst
- A log of names, initials and signatures for all individuals who are responsible for signing or initialing any laboratory record.

13.5 Document Control System

The laboratory has established and maintains procedures to control all documents that form part of its quality system (internally generated or from external sources).

A document control system is used to ensure that all personnel have access to current policies and procedures at all times. Documents, which are managed by this system, include this Quality Manual, all SOPs, policy statements, procedures, specifications, calibration tables, charts, textbooks, posters, notices, memoranda, software, drawings, plans, etc. The system consists of a document review, revision and approval system, and document control and distribution. The documents may be on various media, whether hard copy or electronic, and they may be digital, analog, photographic or written.

All quality documents (this manual, SOPs, policies, etc.) are reviewed and approved by the QA Officer, the Technical Directors and the Laboratory Director. Such documents are revised whenever the activity described changes significantly. All documents are reviewed at least every 5 years, with the exception of the QA Manual, which is reviewed annually.
All QA/QC documents are controlled by the QA Officer. Controlled copies are made available to all affected individuals in the laboratory. The QA Officer maintains a distribution list for controlled copies and ensures that any revisions are available.

More detailed procedures related to Document Control are specified in the corresponding SOP (MIS045).

13.6 Confidentiality

All analytical reports, results, electronic records and transmission of results are kept in confidence to the customer who requested the analyses and only released to third parties with written permission from a properly authorized representative of the client. This information includes, but is not limited to COCs, Certificates of Analysis, raw data, bench sheets, electronic information and sample results.
In addition no information pertaining to clients is posted in public areas where the access is not restricted.

Access to laboratory records and LIMS data is limited to authorized laboratory personnel except with the permission of the QA Officer or Laboratory Director. NELAP-related records are made available to authorized accrediting authority personnel.

13.7 Service to the Client

The laboratory shall afford clients or their representatives’ cooperation to clarify the client's request and to monitor the laboratory’s performance in relation to the work performed, provided that the laboratory ensures confidentiality to other clients.

The laboratory shall maintain and document timely communication with the client for the purposes of seeking feedback, both positive and negative, and clarifying customer requests. Feedback shall be used and analyzed to improve the quality system, testing activities, and service to the client.

The following are specific situations for which immediate clarification or feedback is required from the client:

- The client has specified incorrect, obsolete, or improper methods;
- Methods require modification to ensure achievement of project-specific objectives contained in planning documents (e.g., difficult matrix, poor-performing analyte);

- Project-planning documents (e.g., Quality Assurance Project Plan (QAPP) or Sampling and Analysis Plan (SAP)) are missing or requirements in the documents (e.g., action levels, detection and quantification capabilities) require clarification; or
- The laboratory has encountered problems with sampling or analysis that may impact results (e.g., improper preservation of sample).

14 PERFORMANCE AND SYSTEM AUDITS AND FREQUENCY

14.1 Internal Laboratory Audits

Annual internal audits are performed to verify that laboratory operations continue to comply with the requirements of the quality system and the corresponding NELAC Standard. The internal audit program shall address all elements of the quality system, including all of the environmental testing activities.
The quality assurance officer plans and organizes internal audits as required by a predetermined schedule and requested by management, ensuring that all areas of the laboratory are reviewed over the course of one year. Such audits are performed by the Quality Assurance Officer or personnel designated by the QA officer, who are trained and qualified in the specific quality system element or technical area under review and wherever resources permit, independent of the activity to be audited. Technical personnel are not allowed to audit their own activities unless it can be thoroughly demonstrated that an effective audit will be carried out.

Where the audit findings cast doubt on the correctness or validity of the laboratory's results, an immediate corrective action is initiated and any client must be notified in writing within 30 days of the finding if investigations show that the laboratory results may have been affected.

The laboratory shall notify clients promptly, in writing, of any event such as the identification of defective measuring or test equipment that casts doubt on the validity of results given in test report or test certificate or amendment to a report or certificate.

The internal system audits include an examination of laboratory documentation and records on sample receiving, sample log-in, sample storage, chain-of-custody procedures, sample preparation and analysis, instrument operating records, etc. Specific records that are subject to review are detailed in the corresponding SOP for performing audits and data review (SOP MIS014).

14.2 Management Review

At least once per year, laboratory executive management conducts a review of the quality system and environmental testing activities to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements in the quality system and laboratory operations. The management review is a separate activity from the internal audit. The review takes account of the following:

- The suitability of policies and procedures;
- Reports from managerial and supervisory personnel;
- The outcome of recent internal audits;
- Corrective and preventive actions;
- Assessments by external bodies;
- The results of interlaboratory comparisons or proficiency tests;

- Changes in the volume and type of the work;
- Client feedback;
- Complaints;
- Other relevant factors, such as quality control activities, resources and staff training.

The managerial review is performed according to specified procedures detailed in the corresponding SOP and the records of review findings and actions are kept at the laboratory.

The area of activity audited, the audit findings and corrective actions that arise from them shall be recorded. The laboratory management shall ensure that these actions are discharged within the agreed time frame as indicated in this QA manual and/or in the corresponding SOPs. Follow-up audit activities shall verify and record the implementation and effectiveness of the corrective action taken.

The laboratory, as part of their overall internal auditing program, shall insure that a review is conducted with respect to any evidence of inappropriate actions or vulnerabilities related to data integrity. Discovery of potential issues shall be handled in a confidential manner until such time as a follow up evaluation, full investigation, or other appropriate actions have been completed and the issues clarified. All investigations that result in finding of inappropriate activity shall be documented and shall include any disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients. All documentation of these investigation and actions taken shall be maintained for 10 years.

14.3 Other Audits

The Laboratory is also subject to external audits performed by regulatory agencies and clients. The State regulatory agency under which the laboratory is accredited under NELAC performs a bi-annual quality systems audit. The QA Manager and other relevant management personnel ensure that all the items identified in NELAC Chapter 5 Quality Systems are available for on-site inspection at the time they are requested in order to facilitate the audit process.

Audits performed by clients are non-routine and could be part of the evaluation process in selecting a laboratory for a particular project. For these audits, the management personnel can make available all items requested that are relevant to the evaluation of the Quality System and specific QA/QC practices without releasing information that could be considered confidential or pertaining to other clients data.

15 FACILITIES, EQUIPMENT AND REAGENTS

15.1 Facilities

The Laboratory is segregated into different areas for operations that are not compatible with each other. This separation prevents contamination of low levels of common laboratory solvents in the volatile organics analyses and maintains culture handling or incubation areas segregated from other areas. The access to the volatile organics laboratory and microbiology laboratory is restricted to appropriate personnel only; signs to that effect are posted on the entry doors of these areas.

It is the policy of the company to assure that the facilities housing the laboratory and the workspaces are adequate to perform the analyses for which it is accredited. These include physical space, energy sources, lighting and environmental conditions, sufficient storage space, workbenches, ventilation, utilities, access and entryways to the laboratory, sample receipt area(s), sample storage area(s), chemical and waste storage area(s); and data handling and storage area(s). For microbiology, floors and work surfaces shall be non-absorbent and easy to clean and disinfect. Work surfaces shall be adequately sealed and shall be clean and free from dust accumulation. Plants, food, and drink shall be prohibited from the laboratory work area. The company will procure to improve the condition of the facilities whenever possible and make plans for future expansions or improvements.

The laboratory, as per Standard Operating Procedures, monitors, control and records environmental conditions as required by the relevant specifications, methods and procedures or where they influence the quality of the results, for example monitoring biological sterility and other environmental effects, as appropriate to the technical activities concerned. Environmental tests shall be stopped when the environmental conditions jeopardize the results of the environmental tests and/or calibrations.

In order to prevent cross-contamination, samples suspected of containing high concentrations of target analytes shall be isolated from other samples. Samples or extracts designated for volatile organics analysis are stored in separate refrigerators located in volatile organics area, completely segregated from all other samples and extracts. Samples suspected of containing high concentrations of volatile organics are further isolated from other volatile organics samples and samples for volatile organic analysis in potable water are kept in designated refrigerator.

When the project requires it, travel blanks, used as storage blanks, are kept with the samples until the moment of analysis to determine whether or not cross-contamination occurred. The procedures for evaluation of storage blanks, as well as other considerations for incompatible activities as detailed in the SOP MIS036.

Adequate measures are taken to ensure good housekeeping in the laboratory and to ensure that any contamination does not adversely affect data quality.

15.2 Equipment and Equipment Maintenance

The Laboratory is furnished with all items of sampling, measurement and test equipment required for the correct performance of the environmental tests (including sampling, preparation of samples, processing and analysis of environmental data). If the laboratory needs to use equipment outside its permanent control, this equipment must meet the requirements of other lab equipment according to this QA Manual.

The Laboratory acquires only equipment and its software required for testing and sampling that is capable of achieving the accuracy required and that complies with specifications relevant to the environmental tests concerned.

Before being placed into service, equipment (including that used for sampling) is calibrated and/or checked to establish that it meets the laboratory's specification requirements and complies with the relevant standard specifications.

Records are maintained for all major equipment, including documentation of all routine and non-routine maintenance activities.

The records include:

- The name of the equipment

- The manufacturer’s name, type identification, and serial number or other unique identification of the equipment and its software.
- Date received and date placed in service (if available)
- Current location, where appropriate.
- If available, condition when received (e.g., new, used, reconditioned)
- Dates and results of calibrations, if appropriate
- Details of routine and non-routine maintenance carried out to date and planned for the future
- History of any damage, malfunction, modification or repair

When purchasing new laboratory equipment and accessories, only reputable brands will be considered and always the instruments that have the best quality shall be considered, regardless of the difference in price with a similar instrument, considered of an inferior quality.

Instruments and equipment are maintained in optimum condition. Frequent inspections, routine preventative maintenance, prompt service, etc. ensure optimal performance.

It is the policy of the company to provide analytical instruments and software adequate to meet the method requirements and the quality control operations specified in both NELAC and the individual methods. Older instruments shall be replaced with newer ones as technology improves and efforts shall be made to provide a greater degree of automation and security in analytical instruments. A list of major instruments and reference materials is in Appendix 4.

Equipment shall be operated by authorized personnel. Up-to-date instructions on the use and maintenance of equipment (including any relevant manuals provided by the manufacturer of the equipment) shall be readily available for use by the appropriate laboratory personnel.

Service contracts or agreements with the manufacturer or instrument Maintenance Company are maintained for the following instruments:

- ICP and/or ICP-MS instruments for metal analysis
- GC/MS units for volatile organics
- Purge and Trap systems and autosamplers
- GC/MS units for semi-volatile organics

The analyst in charge of each particular instrument performs preventive maintenance for all other analytical instruments.

All maintenance and repairs are thoroughly documented in logbooks, with information pertaining to the description of the problem or routine maintenance, date of occurrence and name of person that performed the maintenance operation.

A routine preventive maintenance program is used to minimize the occurrence of instrument failure and other system malfunctions. Designated employees regularly perform routine scheduled maintenance and repair of instruments. They also check that equipment complies with the specifications, design a plan for maintenance, where appropriate, and verify that the maintenance is carried out to date. All laboratory instruments are maintained according with manufacturer’s specifications.

Any item of the equipment which has been subjected to overloading or mishandling, or which gives suspect results, or has been shown by verification or otherwise to be defective, is taken out of service, isolated to prevent its use or clearly labeled as being out of service until it has been repaired and shown by calibration, verification or test to perform satisfactorily. The laboratory will examine the effect of this defect or departure from specified limits on previous tests and shall institute the "Control of nonconforming work" or Corrective Action procedures.

The equipment and its software used for testing, calibration and sampling used at the laboratory is capable of achieving the accuracy required and comply with specifications relevant to the environmental tests concerned. Calibration programs are established for key quantities or values of the instruments where these properties have a significant effect on the results. All new analytical and sampling equipment is calibrated or checked to establish that it meets the laboratory's specification requirements and complies with the relevant standard specifications before being placed into service. All pieces of equipment are calibrated or checked before use.

Whenever practicable, all equipment under the control of the laboratory and requiring calibration shall be labeled, coded or otherwise identified to indicate the status of calibration, including the date when last calibrated and the date or expiration criteria when recalibration is due.

When, for whatever reason, equipment goes outside the direct control of the laboratory, the laboratory shall ensure that the function and calibration status of the equipment are checked and shown to be satisfactory before the equipment is returned to service.

Test and calibration equipment, including both hardware and software, shall be safeguarded from adjustments which would invalidate the test and/or calibration results.

Glassware is cleaned to meet the sensitivity of the method. Any cleaning and storage procedures that are not specified by the method are documented in laboratory records or SOPs.

15.3 Reagents and Chemicals

The reagents and chemicals used in the laboratory are obtained from reputable suppliers that have proven consistency over the years. Purity specifications are chosen based on the analysis and this is always verified by the analysis of solvent blanks and check standards. In methods where the purity of reagents is not specified, analytical reagent grade are used. Reagents of lesser purity than those specified by the test method are not used. Upon receipt of reagents, the labels on the container are checked to verify that the purity of the reagents meets the requirements of the particular test method. Such information is documented in the corresponding section of the LIMS.

The following are some of the reagents used:

- Solvents used for Gas Chromatography and GC/MS are “organic residue analysis” grade.
- Methanol used for volatile organics by GC or GC/MS is “Purge and Trap” grade.
- All inorganic chemicals are “reagent grade” or better, depending of the requirement.
- Nitric acid used for preparation of standards for ICP/MS analysis is “trace metals”.

The quality (e.g., purity) specifications for all standards and reagents (including water) are documented in SOP MIS004.

The quality of reagent water sources used for microbiological analyses is monitored for trace metals, TKN, TOC and bacteria content. The results are documented in the corresponding logbook kept at the Microbiological Lab. On daily basis, the quality of reagent water is monitored by performing method blanks and system blanks for all tests that require water and the results documented with the analytical batch. If the reagent water does not meet method specific requirements a corrective action procedure is initiated.

The concentration of titrants is verified in accordance with written laboratory procedures (SOPs) and documented in the Standardization log book kept in the Wet Chemistry section of the Laboratory.

15.4 Analytical Standards and Reference Materials

In general the Laboratory uses reference materials that are traceable, when possible to SI units of measurement, or to certified reference materials. Where possible, traceability shall be to national or international standards of measurement or to national or international standard reference materials. Internal reference materials are checked as far as is technically and economically practicable.

Most of the standards used are purchased as certified solutions from qualified vendors. These stock standards are traceable to NIST, the corresponding documentation, including certificate of analysis or purity, date of receipt, recommended storage conditions, expiration date, lot numbers, etc., is maintained in laboratory files.

All standard containers, both original and of daughter standards, are labeled with an expiration date.

All analytical standards received at the laboratory are inspected for appearance and expiration date, if any. They are recorded in the LIMS, which assigns a unique identification number to assure traceability. The identification number is referenced when a dilution of the stock is made or when a reagent solution is prepared.

All reference materials after they have been properly inspected and logged in, are handled, transported, stored and used, according to the manufacturer's instructions in order to prevent contamination or deterioration and to protect their integrity.

Analytical standards prepared in the laboratory are prepared from certified stock solutions or pure product. Quality Control Standards (QCS) are prepared or obtained from a separate source other than the working standards.

The management does not reject any request from technical personnel to obtain a reference material or any type of instrument or chemical that he or she considers essential for the normal operation of the laboratory.

15.5 Computers and Electronic Data Related Requirements

Where computers or automated equipment are used for the acquisition, processing, recording, reporting, storage or retrieval of test data the following are taken into consideration:

- Computer software developed by the user is documented in sufficient detail and is suitably validated as being adequate for use;
- Procedures are established and implemented for protecting the data; including, but not limited to, integrity and confidentiality of data entry or collection, data storage, data transmission and data processing;
- Computers and automated equipment are maintained to ensure proper functioning and are provided with the environmental and operating conditions necessary to maintain the integrity of environmental test data.
- Establishment and implementation of appropriate procedures for the maintenance of security of data including the prevention of unauthorized access to, and the unauthorized amendment of, computer records.
- Commercial off-the-shelf software (e. g. word processing, database and statistical programs) in general use within their designed application range is considered to be sufficiently validated, however, laboratory software configuration or modifications must be validated.
- All aspects of electronic data management shall be addressed. At a minimum, a sample data set shall be used to test and verify the operation of all automated data reduction processes (including data capture, manipulation, transfer, and reporting). This shall be done any time new software (including commercially available software) is installed or programming code is modified or manipulated.

16 SPECIFIC ROUTINE PROCEDURES USED TO EVALUATE DATA QUALITY

Quality control acceptance criteria are used to determine the validity of the data based on the analysis of internal quality control check (QC) samples (see section 11). The specific QC samples and acceptance criteria are found in the laboratory SOPs. Typically, acceptance criteria are taken from published EPA methods. Where no EPA criteria exist, laboratory generated acceptance criteria are established. Acceptance criteria for bias are based on historical mean recovery plus or minus three standard deviation units, and acceptance criteria for precision range from zero (no difference between duplicate control samples) to the historical mean relative percent difference plus three standard deviation units. Analytical data generated with QC samples that fall within prescribed acceptance criteria indicate the laboratory was in control. Data generated with QC samples that fall outside the established acceptance criteria indicate the laboratory was “out of control” for the failing tests. These data are considered suspect and the corresponding samples are reanalyzed or reported with qualifiers.

Many published EPA methods do not contain recommended acceptance criteria for QC sample results. In these situations, Weck Laboratories, Inc. uses 70 – 130 % as interim acceptance criteria for recoveries of spiked analytes, until in-house limits are developed. In-house limits are based on a 95% confidence interval and should include all historical data points (minimum of 20 data points).

16.1 Laboratory Control Samples

A Laboratory Control Sample is analyzed with each batch of samples to verify that the accuracy of the analytical process is within the expected performance of the method.

The results of the LCS are compared to acceptance criteria to determine usability of the data. Data generated with LCS samples that fall outside the established acceptance criteria are judged to be out-of-control. These data are considered suspect and the corresponding samples are reanalyzed or reported with qualifiers.

LCS samples are prepared in each corresponding matrix (reagent water for aqueous and Ottawa sand for soil/solid), which must be free of the target analytes to be analyzed.

16.2 Matrix Spikes/Matrix Spike Duplicates

Results from MS/MSD analyses are primarily designed to assess data quality in a given matrix, and not laboratory performance. In general, if the LCS results are within acceptance criteria, performance problems with MS/MSD results may either be related to the specific sample matrix or to an inappropriate choice of extraction, cleanup, or determinative methods. If any individual percent recovery in the matrix spike (or matrix spike duplicate) falls outside the designated acceptance criteria, Weck Laboratories, Inc. will determine if the poor recovery is related to a matrix effect or a laboratory performance problem. A matrix effect is indicated if the LCS data are within acceptance criteria but the matrix spike data exceed the acceptance criteria.

16.3 Surrogates Recoveries

Surrogates are exclusively used in organic analysis. Surrogate recovery data from individual samples are compared to surrogate recovery acceptance criteria in the methods. As for MS/MSD results, surrogate recoveries are used primarily to evaluate data quality and not laboratory performance.

16.4 Method Blanks

Method blank analyses are used to assess acceptance of sample results. The source of contamination is investigated and measures taken to correct, minimize or eliminate the problem in the situations detailed in Section 12.1.1.

Any sample associated with the contaminated blank is reprocessed for analysis or the results reported with appropriate qualifying codes.

17 NON-COMFORMING WORK, CORRECTIVE ACTION AND PREVENTIVE ACTION

17.1 Control of Nonconforming Environmental Testing Work

A policy has been established to handle situations when any aspect of the Laboratory's environmental testing work, or the results of this work, do not conform to its own procedures or the agreed requirements of the client. The procedures to be implemented when this situation occurs are detailed in the corresponding SOP (MIS044).

17.2 Corrective Action

Corrective action is the process of identifying, recommending, approving and implementing measures to counter unacceptable procedures or out of control QC performance that can affect data quality. To the extent possible, samples are reported only if all quality control measures are acceptable. If a quality control measure is found to be out of control, and the data is to be reported, all samples associated with the failed quality control measure are reported with the appropriate data qualifier(s). Sample results may also be qualified when holding times are not met, improper sample containers and/or preservatives are used or when other deviations from laboratory standard practices and procedures occur.

Corrective action in the laboratory may occur prior to, during and after initial analyses. A number of conditions such as broken sample containers, multiple phases, low or high pH readings, and potentially high concentration samples may be identified during sample login or just prior to analysis. The SOPs specify conditions during and after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, and automatic reinjection/reanalysis when certain QC criteria are not met.

Any QC sample result outside of acceptance limits requires corrective action. Once the problem has been identified and addressed, corrective action may include the reanalysis of samples, or appropriately qualifying the results.

The analyst will identify the need for corrective action. The Technical Director will approve the required corrective action to be implemented by the laboratory staff. The QA Officer will ensure implementation and documentation of the corrective action.

Corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both a corrective action log (Appendix 10), signed by the personnel involved, and the narrative in the data report.

Where a complaint, or any other circumstance, raises doubt concerning the laboratory's compliance with the laboratory's policies or procedures, or with the quality of the laboratory's tests, the laboratory shall ensure that those areas of activity and responsibility involved are promptly audited in accordance with internal audit procedures established under this QA Manual. All complaints received at the laboratory from clients or other parties shall be treated according to the corresponding standard operating procedure for its resolution. Records of the compliant and subsequent actions are maintained for future review.

There are some cases in which the QC checks do not fail but the analyst or supervisor discovers that an unexpected or contradictory result has been obtained. These situations are considered also as "Out-Of-Control" and an investigation is carried out.

The investigations/corrective action procedures include but are not limited to:

- Identification of the individuals responsible for assessing each QC data type
- Identification of the individuals responsible for initiating and/or recommending corrective actions
- Definition of how the analyst should treat the data set if the associated QC measurements are unacceptable
- Investigate the probable cause of irregularity and determine the root cause(s) of the problem.
- Review the sample's documented history.
- Review the documentation for errors.
- Scrutinize the sample preparation (digestion, extraction, dilutions, cleanup, etc.)
- Verify standards with reference materials.
- Re-analyze the sample if possible.
- Investigate alternate methodologies.

- If the event is determined to be matrix dependent the data is reported with a qualifier.
- Definition of how out-of-control situations and subsequent corrective actions are to be documented
- Definitions of how management, including the QA Officer, review corrective action reports

Where corrective action is needed, the laboratory shall identify potential corrective actions. It shall select and implement the action(s) most likely to eliminate the problem and to prevent recurrence.

Corrective actions shall be to a degree appropriate to the magnitude and the risk of the problem. The laboratory shall document and implement any required changes resulting from corrective action investigations.

The laboratory shall monitor the results to ensure that the corrective actions taken have been effective.

Where the identification of nonconformances or departures casts doubts on the laboratory's compliance with its own policies and procedures, or on its compliance with the NELAC Standard, the laboratory shall ensure that the appropriate areas of activity are audited in accordance with Section 14.1 of this Manual, Internal Laboratory Audits as soon as possible.

17.3 Preventive Action

Preventive action is a pro-active process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints.

Needed improvements and potential sources of nonconformances, either technical or concerning the quality system, shall be identified. If preventive action is required, action plans shall be developed, implemented and monitored to reduce the likelihood of the occurrence of such nonconformances and to take advantage of the opportunities for improvement.

Procedures for preventive actions shall include the initiation of such actions and application of controls to ensure that they are effective.

18 SUBCONTRACTING AND SUPPORT SERVICES AND SUPPLIES

18.1 Subcontracted Laboratory Services

A subcontracted laboratory will be used only if Weck Laboratories does not have the capability of performing the requested test, because of unforeseen reasons (e. g. workload, need for further expertise or temporary incapacity) or if the client specifically requests a particular analysis to be subcontracted. Weck Laboratories advises the client in writing or by other means of its intention to subcontract any portion of the testing to another party, and when appropriate, gain the approval of the client, preferably in writing.

When subcontracting any part of the testing, this work will be placed with a laboratory accredited under NELAP for the tests to be performed or with a laboratory that meets applicable statutory and regulatory requirements for performing the tests and submitting the results of tests performed.

For DoD related work, only subcontracted laboratories accredited by DoD or its designated representatives will be used. Subcontracted laboratories must receive project-specific approval from the DoD client before any samples are analyzed.

The corresponding records demonstrating that the above requirements are met are retained (e.g., copies of the subcontracted lab certifications, communications with the client, etc.).

When subcontracted laboratories are used, this is indicated in the Certificate of Analysis and a copy of the subcontractor's report is kept in file in case the client requests it at a later time. Subcontracted work performed by non-NELAP accredited laboratories is also clearly identified in the final report.

Weck Laboratories is responsible to the client for the subcontractor's work, except in the case where the client or a regulatory authority specifies which subcontractor is to be used.

A register of all subcontractors that are routinely used by the laboratory is kept on file, along with evidence of certifications.

18.2 Outside Support Services and Supplies

Weck Laboratories, Inc. only uses those outside support services and supplies that are of adequate quality to sustain confidence in the laboratory's tests. Records of all suppliers for support services or supplies required for tests are maintained. Services and supplies that may affect the quality of environmental tests include, but are not limited to, balance calibration, solvents, standards, and sample containers; their records include the following, where applicable:

- Date of receipt;
- Expiration date;
- Source;
- Lot or serial number;
- Calibration and verification records
- Certifications.

Specific procedures to evaluate, select and monitor suppliers of materials and services as well as required documentation is detailed in the corresponding SOP (MIS042)

19 REFERENCES

19.1 NELAC 2003 Standard
19.2 Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans,
19.3 QAMS-005/80, December 29, 1980, Office of Monitoring Systems and Quality Assurance, ORD, USEPA, Washington, DC 20460
19.4 RCRA QAPP Instructions, USEPA Region 5, Revision: April 1998
19.5 ASTM D-5283-92. Generation of Environmental Data Related to Waste Management Activities: Quality Assurance and Quality Control Planning and Implementation.
19.6 American National Standards Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs (ANSI/ASQC E-4), 1994.

19.7 EPA 2185 – Good Automated Laboratory Practices, 1995
19.8 ISO/IEC Guide 25: 1990. General Requirements for the Competence of Calibration and Testing Laboratories.
19.9 QA/R-2: EPA Requirements for Quality Management Plans, August 1994.
19.10 QA/G-4: Guidance for the Data Quality Objectives Process EPA/600/R-96/055, September 1994.
19.11 A/R-5: EPA Requirements for Quality Assurance Project Plans Draft – November 1997
19.12 QA/G-5: Guidance on Quality Assurance Project Plans EPA/600/R-98/018, February 1998.
19.13 A/G-6: Guidance for the Preparation of Standard Operating Procedures for Quality Related Operations EPA/600/R-96/027, November 1995.
19.14 A/G-9: Guidance for the Data Quality Assessment: Practical Methods for Data Analysis EPA/600/R-96/084, January 1998.
19.15 Manual for the Certification of Laboratories Analyzing Drinking Water EPA/570/9-90/008.
19.16 ISO. 2005. General requirements for the competence of testing and calibration laboratories. ISO 17025
19.17 DoD Quality Systems Manual for Environmental Laboratories, Version 4, dated 3/19/09.

Appendix Detail

Appendix 1	**Resumes of Key Personnel**
Appendix 2	**Code of Ethics**
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APPENDIX 1
RESUMES OF KEY PERSONNEL

Name	Position
Alfredo Pierri	President/CEO – Laboratory Director
David Cerna	QA Officer
Joe Chau	Technical Director Inorganics
Alan Ching	Technical Director Organics
Hai-Van Nguyen	Technical Director Microbiology - Senior Project manager

ALFREDO E. PIERRI

Title

President, Laboratory Director

Education

M.S. (equiv.) - University of Buenos Aires, Argentina, 1978. Organic Chemistry

- University of California, Los Angeles
Certificate in Hazardous Materials Control and Management, 1991 - 1993

Affiliations

American Chemical Society, member
American Water Works Association, member
Water Environment Federation, member
American Council of Independent Laboratories (ACIL), member
The NELAC Institute, member

Professional Experience

Jan/1987 to Present	Weck Laboratories, Inc., City of Industry, CA Full Service Environmental Testing laboratory
Sep/1984 to Dec/1986	SCS Engineers, Long Beach, CA Environmental Testing laboratory owned by Large Environmental Engineering Firm
Jul/1979 to Aug/1984	Argentina Atomic Energy Commission, Buenos Aires, Argentina Government Agency – Research and Development

Mr. Pierri has extensive experience in analytical chemistry. Most of his work in this field has been in the application and development of instrumental methods of analysis for organic analytes using GC, GC/MS, HPLC, IR and UV-Visible spectrometry. He has also worked in Spectrometric techniques for metals analysis such as Atomic Absorption with flame and graphite furnace and Inductively Coupled Plasma with Optical Emission and Mass Spectrometry.

Since 1984 he has been working exclusively in the environmental field obtaining in 1993 the certification as Registered Environmental Assessor (REA-04975) from the California Environmental Protection Agency.

As Laboratory Director, Mr. Pierri is responsible for all laboratory operations including the supervision of the overall performance of the laboratory, revision of analytical reports and Quality Assurance Program, provision of technical assistance and direction to laboratory personnel and consulting with clients about technical and regulatory issues.

Mr. Pierri is well acquainted in all aspects of environmental regulations at Federal and State level, providing consulting services and guidance to clients in regulatory compliance and chemical treatment issues as well as understanding and interpreting analytical data.

Other relevant experience and projects in which Mr. Pierri has participated are as follows:

- For over 22 years provided Project Management for large environmental monitoring projects for wastewater treatment plants, desalination plants, groundwater studies, potable water compliance monitoring and unregulated contaminants studies managed by the EPA such as ICR, UCMR 1 and UCMR 2. These projects required dealing with significant technical issues, regulatory compliance and innovative analytical methods.

- Characterization of wastes to be classified as hazardous as per State of California and Federal Regulations.

- Developing of analytical methods for emerging contaminants in water using GC/MS, LC/MS and other analytical techniques and writing the operating procedures.

- Identification and selection of new laboratory equipment for the laboratory

- Determination of contamination in soil and groundwater due to leaking underground storage tanks.

- Design and implementation of a Quality Assurance Program based on NELAC requirements for the laboratory, writing of the QA manual and training of laboratory personnel.

- Developing and implementation of an Ethics Training Program for the Laboratory, writing the documentation and training course for laboratory employees.

- Interpretation of analytical data and compliance with regulations for drinking water for different potable water purveyors in Southern California.

- Compliance for wastewater discharges with local regulatory agencies and NPDES permits.

- Consulting services to industrial clients on pre-treatment of effluents in order to minimize organic matter and solids and reduce costs in taxes imposed by POTWs.

- Identification of unknown materials by chemical and physical methods.

- Implementation of a LIMS and use of personal computers for data acquisition, handling, and reporting.

- Teaching of Analytical Organic Chemistry at University Level for MS program.

<u>Participation in Seminars and Conferences</u>

Over the years, Mr. Pierri has participated in innumerable conferences and technical meeting involving environmental testing, environmental policy and remediation.

He has been speaker in several conferences and technical meetings related to environmental monitoring in general and emergent contaminants in particular.

DAVID CERNA

Title

QA Manager

Education

B.S. - California Polytechnic University, Pomona, 1997
Chemistry

Professional Experience

May/1997 to Present — Weck Laboratories, Inc., City of Industry, CA
Full Service Environmental Testing laboratory

Mr. Cerna has hands on experience for the analysis of environmental samples by different techniques, including TOC, TOX, Ion chromatography, Liquid Chromatography, GC/MS and sample extraction and preparation for organic analysis by Liquid-Liquid, Solid Phase, sonication and other techniques.
As Group Leader for the IC/HPLC section he was instrumental in developing analytical methods, selecting and setting up new analytical instrumentation and providing training to lab personnel.
Mr. Cerna has also been a data reviewer for analytical batches in the organic department including QA/QC and data accuracy.
As QA Manager, Mr. Cerna is responsible for monitoring and upgrading the QA program for the laboratory, performing internal audits and interacting with State and client auditors. Other responsibilities include providing training to analysts for QA/QC issues and verifying that SOPs are in compliance with current laboratory practices.

Other relevant experience and projects in which Mr. Cerna has participated are as follows:

- Review data packages generated by IC or HPLC for different methods.
- Write SOPs for laboratory procedures.
- Development of analytical methods for trace level contaminants in water by LC/MS/MS and IC
- HPLC and IC troubleshooting and maintenance
- Analysis of water, wastewater, soil and hazardous waste samples by GC/MS for volatile organics
- Analysis of environmental samples by HPLC using different detectors and post-column derivatization systems.

Participation in Seminars and Conferences

Mr. Cerna has participated in many technical seminars for IC, HPLC and LC/MS. He has also attended training classes and conferences relevant to his current position as QA Manager.

JOE CHAU

<u>Title</u>

Technical Director Inorganic

<u>Education</u>

B.S. - California Polytechnic University, Pomona, CA, 1988
Electrical Engineering

B.S - California Polytechnic University, Pomona, CA. 1993
Chemistry, Industrial Option

- University of California, Irvine
Certificate in Hazardous Materials Control and Management, 1991

<u>Professional Experience</u>

Sep/1989 to Present	Weck Laboratories, Inc., City of Industry, CA Full Service Environmental Testing laboratory
Sep/1988 to Sep/1989	Lights of America, Walnut, CA Electrical Engineering

Mr. Chau has extensive experience in environmental analysis, especially for inorganic and physical parameters.
He has been working as analytical chemist for inorganic and wet chemistry determinations, metal analyses by Flame and Graphite furnace AA, ICP, ICP-MS and Cold vapor AA and AF.
Mr. Chau has been instrumental in developing analytical methods for trace metal analyses in a variety of matrices, including brines and sea water. He has also developed for the laboratory especially methods for physical parameters, metal speciation and non-routine determinations.
As lab supervisor, Mr. Chau has provided guidance, technical advice and training to bench chemists and other lab personnel and has managed lab operations to improve logistics such as sample receiving and project management

Mr. Chau is an expert in spectroscopic analysis and provides advice to clients about technical and QA/QC issues.

Other relevant experience and projects in which Mr. Chau has participated are as follows:

- Coordination of monitoring projects that requires large number of analysis on short turnaround time for metals.

- Supervision of lab personnel for the Inorganic Section

- Development of analytical procedures for the determination of environmental samples by ICP-MS in particularly difficult matrices

- Develop of methods by atomic fluorescence and amalgamation for ultra trace level analysis of mercury.

- Design of a clean room and develop protocols for its operation for analysis of trace metals in ambient waters and ultra trace levels of mercury

- Maintenance and troubleshooting of spectroscopy instrumentation.

- Design and improvement of sample digestion procedures for metal analysis to reduce contamination and improve recoveries.

- Development of analytical methods for speciation analysis of metals, including the use of hyphenated analytical techniques.

Participation in Seminars and Conferences

During his time at Weck Laboratories, Mr. Chau has participated in many technical and user meetings provided by spectroscopy equipment manufacturers, such as Perkin Elmer, Thermo and Agilent.
He routinely participates in technical conferences about environmental analysis, where technical issues, new techniques and regulatory subjects are discussed; they include NEMC, NELAC and Pittcon, among others.

ALAN CHING

Title

Technical Director Organic

Education

B.S. - Chu Hai College, Hong Kong, 1985
Chemistry
Shangai University of Technology, China
Analytical Chemistry Courses 1978 - 1981

M.S. - California Polytechnic University, Pomona
Analytical Chemistry, 1997

Professional Experience

Oct/1990 to Present	Weck Laboratories, Inc., City of Industry, CA Full Service Environmental Testing laboratory
Jan/1985 to Jun/1989	Dinippon Ink and Chemical, Sheng Zheng, China Chemical Manufacturing Company

Mr. Ching' primary experience is in the organic analysis field although he has performed as bench chemist inorganic and metal analyses as well. At Weck Labs, he has hands on experience in GC, GC/MS, HPLC and organic extractions.
Mr. Ching has developed many analytical procedures for volatile organic compounds, pesticides, herbicide and semivolatile organic analysis.
As lab supervisor, Mr. Ching has provided training and technical advice to bench chemists in the organic section.
Mr. Ching has also served as QA Manager being instrumental in developing the QA/QC program, obtaining accreditation under NELAC for the laboratory, writing the QA Manual and monitoring its implementation.
Mr. Ching also provides technical support to clients in the areas of Quality Assurance, analytical chemistry and regulatory compliance.

Other relevant experience and projects in which Mr. Ching has participated are as follows:

- Project Management for ICR, UCMR 1 and UCMR 2 analysis, including method development, interaction with Utilities and reporting to the EPA.

- Analysis of environmental samples for metals, and other elements by atomic absorption and ICP spectrometry using flame, hydride generation, cold vapor and graphite furnace.

- Hazardous waste characterization by different analytical techniques.

- Maintenance and troubleshooting of GC, GC/MS and HPLC instrumentation.

- Separation and detection of four different arsenic compounds using ion exchange chromatography and UV detection. (Master's degree project).

- Development of new methods for UCMR testing and other emergent contaminants

- Developing a comprehensive QA/QC program for the Laboratory in compliance with NELAC and ISO 17025.

Participation in Seminars and Conferences

Mr. Ching regularly attends many technical meeting regarding technical and regulatory issues. He has participated in NELAC conferences and other meeting related to Quality Assurance and regulatory compliance issues.

HAI-VAN NGUYEN

Title

Senior Project Manager – Technical Director Microbiology

Education

B.S. - California Polytechnic University, Pomona, CA, 2000
Biology, Minor in Chemistry

University of California, Irvine, CA, 2008
Environmental management Certificate Program

Professional Experience

Apr/2000 to Present — Weck Laboratories, Inc., City of Industry, CA
Full Service Environmental Testing laboratory

Ms. Nguyen has extensive experience in the environmental laboratory. She has been a bench chemist for inorganic, bacteriological testing, HPLC, GC and GC/MS, which has given her a well rounded view of the operation of the environmental laboratory in all its aspects. Other important tasks completed include assisting the QA Manager in preparing SOPs and updating the program.
As Technical Director for Microbiology she oversees the department and provides training to analysts.
Ms. Nguyen is also very well versed in compliance regulations for potable water and wastewater programs, as well as interpretation of analytical data.
In her position as Senior Project Manager, she has managed many large environmental projects for potable water, wastewater and groundwater investigations, proving consulting to clients and interacting with regulatory agencies.

Other relevant experience and projects in which Ms. Nguyen has participated are as follows:

- Managing testing projects for large clients.
- Assisting the QA Manger in supervising and designing QA/QC operations.
- Writing and upgrading of SOPs.
- Evaluation and reviewing analytical data for inorganic analysis, HPLC, GC, GC/MS and wet chemistry methods.
- Reviewing analytical data for microbiological determinations and providing technical support to analysts.

Participation in Seminars and Conferences

Ms. Nguyen regularly participates in technical seminars and meeting regarding regulatory compliance issues.

APPENDIX 2

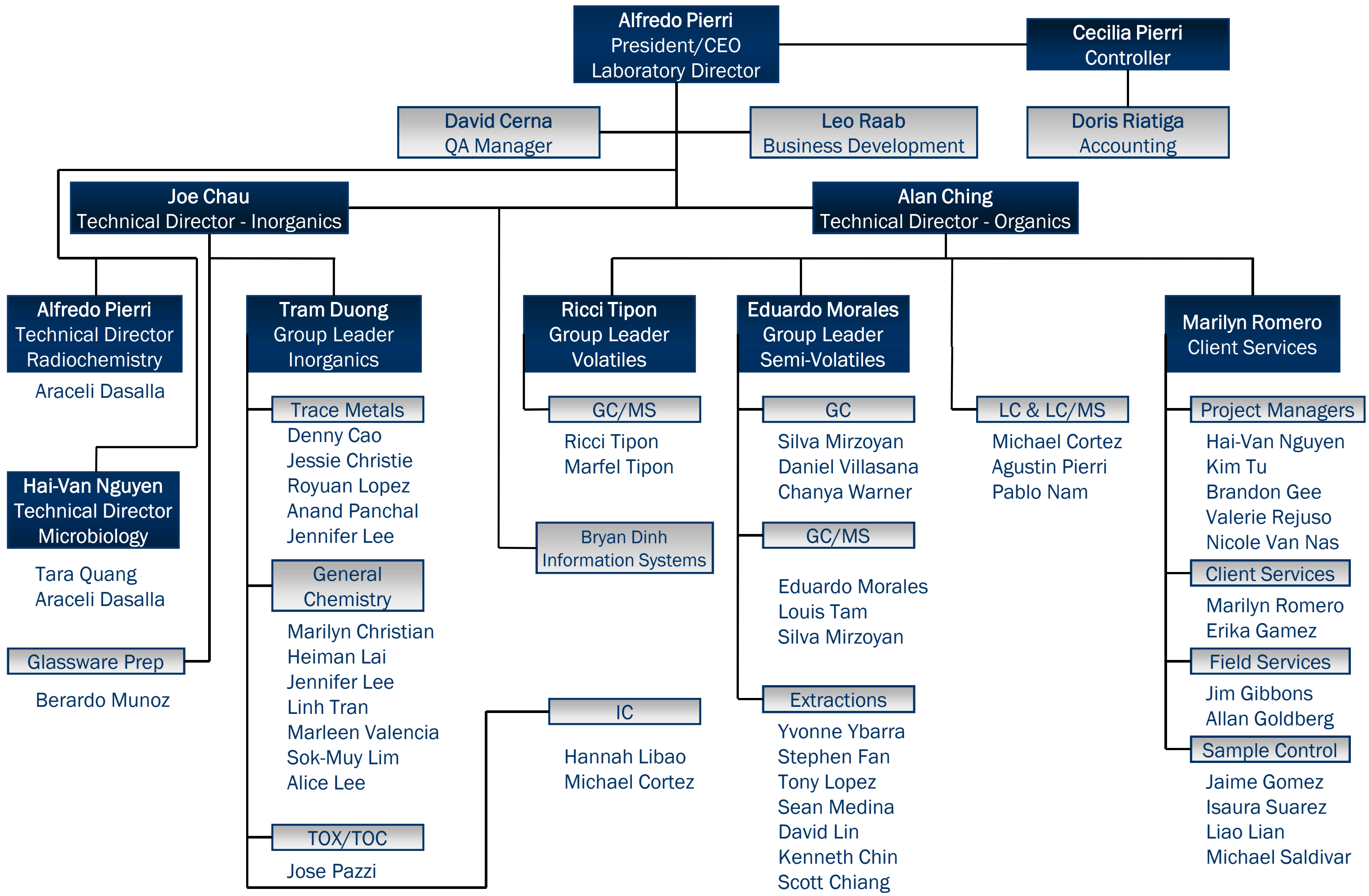
CODE OF ETHICS

Weck Laboratories, Inc. is committed to ensuring the integrity of our data and meeting the quality needs of our clients. We pledge to manage our business according to the following principals:

- To produce results that are technically sound and legally defensible;
- To assert competency only for work for which adequate equipment and personnel are available;
- To present services in a confidential, honest, and forthright manner;
- To have a clear understanding with the client as to the extent and kind of services to be rendered;
- To provide employees with guidelines and an understanding of the ethical and quality standards required in this industry;
- To operate facilities in a manner that protects the environment and the health and safety of employees and the public;
- To obey all pertinent federal, state, and local laws and regulations;
- To continually improve product and service quality;
- To treat employees equitably, acknowledge their scientific contributions, and provide them with opportunities for professional growth and development;
- To recognize and respond to community concerns; and
- To deal openly, honestly, and fairly in all business and financial matters with employees, clients and the public.

APPENDIX 3

Weck Laboratories, Inc.
Organizational Chart – October 2009



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APPENDIX 4

List of Major Equipment as of July 2009

Type	Section	Number	Instrument Description	Tests Performed
LC/MS/MS	LC/MS	1	ABI 4000 Q trap Triple quad with +ESI, -ESI, APCI,MS/MS and linear Ion Trap capabilities	PPCPs, Endocrine disruptors, Emergent chemicals
LC/MS/MS	LC/MS	1	LC/MS/MS Varian 1200L Triple quad with positive and negative ESI, APCI and MS/MS capabilities	EPA 535, EPA 331, EPA 332, Emergent Chemicals
GC/MS	Semivolatile Organics	1	GC/MS/MS system, Varian 4000 with EI, CI and MS/MS capabilities	EPA 521, Nitrosamines
GC/MS	Semivolatile Organics	1	GC/MS/MS system, Varian 4000 with EI, CI and MS/MS capabilities and Combi-Pal robotic autosampler	Special tests, low level pesticides; EDCs, EPA 521 backup
GC/MS	Semivolatile Organics	1	GC/MS system, Agilent 7890/5975 Turbo with EI and PTV injection capabilities	EPA 525.2, 548.1, 527, 529
GC/MS	Semivolatile Organics	1	GC/MS system, Agilent 6890/5973N Turbo with EI and PCI capabilities	EPA 625, 8270 and 1,4-Dioxane
GC/MS	Semivolatile Organics	1	GC/MS system, ThermoFinnigan DSQ II with EI, PCI,NCI and PTV capabilities	EPA 527, PCB congeners, low level pesticides, Pyretroids
GC/MS	Volatile Organics	1	GC/MS system, Agilent 6890/5973 with Tekmar Solatek autosampler and Tekmar 3100 Purge & Trap	EPA 524.2, Low level 123TCP
GC/MS	Volatile Organics	1	GC/MS system, Agilent 6890/5973 with Archon autosampler and Tekmar 3000 Purge and Trap	EPA 524.2
GC/MS	Volatile Organics	1	GC/MS system, Agilent 6890/5973 with Archon autosampler and Tekmar 3100 Purge and Trap	EPA 8260 and 624
GC/MS	Volatile Organics	1	GC/MS system, Hewlett-Packard 5890 series II/5972 MSD with Aquatek 70 autosampler and Tekmar 3000 Purge and Trap	EPA 524.2
GC/MS	Volatile Organics	1	GC/MS system, Hewlett-Packard 5890 series II/5972 MSD with Archon autosampler and O-I Eclipse Purge and Trap	EPA 8260 and 624
GC	Semivolatile Organics	2	Gas chromatograph Agilent model 6890 with autosampler and dual ECD detectors	EPA 551.1, EPA 508, 515.3

Type	Section	Number	Instrument Description	Tests Performed
GC	Semivolatile Organics	1	Gas chromatographs Agilent 6890 with autosampler FID and ECD	EPA 8015 TPH, Alcohols
GC	Semivolatile Organics	1	Gas chromatographs Varian 3800 with autosampler and dual ECDs and TSD detectors	EPA 504.1, EPA 552.2
GC	Semivolatile Organics	1	Gas chromatograph Hewlett Packard model 5890A with autosampler and ECD and NPD detector.	EPA 507, Backup instrument for EPA 508, 504 or 515.3
GC	Semivolatile Organics	1	Gas chromatograph Hewlett Packard model 5890A with autosampler and FID and TCD detectors.	Backup instrument for EPA 8015 TPH and alcohols
GC	Volatile Organics	1	Gas Chromatograph, Hewlett-Packard 5890A with FID/PID in series with Tekmar 2016 autosampler and Tekmar 2000 Purge and Trap	EPA 8021 BTEX
HPLC	IC/HPLC	1	Liquid Chromatograph system Dionex DX500 with gradient pump, post-column reaction systems, and fluorescence and UV-VIS detectors.	EPA 531.1 and 547
HPLC	IC/HPLC	1	Liquid Chromatograph system Dionex DX500 with gradient pump and UV-VIS detector	EPA 549.2, 8315 and 8330
HPLC	IC/HPLC	1	Liquid Chromatograph system Shimadzu with dual pumps, UV-VIS detector and autosampler Model SIL 10AD-vp	Backup for EPA 549.2, 8315 and 8330
IC	IC/HPLC	1	Ion chromatograph DIONEX DX-120 with isocratic pump and conductivity detector	EPA 300.0
IC	IC/HPLC	1	Ion Chromatograph Dionex with gradient pump, post-column derivatization and UV-Vis detector dedicated for hexavalent chromium.	EPA 218.6, EPA 7199
IC	IC/HPLC	1	Ion Chromatograph Dionex ICS-2000 with eluent generator and conductivity detector dedicated to perchlorate analysis	EPA 314.0
IC	IC/HPLC	1	Ion Chromatograph Dionex DX-500 with gradient pump and conductivity detector	EPA 314.0
IC	IC/HPLC	1	Ion Chromatograph system Dionex DX-600 with gradient pump, post column derivatization, conductivity and Photodiode array detectors.	EPA 300.1 and 326 low levels Bromide, chlorite, chlorate and bromate

Type	Section	Number	Instrument Description	Tests Performed
ICP-MS	Metals	1	ICP-MS Spectrometer Agilent 7500ce	EPA 200.8, EPA 6020, EPA 1638, EPA 1640
ICP-MS	Metals	1	ICP-MS Spectrometer Perkin Elmer model ELAN DRC-II with Apex Duo Fast autosampler option with Preconcentration column On-line. Also option with hydride generation On-line.	EPA 200.8, EPA 1638, EPA 1640, Modified 200.8 for sea water and brines; hydride analysis
ICP	Metals	1	ICP Spectrometer Perkin Elmer model Optima DV-5300 with FAST autosampler	EPA 200.7, EPA 6010
CVAA	Metals	1	Mercury analyzer CETAC model M-6000 with autosampler	EPA 245.1; EPA 7470; EPA 7471
CVAF	Metals	1	Low Level Mercury Analyzer Leeman Labs model Hydra AF Gold +	EPA 1631; EPA 245.7 and methyl mercury
HPLC	Metals	1	Dionex HPLC system DCX500	Connected to ICP-MS for Metal Speciation
Automated SPE	Sample Prep	1	Solid phase extraction system Horizon Technologies 4790 consisting in 8 automated extractors	Various EPA 500's series methods and UCMR
Automated SPE	Sample Prep	3	Caliper Autotrace automated cartridge solid phase extractor with 6 positions	PPCP/EDC; Various EPA 500's series and UCMR
Continuous L-L	Sample Prep	3	Continuous accelerated liquid-liquid extractor/concentrator Corning from Organomation of 8 position each.	Various
Concentrator	Sample Prep	1	Automated solvent blow-down apparatus Horizon model Dry-Vap with 6 positions	Various
Concentrator	Sample Prep	1	Turbo Vap solvent blow-down apparatus with 50 positions	Various
Automated ASE	Sample Prep	1	Accelerated Solvent Extraction system Dionex model ASE 200 for soils/sediments	EPA 8000's series in soil/sediment
Automated SPE	Sample Prep	1	Automated solid phase extractor for Oil and Grease with 3 positions Horizon Technologies Model 3000 XL	EPA 1664
L-L	Sample Prep	1	Separatory funnel shaker 4-positions from Glas-Col	Various
Digester	Sample Prep	2	Block digesters for trace metal sample preparation	EPA 200.7; 200.8; 245.1; 6010; 6020; 7470 and 7471
Digester	Sample Prep	2	Block digesters for TKN and total phosphorus sample preparation	Various
Shaker/Extractor	Sample Prep	2	TCLP rotary extractors for leaching procedures with glassware	Various

Type	Section	Number	Instrument Description	Tests Performed
Shaker/Extractor	Sample Prep	2	Zero Headspace apparatus for TCLP extractions for Volatiles	EPA 8260-TCLP
Titrator/ISE/pH/EC	General Chemistry	1	Automated Titration-ISE instrument Man-Tech Associates, model PC Titrate with autosampler	SM2320B; SM2310B, pH, SM5210
Autoanalyzer	General Chemistry	1	Lachat model 8500 + FIAS auto analyzer with four simultaneous channels for NO3-N, NO2-N, TKN, TP, OP, Cyanide and NH3	EPA 353.2, 351.2; 365.1; 335.2 and 350.1
Autoanalyzer	General Chemistry	1	Seal Analytical model AQ2+ discrete spectrophotometric wet chemistry analysis (NO3, NO2, TKN, TP, OP, Phenols, Cyanide and NH3	EPA 353.2; 351.2; 365.1; 335.2; 350.1 and 420.4
Proportional Counter	Radiochemistry	2	Gas flow Alpha + Beta Counter Protean model MPC 9604 for radiological analyses.	EPA 900.0, SM7110C EPA 903.0, EPA 904
Liquid Scintillation	Radiochemistry	1	Beckman Liquid Scintillation apparatus model LS6500	Radon, Tritium, EPA 903.1
TOC	General Chemistry	1	Total organic carbon (TOC) Tekmar-Dorhman Phoenix 8000 with autosampler.	SM5310C
TOX	General Chemistry	1	Total organic halides (TOX) Mitsubishi TX-10.	SM5320B, EPA 9020
UV-VIS	General Chemistry	1	UV-Visible Spectrophotometer Milton Roy Genesis 5.	Various
UV-VIS	General Chemistry	1	UV-Visible Spectrophotometer Hach model DR4000U	Various
ISE/pH	General Chemistry	1	Ion Selective electrode system Accumet 150 for pH, conductivity and ISE measurements	EPA 150.1, SM2510B,
Trucks	Field	3	Pickup trucks for field sampling Toyota Tacoma, models 2009, 2006 and 1998	Field work
Samplers	Field	9	Composite water sampling equipment ISCO, different models.	Wastewater sampling
Software	IT	1	Laboratory Information Management System (LIMS) "Element" from Promium running on SQL database.	Supports all methods
Software	IT	1	Element Web program to allow clients to review projects on real time through the Laboratories' web page.	Supports all methods
Software	IT	1	Element Data tool program to transfer analytical data directly from instruments into the LIMS.	Supports all methods
Software	IT	1	Agilent Chem Station software latest revision for control and data processing of Agilent GC and GC/MS instruments.	Supports organic methods
Software	IT	1	Varian Star Chromatography software for control and data processing of Varian GC and GC/MS instruments.	Supports organic methods

Type	Section	Number	Instrument Description	Tests Performed
Software	IT	1	Dionex Peak Net Software for control and data processing of Dionex HPLC and IC instruments	Supports inorganic methods
Software	IT	1	Tal Technologies Wedge software for data acquisition of all RS232 devices (balances, pH meter, turbidimeter etc.) and other vendor specific software for data acquisition and processing of all other instruments.	Various

APPENDIX 5

Chain of Custody Form

Weck Laboratories, Inc.
Analytical Laboratory Services · Since 1964

CHAIN OF CUSTODY RECORD

14859 East Clark Avenue : Industry : CA 91745
Tel 626-336-2139 ♦ Fax 626-336-2634 ♦ www.wecklabs.com

Page 1 Of 1

CLIENT NAME:	PROJECT:
ADDRESS:	PHONE: FAX: EMAIL:
PROJECT MANAGER	SAMPLER

SPECIAL HANDLING

- [ ] Same Day Rush 150%
- [ ] 24 Hour Rush 100%
- [ ] 48-72 Hour Rush 75%
- [ ] 4 - 5 Day Rush 30%
- [ ] Rush Extractions 50%
- [ ] 10 - 15 Business Days
- [ ] QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	ANALYSES REQUESTED										COMMENTS

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Attacked	Y / N
Preserved at Lab	Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA= Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY
OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION

APPENDIX 6

Sample Collection and Holding Times

Weck laboratories, Inc. - Sampling Guidelines

Test Name	Matrix	Bottle Type	Bottle size	Preservative: Unchlorinated Water (Raw)	Preservative: Chlorinated Water (Treated)	Preservative: Soil/Solid	Holding Time until start of analysis	Analytical Technique	Analytical Method
1,2,3-TCP	Water	Glass	2 x 40 ml	None	Ascorbic		14 days	GC/MS Isot. Dil.	EPA 524.2SIM
1,4-Dioxane	Water	Amber Glass	2 x 1 L (*)	None	None		14 days	GC/MS Isot. Dil.	EPA 8270M
Alcohols	Water	Glass	1 x 40 ml	None	None		14 days	Dir. Inj./FID	EPA 8015B
Aldehydes	Water	Glass	2 x 40 ml	CuSO4	NH4Cl/CuSO4		7 Days	GC/ECD	EPA 556
Aldehydes	Water	Glass	1 L (*)	None	Thiosulfate		3 days	HPLC-UV	EPA 8315
Aldehydes(1)	Soil/Solid	Glass	4 oz			None	3 days	HPLC-UV	EPA 8315
Alkalinity, Total	Water	Poly	250 ml		None		14 Days	Titration	SM2320B
Anions by IC (F-,Cl-,SO4=)	Water	Poly	250 ml	None	None		28 days	IC	EPA 300.0
Anions by IC (NO2-,NO3-,PO4≡)	Water	Poly	250 ml	None	None		48 hours	IC	EPA 300.0
Arsenic speciation	Water	Poly	250 ml	EDTA/acetic acid	EDTA/acetic acid		14 Days	Resin-ICP/MS	EPA 200.8
Asbestos-Sub	Water	Poly	1 L	None	None		48 Hours	TEM	EPA 100.1/.2-Sub
Bacteria-Coliform - solid/sludge/soil	Soil/solid	Glass-Sterile	4 oz			None	N/A	MTF	SM 9221B
Bacteria-Coliform - Wastewater	Water	Poly-Sterile	125 ml	Thiosulfate	Thiosulfate		6 hours	MTF	SM 9221B
Bacteria-Coliform - Drinking Water	Water	Poly-Sterile	125 ml	Thiosulfate	Thiosulfate		24 Hours	Colilert P/A or enumeration	SM 9223B
Bacteria-Enterococcus - Wastewater	Water	Poly-Sterile	125 ml	Thiosulfate	Thiosulfate		24 Hours	Enumeration Quantitray	Enterolert
Bacteria-Heterotrophic Plate Count	Water	Poly-Sterile	125 ml	Thiosulfate	Thiosulfate		24 Hours	Pour Plate Method	SM 9215B
BOD	Water	Poly	1 L	None	None		48 Hours	DO Probe	SM 5210B
BOD, Carbonaceous	Water	Poly	1 L	None	None		48 Hours	DO Probe	SM 5210
Bromate	Water	Poly	250 ml	EDA	EDA		28 Days	IC	EPA 300.1
Bromate- Low Level	Water	Poly	250 ml	EDA	EDA		28 Days	IC	EPA 326
Bromide	Water	Poly	250 ml	None	None		28 Days	IC	EPA 300.0
Bromide-Low Level	Water	Poly	250 ml	None	None		28 Days	IC	EPA 300.1
Carbamates	Water	Glass	1 x 40 ml	MCAA	MCAA/thiosulf.		28 Days	HPLC	EPA 531.1
COD	Water	Poly	250 ml	H2SO4	H2SO4		28 Days	Colorimetric	EPA 410.4
Chloral Hydrate	Water	Glass	2 x 60 ml	Sulfite/buffer	Sulfite/buffer		14 days	GC/ECD	EPA 551.1
Chlorate	Water	Poly	250 ml	EDA	EDA		28 Days	IC	EPA 300.1

Chloride	Water	Poly	250 ml	None	None		28 Days	IC	EPA 300.0
Chlorine Dioxide	Water	Glass	250 ml	None	None		24 Hours	Colorimetric	SM 4500CLO2D
Chlorine Residual	Water	Glass	250 ml	None	None		24 Hours	Colorimetric	SM 4500CL-G
Chlorite	Water	Amber Glass	125 ml	EDA	EDA		14 Days	IC	EPA 300.1
Chlorophyll-a	Water	Amber Poly	2 x 1L	None			48 Hours	Spectrophotometric	SM 10200H
Chromium, Hexavalent	Water	Poly	250 ml	None	None		24 Hours	Spectrophotometric	SM3500CR-D/7196
Chromium, Hexavalent	Soil/solid	Glass	4 oz	None	None		30 days	Spectrophotometric	EPA 3060/7196
Chromium, Hexavalent (low level)	Water	Poly	250 ml	None	None		24 Hours	IC	EPA 218.6
Chromium, Hexavalent (low level)	Soil/solid	Glass	4 oz	None	None		30 days	IC	EPA 3060/7199
Color	Water	Glass	500 ml	None	None		48 Hours	Visual	SM2120B
Conductivity (Specific Conductance)	Water	Poly	250 ml	None	None		28 Days	Electrometric	SM2510B
Cyanide	Water	Poly	500 ml	NaOH	NaOH/ascorbic		14 Days	FIA-Colorimetric	EPA 335.2/335.4
Dioxin-Sub	Water	Glass	2 x 1 L	None	None		1 year	GC/ MS	EPA 1613/8290
Diquat/Paraquat	Water	Amber poly	1L	None	Thiosulfate		7 Days	HPLC	EPA 549.2
Disinfection by-products	Water	Glass	2 x 60 ml	Sulfite/buffer	Sulfite/buffer		14 days	GC/ECD	EPA 551.1
Diuron	Water	Amber Glass	1 L (*)	None	None		7 days	HPLC/UV	EPA 632
Diuron-UCMR	Water	Amber Glass	1 L (*)	CuSO4/Trizma	CuSO4/Trizma		14 days	HPLC/UV	EPA 532
EDB and DBCP	Water	Glass	2 x 40ml	None	Thiosulfate		14 Days	GC/ECD	EPA 504.1
Endothall	Water	Amber Glass	250 ml	None	None		7 days	GCMS	EPA 548.1
Ethanol	Water	Glass	1 x 40 ml	None	None		14 Days	Dir. Inj./FID	EPA 8015B
Explosives	Water	Amber Glass	1 L (*)	None	Thiosulfate		7 days	HPLC/UV	EPA 8330
Fluoride	Water	Poly	250 ml	None	None		28 Days	IC	EPA 300.0
General Minerals (excluding metals)	Water	Poly	1 L	None	None		Various	Wet Chem methods	various
General Minerals (metals only)	Water	Poly	250 ml	HNO3	HNO3		6 Months	ICP-AES	EPA 200.7
General Physical (Color, Odor, Turbidity	Water	Glass	500 ml	None	None		24 Hours	Wet Chem methods	various
Glyphosate	Water	Glass	1 x 40 ml	None	Thiosulfate		14 Days	HPLC	EPA 547
HAAs	Water	Amber Glass	250 ml (*)	NH4Cl	NH4Cl		14 days	GC/ECD	EPA 552.2

HAAs-Formation Potential	Water	Amber Glass	1L	None	None		14 days	GC/ECD	SM 5710B/EPA 552.2
Herbicides-DW	Water	Amber Glass	250 ml (*)	None	Thiosulfate		14 days	GC/ECD	EPA 515.3
Herbicides-GW	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 Days	GC/ECD	EPA 8151
Mercury	Water	Glass jar	250 ml	HNO3	HNO3		28 Days	Cold Vapor AAS	EPA 245.1/7470
Methanol	Water	Glass	1 x 40 ml	None	None		14 Days	Dir. Inj./FID	EPA 8015B
Mercury in soil/solid/sludge	Soil/Solid	Glass jar	4 oz.	None	None		28 Days	Cold Vapor AAS	SW 7471
Metals (2)	Water	Poly	250 ml	HNO3	HNO3		6 Months	ICP/MS or ICP-AES	EPA 200.8/200.7
NDMA	Water	Amber Glass	2 x 1 L (*)	None	Ascorbic		7 days	GC/MS/CI SIM	EPA1625M
Nitrate	Water	Poly	250 ml	None	None		48 Hours	IC or FIA	EPA 300.0/353.2
Nitrite	Water	Poly	250 ml	None	None		48 Hours	IC or FIA	EPA 300.0/353.2
Nitrite+Nitrate as N	Water	Poly	250 ml	H2SO4	H2SO4		28 Days	FIA-Colorimetric	EPA353.2
Nitrogen, Total Kjeldahl (TKN)	Water	Poly	250 ml	H2SO4	H2SO4		28 Days	FIA-Colorimetric	EPA 351.2
Nitrogen-Ammonia	Water	Poly	250 ml	H2SO4	H2SO4		28 Days	FIA-Colorimetric	EPA 350.1
Nitrogen-Ammonia in ww with distillation	Water	Poly	250 ml	H2SO4	H2SO4		28 Days	FIA-Colorimetric	EPA 350.1
Nitrosamines	Water	Amber Glass	2 x 1 L (*)	None	Ascorbic		14 days	GC/MS/CI SIM	EPA 521
Odor	Water	Glass	500 ml	None	None		24 Hours	Odor	SM 2150B
Oil and Grease	Water	Glass	1 L	HCL	HCL		28 Days	Gravimetric	EPA1664
Organotins (tributyltin)	Water	Glass	1 L (*)	None	None		7 Days	GC/MS	GC/MS
Oxygen, Dissolved	Water	Glass	BOD bottle	None	None		24 Hours	O2 Probe	SM 4500-OG
PBDEs	Water	Amber Glass	2 x 1 L (*)	None	None		14 days	GC/MS SIM	EPA 1614M
Perchlorate	Water	Poly	250 ml	None	None		28 Days	IC	EPA 314
Perchlorate - Low Level by LC/MS/MS	Water	Poly Sterile	125 ml	Sterile field filtration	Sterile field filtration		28 Days	LC/MS/MS	EPA 331/332
Perchlorate in soils	Soil	Glass jar	4 oz	None	None		28 Days	IC	EPA 314M
Pesticides-Organophosphorus	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 Days	GC/NPD	EPA8141
Pesticides, Chlorinated (DW)	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 days	GC/ECD	EPA 508
Pesticides, Chlorinated WW/GW	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 Days	GC/ECD	EPA 608/8081
PCBs - GW	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		7 Days	GC/ECD	EPA 8082
Pesticides, N/P -DW	Water	Amber Glass	2 x 1 L (*)	None	Thiosulfate		14 days	GC/ NPD	EPA 507/8141
pH	Water	Poly	250 ml	None	None		3 Days	Electrometric	SM4500H

Phenolics	Water	Amber Glass	500 ml	H2SO4	H2SO4		28 Days	Spectrophotometric	EPA 420.1
Phosphate, Ortho	Water	Poly	250 ml	None	None		48 hours	FIA-Colorimetric	EPA 365.1
Phosphate, Total	Water	Poly	250 ml	H2SO4	H2SO4		28 Days	FIA-Colorimetric	EPA 365.1
Polynuclear Aromatics (PNAs) Low level	Water	Amber Glass	2 x 1L	None	Thiosulfate		7 Days	HPLC or GC/MS	EPA 610/8310 or EPA 8270SIM
Radiological-Gross Alpha	Water	Poly	1 L	HNO3	HNO3		6 Months	GPC	EPA 900.0
Radiological-Gross Alpha high TDS	Water	Poly	1 L	HNO3	HNO3		6 Months	Coprecipitation-GPC	SM7110C
Radiological-Gross Beta	Water	Poly	1 L	HNO3	HNO3		6 Months	GPC	EPA 900.0
Radiological-Radium 226-Sub	Water	Poly	2 x 1 L	HNO3	HNO3		6 Months		EPA 903.1 Sub
Radiological-Radium 228-Sub	Water	A-Poly	1 L	HNO3	HNO3		6 Months		RA-05 Sub
Radiological-Radon 222-Sub	Water	Glass	2 x 60 ml	None	None		4 Days	LSC	EPA 913.0
Radiological-Strontium 90-Sub	Water	Poly	1 L	HNO3	HNO3		6 Months		EPA 905.0 sub
Radiological-Tritium-Sub	Water	Amber Glass	125 ml	None	None		6 Months	LSC	EPA 906.0 sub
Radiological-Uranium-Sub	Water	Poly	250 ml	HNO3	HNO3		6 Months	ICP-MS	EPA 200.8
Semivolatile Organics (BNA) - GW or WW	Water	Amber Glass	2 x 1L	None	Thiosulfate		7 Days	GC/MS	EPA 625/8270C
Silica by ICP	Water	Poly	250 ml	None	None		28 Days	ICP	EPA 200.7
SOCs - Drinking Water	Water	Amber Glass	2 x 1 L	HCL	Sulfite/HCL		14 days	GC/MS	EPA 525.2
SOCs - Special Analytes	Water	Amber Glass	2 x 1 L	HCL	Asc., EDTA, Diazol. Urea, Buffer		14 days	GCMS	EPA 526
SOCs - Phenolics	Water	Amber Glass	2 x 1 L	HCL	Sulfite/HCL		14 days	GCMS	EPA 528
Solids, Settleable	Water	Poly	1 L	None	None		48 Hours	Gravimetric	EPA 160.5
Solids, TDS	Water	Poly	500 ml	None	None		7 Days	Gravimetric	SM2540C
Solids, Total	Water	Poly	500 ml	None	None		7 Days	Gravimetric	SM2540B
Solids, TSS	Water	Poly	500 ml	None	None		7 Days	Gravimetric	EPA 160.2
Solids, TVS	Water	Poly	500 ml	None	None		7 Days	Gravimetric	EPA 160.4
Solids, VSS	Water	Poly	500 ml	None	None		7 Days	Gravimetric	SM 2540E
Sulfate	Water	Poly	250 ml	None	None		28 Days	IC	EPA 300.0
Sulfide, Dissolved	Water	Poly	250 ml	NAOH	NAOH		24 hours	Colorimetric	SM4500S2D
Surfactants (MBAS)	Water	Poly	500 ml	None	None		48 Hours	Colorimetric	SM5540C
t-Butyl Alcohol	Water	Glass	2 x 40 ml	none	None		14 Days	GC/MS	EPA 524.2

THMs	Water	Amber Glass	2 x 40 ml	Thiosulfate	Thiosulfate		14 Days	GC/MS	EPA 524.2
THMs-Formation Potential	Water	Amber Glass	1L	None	None		14 Days	GC/MS	SM5710/EPA 524.2
Total Organic Carbon	Water	Amber Glass	250 ml	H3PO4	H3PO4		28 Days	UV-Persulfate	SM5310C
Total Organic Halides	Water	Amber Glass	500 ml	H2SO4	Sulfite/H2SO4		14 Days	Pyrolysis/ Coulometric	SM5320B/EPA 9020
Turbidity	Water	Poly	250 ml	None	None		48 Hours	Nephelometric	EPA 180.1
UCMR2-PBDEs	Water	Amber Glass	2 x 1 L	Ascorbic, EDTA, Citrate	Ascorbic, EDTA, Citrate		14 days	GCMS	EPA 527
UCMR2-Explosives	Water	Amber Glass	2 x 1 L	CuSO4/Trizma Buffer	CuSO4/Trizma Buffer		14 days	GCMS	EPA 529
UCMR2-Perchlorate	Water	Poly-Sterile	125 ml	Sterile Field Filtration	Sterile Field Filtration		28 days	LC/MS/MS	EPA 331/332
UCMR2-Acetanilide Degradates	Water	Amber Glass	2 x 500 ml	NH4Cl	NH4Cl		14 days	LC/MS/MS	EPA 535
UCMR2-Acetamide Pesticides	Water	Amber Glass	2 x 1 L	Sulfite/HCL	Sulfite/HCL		14 days	GCMS	EPA 525.2
UCMR2-Nitrosamines	Water	Amber Glass	1 x 1 L	Thiosulfate	Thiosulfate		14 days	GCMS	EPA 521
UV254	Water	Amber Glass	250 ml	None	None		2 Days	Spectrophotometric	SM 5910B
Volatile Organics-DW	Water	Glass	3 x 40 ml	HCL	Ascorbic/HCL		14 Days	GC/MS	EPA 524.2
Volatile Organics-Aromatics only	Water	Glass	2 x 40 ml	HCL	Thiosulfate/HCL		14 Days	P&T/PID	EPA 602
Volatile Organics-WW/GW	Water	Glass	2 x 40 ml	HCL	Thiosulfate/HCL		14 Days	GC/MS	EPA 624/8260B
Gasoline -TPH	Water	Glass	2 x 40 ml	HCL	Thiosulfate/HCL		14 Days	P&T/FID	EPA 8015B
Diesel/Oil-TPH	Water	Amber Glass	1 L (*)	HCL	Thiosulfate/HCL		14 Days	GC/FID	EPA 8015B

Notes:

(1): Formaldehyde and acetaldehyde only

(2): Al,Sb,As,Ba,Be,B,Cd,Ca,Na,Mg,K,Cr,Co,Cu,Fe,Pb,Li,Mn,Mo,Ni,Se,Ag,Sr,Tl,Ti,V,Zn

(*): Needs extra bottles for QA/QC for certain projects.

APPENDIX 7

List of SOPs as of July 2009

SOP's LIST AND INDEX
Administration - Miscellaneous and administrative SOPs

File Name	Rev No	Rev Date	Method	Title
MIS001	18	**Jun-09**	General	Sample Receiving, Log in, Storage and Disposal
MIS002	5	**Mar-09**	Sampling	Industrial Wastewater Sampling Instructions
MIS003	3	Jul-05	General	Back Up Procedures for Data Files
MIS004	5	**Apr-08**	General	Chemicals, Standards and consumable materials, Receipt, Storage and Preparation of Solutions
MIS005	3	**Jul-09**	General	Procedures for Start Up and Shut Down the File Servers
MIS006				Discontinued
MIS007	2	**Mar-08**	General	Sample Container Management
MIS008	3	**Mar-08**	General	Laboratory Hazardous Waste Management
MIS009	3	**Feb-08**	General	Handling of Foreign Soil
MIS010	2	**Mar-08**	Sampling	Sampling Instructions for Protected Groundwater Supplies and Water Supplies with Treatment
MIS011	4	**Mar-08**	General	Preparation, Approval, Distribution, & Revision of standard Operating Procedures
MIS012	2	**Mar-08**	General	Significant Figures and Rounding
MIS013	2	**Mar-08**	General	Generation and Utilization of Control Charts
MIS014	5	**Mar-09**	General	Performing Internal Audits
MIS015	4	**Jun-09**	General	Handling and Analysis of Proficiency Testing (PT) Samples
MIS016	3	**Apr-08**	General	Corrective Action Procedures
MIS017	3	**Apr-08**	General	Maintenance, Utilization and Review of Laboratory Logbooks
MIS018	5	**May-09**	General	Internal Laboratory Data Verification and Review
MIS019	3	**Apr-08**	General	Resolution of Customer Complaints
MIS020	3	**Apr-08**	General	Calibration and Verification of Analytical Balances
MIS021	3	**Apr-08**	General	Calibration and Maintenance of Mechanical Pipettes
MIS022	2	Oct-03	General	LIMS Security Systems
MIS024	2	**Apr-08**	General	DI Water Quality Checks
MIS025	3	**Apr-08**	General	Control of Data and Manual Data Entry
MIS026	3	**May-09**	General	Taking Representative Samples and Sub-samples in the Laboratory.
MIS028	4	**Mar-09**	General	Standard Cleaning Protocols for Containers and Labware
MIS029	3	**Apr-08**	General	Calibration and Verification of Thermometers
MIS030	4	**Apr-08**	General	Performing Managerial Reviews
MIS031	5	**Mar-09**	General	Calibration and Verification of Lab Support Equipment
MIS032	3	**Mar-09**	General	Calculation of Method Detection Limits (MDL) and Reporting Limits (RL)
MIS033	2	**Apr-08**	General	Rejection/acceptance Criteria for Special Analyses
MIS034	4	**Mar-09**	General	Performing Initial Demonstration of Capability (IDC)
MIS035	4	**Apr-08**	General	Procedures for Initiation of Employment for a new Associate
MIS036	2	**Apr-08**	General	Use of Areas of Incompatible Activities
MIS037	3	Nov-06	General	Computers and Electronic Data Requirements
MIS038	2	**Apr-08**	General	Chain of Custody Procedures for Legal and Evidentiary Custody of Samples
MIS039	2	**Apr-08**	General	Proper Raw Data Handling and Manual Integration Procedures
MIS040	2	Oct-03	General	Archival System for Instrument Raw Data
MIS041	2	**Apr-08**	General	Procedures for Subcontracting Client Samples
MIS042	4	**Mar-09**	General	Outside Support Services and Supplies
MIS043	3	**Apr-08**	General	Implementation of the Business Ethics and Data Integrity Policy
MIS044	3	**Mar-09**	General	Control of Nonconforming Environmental Testing
MIS045	4	**Mar-09**	General	Control of Records and Documents
MIS046	3	**Mar-09**	General	Training of Laboratory Personnel

MIS047	3	**Mar-09**	General	Estimating the Uncertainty of Measurements
MIS048	3	**Apr-08**	General	Development and Maintenance of Test Method SOPs
MIS049	2	**Apr-08**	General	Health and Safety Training Procedures
MIS050	1	**Oct-08**	General	Disaster Procedures
MIS051	1	**Jun-09**	General	Sample Disposal
MIS052	1	**Jul-09**	General	Acceptance criteria for analyte confirmation

SOP's LIST AND INDEX
Inorganic Department - Metals SOPs

File Name	**Rev No**	**Rev Date**	**Method**	**Title**
MET001	6	Sep-07	1311	Toxicity Characteristic Leaching Procedure (TCLP)
MET005	6	**Sep-08**	3010A	Acid Digestion of Aqueous Samples and Extracts for Total Metals by ICP and ICP-MS, EPA Method 3010A Modified
MET007	5	**Sep-08**	3050B	Acid Digestion of Sediments, Sludges and Soils, EPA Method 3050B
MET009	3	**Sep-08**	3050B Mod	Acid Digestion of Sediments, Sludges, Soils and Wipes, EPA Method 3050 Modified.
MET010	7	**Sep-08**	7471A	Analysis of Mercury in Solid Matrices by Cold Vapor Atomic Absorption, EPA 7471A
MET011	5	**Sep-08**	245.1	Analysis of Hg in water by manual cold vapor technique EPA method 245.1
MET017	8	**Jun-08**	6010	Analysis of Trace Metal in Water and Solid Matrices by ICP-AES, EPA Method 6010
MET018	10	**Sep-08**	200.8	Analysis of Trace Metals in Water by ICP-MS, EPA Method 200.8
MET019	7	**Sep-08**	6020	Analysis of Trace Metal in Water and Solid Matrices by ICP-MS, EPA Method 6020
MET020	5	**Sep-08**	200.2	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, EPA Method 200.2
MET021	3	**Sep-08**	WET	Waste Extraction Test Procedure, Title 22 Part 66261.126 Appendix ll

MET023	3	**Sep-08**	As-ICPMS	Analysis of Arsenic by Hydride Generation-ICPMS, EPA Method 200.8 Modified
MET024	3	**Sep-08**	Se-ICPMS	Analysis of Selenium by Hydride Generation-ICPMS, EPA Method 200.8 Modified
MET025	5	**Dec-08**	200.7	Analysis of Trace Metals in Water by ICP-AES, EPA Method 200.7
MET031	3	**Sep-08**	7470	Analysis of Mercury in Aqueous Samples and Liquid Waste by Cold Vapor Atomic Absorption, EPA 7470A
MET034	1	Mar-06	1631	Analysis of Low Level Mercury by CVAFS with Gold Amalgamation, EPA Method 1631E
MET035	1	May-07	245.7	Analysis of Low Level Mercury by CVAFS, EPA Method 245.7
MET036	1	**Jun-08**	1640	Determination of Trace Elements in Saline Waters by Direct Injection and Preconcentration and ICP-MS - EPA Method 1640
MET037	1	**Jun-08**	3500Fe B	Determination of Ferrous Iron by the Phenantrloline Colorimetric Method, SM3500-Fe B
MET038	1	**Oct-08**	1638	Analysis of Trace Elements in Ambient Waters by ICP-MS - EPA Method 1638
MET039	2	**May-09**	SM2330B	Determination of Corrosivity (Langlier Index) in Water, SM 2330B

SOP's LIST AND INDEX
Inorganic Department - Microbiology SOPs

File Name	Rev. No	Rev Date	Method	Title
MIC003	8	**Feb-09**	SM9223	Analysis of Total Coliform and E. Coli in Water by P/A Colilert^{TM} and Enumeration by the Quanti-Tray® method, SM9223
MIC004	6	**Feb-09**	SM9215B /SimPlate	Analysis of Heterotrophic Plate Count by Pour Plate and SimPlate Methods, SM 9215B
MIC005	7	**Apr-09**	SM9221	Analysis of Total and Fecal Coliform in Water by Multiple Tube Fermentation Technique, SM9221
MIC006	5	**May-09**	QAQC	Quality Assurance for Microbiological Tests
MIC007	2	**Jul-09**	QAQC	Using New Methods or Test Kits for Microbiological Determinations
MIC008	3	**Jul-09**	QAQC	Verification of Support Equipment Used for Microbiological Determinations
MIC009	2	**Apr-09**	Enterolert	Bacteriological Analysis of Ambient Water Samples for Enterococci by Enterolert Presence/Absence and Quanti-Tray® Method
MIC010	1	**Apr-09**	Disposal	Disposal of Material Used for Microbiological Determinations

SOP's LIST AND INDEX
Radio Chemistry Department - RadChem SOPs

File Name	Rev. No	Rev Date	Method	Title
RAD001	2	Nov-07	900.0	Determination of Gross Alpha and Gross Beta Radioactivity in Drinking Water, EPA Method 900.0
RAD002	1	Jul-05	SM7110C	Determination of Gross Alpha Radioactivity in Water by Coprecipitation, SM 7110C
RAD003	2	**Apr-08**	903.0	Determination of Alpha-emitting Radium Isotopes in Water, EPA Method 903.0
RAD004	1	Oct-05	All	Quality Control for Radiochemical Analysis
RAD005	1	Apr-06	All	The Procedure for Monitoring Radiation Measurement Instrumentation for Radioactive Contamination
RAD006	1	Apr-06	All	The Procedure for Handling, Storing and Establishing Expiration Dates for Reference Standards
RAD007	1	Jul-06	RA-05	Radiochemical Determination of Radium-228 in Water Samples, EPA Method Ra-05
RAD008	2	**May-08**	904	Radiochemical Determination of Radium-228 in Water Samples, EPA Method 904.0
RAD009	1	Sep-07	200.8	Spectrometric Determination of Uranium in Water Samples for Radiological Compliance, EPA Method 200.8
RAD010	1	**Aug-08**	SM7500Rn	Radiochemical Determination of Radon-222 in water samples, SM7500-Rn

SOP's LIST AND INDEX
Inorganic Department - Wet Chemistry SOPs

File Name	Rev No	Rev Date	Method	Title
WET001	10	Sep-07	300	Analysis of Anions in Water by Ion Chromatography, EPA 300.0
WET002	1	Sep-02	9056	Analysis of Anions in Solid and Liquid Matrices by Ion Chromatography, EPA Method 9056
WET003	11	**Oct-08**	SM4500CN C,D,E	Analysis of Total Cyanide in Water - Manual Colorimetric/Titimetric, SM4500CN-C,D,E
WET004	8	**Oct-08**	SM5210B	Biological Oxygen Demand (BOD) Test, SM 5210B
WET005	2	**Oct-08**	D240	Heat of combustion
WET006	3	**Oct-08**	418.1	Analysis of Total Recoverable Petroleum Hydrocarbons in Soil, EPA 418.1M
WET007	2	**Oct-08**	5050	Parr Bomb Preparation Method for Solid Waste analysis, EPA Method 5050
WET008	3	**Oct-08**	SM5540D	Non-ionic Surfactants as CTAS (Cobalt Thiocyanate Active Substances) SM 5540D
WET009	7	**Oct-08**	SM2120B	Analysis of Color in Water, SM 2120B
WET010	2	**Oct-08**	SM4500CN M	Analysis of Thiocyanate in Wastewater by SM 4500-CN M
WET013	3	**Oct-08**	140.1	Analysis of Odor in Drinking Water, EPA Method 140.1/SM 2150
WET015	3	**Oct-08**	E203	Analysis of Water Content by Karl Fisher Titration ASTM Method E203
WET018	4	**Oct-08**	SM4500CN G	Analysis of Cyanide Amenable to Chlorination in Water - Manual Colorimetric, SM 4500CN-G
WET019	5	**Mar-08**	420.1	Analysis of Low Level Total Recoverable Phenolics in Water by chloroform Extraction and Manual Spectrophotometry, EPA 420.1
WET021	7	**Oct-08**	1010	Ignitability by Pensky Marten Closed Cup Method, EPA Method 1010
WET022	4	**Nov-08**	SM2320B	Determination of Alkalinity by the Titrimetric Method, SM 2320B

WET024	5	**Dec-08**	SM2310B	Analysis of Acidity as CaCO3, SM 2310B
WET027	3	**Dec-08**	3060	Alkaline Digestion for Analysis of Hexavalent Chromium in Solid Matrices, EPA Method 3060
WET028	5	**Jan-08**	SM4500 H B	pH (Electrometric), SM 4500-H+ B
WET029	4	**Dec-08**	SM3500 Cr D	Analysis of Hexavalent Chromium in Water - Manual Colorimetric, SM 3500-Cr D
WET032	4	**Dec-08**	SM4500 S2 D	Analysis of Dissolved Sulfide - Methylene Blue Method, SM 4500-S= D)
WET033	4	**Dec-08**	9030/9034	Analysis of Acid-Soluble and Acid-Insoluble Sulfides, EPA Method 9030A
WET038	4	**Dec-08**	SM4500Cl G	Analysis of Total Residual Chorine by Colorimetry with DPD, SM 4500Cl G
WET039	6	**Jan-08**	SM2510B	Determination of Specific Conductance, SM 2510B
WET041	7	**May-08**	SM2540C	Filterable Residue (TDS) by Gravimetric analysis, SM 2540C
WET042	7	**Dec-08**	SM2540D	Determination of Non-filterable Residue (TSS) by Gravimetry, SM 2540D
WET043	4	**Jan-09**	SM5540C	Determination of Methylene Blue Active Substances (MBAS) by Spectrophotometry, SM 5540C
WET044	2	**Dec-08**	253B	Analysis of Thiosulfate and Sulfite by Iodometric Titration, LACSD Procedure 253B
WET046	3	**Dec-08**	SM2540B	Determination of Total Residue (TS) by Gravimetry, SM 2540B
WET047	4	**Jun-08**	160.4	Determination of Volatile Residue (VS) by Gravimetry, EPA Method 160.4
WET048	4	**Dec-08**	SM2540F	Determination of Settleable Residue (SS) by Volumetric Imhoff Cone, SM 2540F
WET050	5	**Jan-08**	410.4	Determination of Chemical Oxygen Demand in Water by Colorimetry, EPA Method 410.4
WET055	7	**Dec-08**	1664	Determination of Oil & Grease (HEM and SGT-HEM) by Solid Phase Extraction and Gravimetry, EPA Method 1664A
WET056	5	**May-09**	180.1	Determination of Turbidity by Nephelometric Method, EPA Method 180.1
WET059	3	**Dec-08**	FMC	Analysis of Hydrogen Peroxide by FMC Method
WET062	3	**Dec-08**	9065M	Analysis of Total Recoverable Phenolics in Solid Matrices, EPA Method 9065 Modified
WET064	3	**Dec-08**	9045C	Determination of pH in Soil and Solid Matrices, EPA Method 9045C
WET065	3	**May-09**	9040B	Determination of pH in Liquid Waste and Multiphase Waste, EPA Method 9040B
WET069	2	**May-09**	SM2340B	Determination of Hardness by Calculation, SM 2340B
WET070	3	**Dec-08**	SM4500ClO2 D	Analysis of Chlorine Dioxide by Colorimetric Method with DPD, SM 4500-ClO2 D
WET072	3	**Dec-08**	SM4500 O G	Determination of Dissolved Oxygen by Membrane Electrode Method, SM 4500-O G
WET073	3	**Dec-08**	SM4500SO3 B	Analysis of Sulfite by Iodometric Method, SM4500SO3= B
WET074	3	**Dec-08**	9010/9014	Distillation and Analysis of Total and Amenable Cyanide in Waste and Solid Matrices ,EPA Method 9010B/9014
WET075	2	**Dec-08**	CCR ch10	Determination of Ignitability in Waste, CCR Chapter 10, Article 3
WET077	2	**Dec-08**	CCR ch10	Determination of Corrosivity in Waste, CCR Chapter 10, Article 3
WET078	2	**Dec-08**	SM5910	Determination of UV Absorbing Constituents (UV-254), SM 5910
WET079	2	**Dec-08**	7196	Analysis of Hexavalent Chromium by Manual Spectrophotometric, EPA Method 7196A
WET080	4	**Dec-08**	365.3	Analysis of Total Phosphorus and Ortho Phosphate in Water by Manual Colorimetric Method, EPA Method 365.3
WET081	2	**Dec-08**	ASTM2382	Determination of Heat of combustion, ASTM Method 2382
WET084	2	**Jan-09**	353.2	Analysis of Nitrate and Nitrite in Water by Automated Colorimetry, EPA Method 353.2
WET086	2	**Jan-09**	350.1	Analysis of Ammonia in Water by Automated Colorimetry, EPA Method 350.1
WET087	2	**May-09**	365.1	Analysis of Total Phosphorus in Water by Acid Persulfate Digestion and Automated Colorimetry, EPA Method 365.1
WET088	2	**May-09**	365.1	Analysis of Orthophosphate in Water by Automated Colorimetry, EPA Method 365.1

WET089	3	**Jan-09**	351.2	Analysis of Total Kjeldahl Nitrogen (TKN) in Water by Heating Block Digestion and Automated Colorimetry, EPA Method 351.2
WET091	2	**Jan-09**	335.4	Analysis of Total Cyanide in Water by Midi-Distillation and Automated Colorimetry, EPA Method 335.4
WET093	2	**Jan-09**	SM10200H	Analysis of Chlorophyll-a and Pheophytin-a, SM 10200-H
WET094	1	Sep-05	SM5710B	Determination of Trihalomethane Formation Potential (THMFP), SM 5710B
WET095	2	**Jan-09**	415.3	Determination of TOC and SUVA in Drinking Water, EPA Method 415.3
WET096	2	**Jan-09**	D6646-03	Analysis of the Accelerated Hydrogen Sulfide Breakthrough Capacity of Granular and Pelletized Activated Carbon, ASTM D6646-03
WET097	2	**Jan-09**	D2862	Standard Test Method for Particle Size distribution of Granular Activated Carbon, ASTM D2862-82
WET098	2	**Jan-09**	D2867	Standard Test Method for Moisture in Activated Carbon, ASTM D2867-83
WET099	2	**Jan-09**	D2866	Standard Test Method for Total Ash in Activated Carbon, ASTM D2866-83
WET100	2	**Jan-09**	D3802	Standard Test Method for Ball-Pan Hardness of Activated Carbon, ASTM D3802-79
WET101	2	**Jan-09**	D5029	Standard Test Methods for Water Solubles in Activated Carbon, ASTM D5029-98
WET102	2	**Jan-09**	D5832	Standard Test Methods for Volatile Matter Content of Activated Carbon, ASTM D5832-98
WET103	2	**Jan-09**	USFilter	Standard Test Methods for Contact pH Test Method
WET104	2	**Jan-09**	D93	Standard Method for Test for Flash Point by Pensky-Martens Closed Cup Tester, ASTM D93-73
WET105	1	Sep-07	420.4	Determination of Total Recoverable Phenolics in Water by Semi-Automated Colorimetry, EPA Method 420.4

SOP's LIST AND INDEX
Organic Department - Organics SOPs

File Name	Rev. No	Rev Date	Method	Title
ORG003	7	Apr-05	SM5310C	Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC), SM 5310C
ORG004	9	Mar-02	SM5320B	Determination of Total Organic Halides (TOX) in Water by Adsorption-Pyrolysis-Titrimetric Method , SM 5320B
ORG005	7	**Mar-08**	8315	Analysis of Ketones and Aldehydes by HPLC, EPA Method 8315
ORG006	7	**Apr-08**	8318	Analysis of N-Methylcarbamates by HPLC, EPA Method 8318
ORG007	1	Sep-92	9076	Analysis of Total Halogens and Total Extractable Organic Halides in Solid matrices, EPA Method 9076
ORG008	4	Sep-01	551.1	Analysis of Chlorination Disinfection Byproducts (DBPs) in Drinking water by Liquid-Liquid Extraction and GC/ECD, EPA Method 551.1
ORG009	10	Apr-01	8260	Determination of Volatile Organic Compounds in Groundwater and Soil by GC/MS, EPA 8260B
ORG011	5	**Jun-09**	8330A	Analysis of Explosive Residues by HPLC
ORG012	4	Dec-04	508A	Screening for Polychlorinated Biphenyls by Perchlorination and Gas Chromatography - EPA Method 508A
ORG013	5	Sep-01	8015	Analysis of Volatile Petroleum Hydrocarbons (VPH, C6 to C10) in Soil and Water samples by P&T and GC/FID, EPA Method 8015
ORG014	4	Sep-01	8021	Determination of Aromatic and Halogenated Volatiles by GC/PID and GC/ELCD, EPA Method 8021A
ORG015	6	Mar-02	8141	Analysis of Organophosphorus Pesticides in Water and Solid Matrices by GC/NPD, EPA Method 8141A
ORG016	7	Mar-02	8081	Analysis of Organochlorine Pesticides in Water and Solid Matrices by GC/ECD, EPA Method 8081A
ORG017	5	Apr-01	549.2	Analysis of Diquat and Paraquat by Solid Phase Extraction and HPLC-UV, EPA Method 549.2

ORG020	6	**Apr-08**	547	Analysis of Glyphosate by HPLC-Fluorescence, EPA Method 547
ORG022	4	Mar-01	508	Analysis of Organochlorine Pesticides and PCBs in Drinking Water by LL Extraction and GC-ECD, EPA Method 508
ORG023	5	Mar-02	8015B	Analysis of Diesel Range Organics in soil and water samples by GC-FID, EPA Method 8015
ORG024	1	Dec-93	547M	Analysis of Glyphosate in Soil by Extraction and HPLC-Fluorescence, EPA Method 547 Modified
ORG025	2	Jul-94	24	Determination of Volatile Organic Content (VOC) in Paints and Related Coatings, EPA Method 24
ORG026	9	Jan-02	524.2	Determination of Volatile Organic Compounds in Water by GC/MS, EPA Method 524.2
ORG027	1	Feb-94	509	Analysis of Ethylene Thiourea in Drinking Water, EPA Method 509
ORG028	6	**Apr-08**	531.1	Analysis of N-Methylcarbamates in Water by Direct Aqueous Injection HPLC with Post Column Derivatization, EPA Method 531.1
ORG029	5	Jun-02	8151	Analysis of Chlorinated Acid Herbicides in Water and Solid Matrices by GC-ECD, EPA Method 8151
ORG030	5	Sep-01	504.1	Analysis of EDB, DBCP and 123TCP in Water by Microextraction and GC/ECD, EPA 504.1
ORG032	1	Mar-94	N1003	Analysis of Halogenated Hydrocarbons in Charcoal Tubes, NIOSH Method 1003
ORG033	5	**Apr-08**	632	Analysis of Diuron by HPLC-UV, EPA Method 632
ORG034	1	Jun-94	OSHA57	Analysis of 4,4-Methylenedianiline (MDA) in Air Filters, OSHA Method 57
ORG036	10	Feb-01	8270	Analysis of Semi-Volatile Organic Compounds in Water and Solid Matrices by GC/MS, EPA Method 8270C
ORG037	5	Mar-01	548.1	Analysis of Endothall in Drinking Water by Solid Phase Extraction and GC/MS, EPA Method 548.1
ORG038	2	Mar-02	508.1	Analysis of Chlorinated Pesticides and PCBs in Water by Solid Phase Extraction and GC-ECD, EPA Method 508.1
ORG039	8	Apr-04	525.2	Analysis of Semi-volatile Organic Compounds in Drinking Water by Solid Phase Extraction and GC/MS, EPA Method 525.2
ORG040	5	Feb-01	625	Analysis of Semivolatile Organics in Wastewater by LL Extraction and GC/MS, EPA Method 625
ORG041	3	Apr-00	601/602	Analysis of Purgeable Halocarbons and Aromatics in Waste Water by GC-ELCD and GC-PID, EPA Method 601/602
ORG042	10	**Sep-08**	314	Analysis of Perchlorate in Water and Solid Matrices by Ion Chromatography, EPA Method 314.0
ORG043	3	May-02	8270M	Determination of 1,4 Dioxane in Water and Soil by L-L Extraction and Isotopic Dilution GC/MS, EPA Method 8270M
ORG045	4	Feb-02	3600	Cleanup Procedures for Organic Analyses, EPA Method 3600
ORG046	3	Feb-02	3500	Sample Preparation and Extraction for Hazardous Waste Samples, EPA Method 3500B
ORG047	3	Feb-02	3510	Separatory Funnel Liquid-Liquid Extraction, EPA Method 3510B
ORG048	3	Feb-02	3550	Ultrasonic Extraction, EPA Method 3550B
ORG049	2	Feb-02	3580	Waste Dilution Procedure, EPA Method 3580A
ORG050	3	Mar-02	5030	Purge-and-Trap Extraction Procedure, EPA 5030B
ORG054	1	Jun-98	8031	Determination of Acrylonitrile by Gas Chromatography, EPA Method 8031
ORG056	2	Feb-02	3520	Continuous Liquid-Liquid Extraction Procedure, EPA Method 3520C
ORG057	2	Feb-02	3540	Soxlet Extraction Procedure, EPA Method 3540C
ORG058	5	Mar-02	8082	Analysis of Polychlorinated Biphenyl's (PCBs) in Liquid and Solid Matrices by GC-ECD, EPA Method 8082
ORG059	1	Jul-99	1666	Determination of Volatile Organic Compounds Specific to the Pharmaceutical Industry by Isotope Dilution GC/MS, EPA Method 1666
ORG060	3	Feb-01	624	Analysis of Volatile Organic Compounds in Wastewater by GC/MS, EPA Method 624
ORG062	6	Nov-03	9020B	Determination of Total Organic Halides in Water by Adsorption-Pyrolysis-Titrimetric Method, EPA Method 9020B

ORG063	3	Jul-02	9020M	Determination of Total Halogens and Total Extractable Organic Halides in Solid and Oil Matrices, EPA Method 9020B Modified
ORG064	3	Mar-02	608	Analysis of Organochlorine Pesticides and PCBs in Wastewater by GC-ECD, EPA Method 608.
ORG065	10	Dec-03	1625M	Determination of Ultra Low Levels of N-Nitrosodimethylamine (NDMA) by Continuous L-L Extraction and Isotopic Dilution GC/MS. EPA Method 1625C Mod
ORG066	2	Feb-03	8270sim	Determination of Low Levels of Polynuclear Aromatic Compound in Water and Solid Matrices by GC/MS SIM Mode, EPA Method 8270 Modified
ORG067	3	Mar-02	5035	Determination of Volatile Organic Compounds in Soil by Closed-System Purge and Trap and GC/MS, EPA 5035/8260
ORG069	6	**May-08**	7199	Analysis of Hexavalent Chromium by Ion Chromatography, EPA Method 7199
ORG071	2	Mar-02	8015B	Analysis of Alcohols by GC-FID, EPA Method 8015B
ORG072	2	Mar-02	515.3	Analysis of Chlorinated Acid Herbicides in Water by Microextraction and GC-ECD, EPA Method 515.3
ORG073	3	Sep-01	505	Analysis of Chlorinated Pesticides and PCBs in Drinking Water by Microextraction and GC-ECD, EPA Method 505
ORG074	2	Jul-02	General	Establishing Retention Times Windows for Organic Analyses by GC and GC/MS
ORG075	2	Mar-01	552.2	Analysis of Haloacetic Acids by Microextraction and GC-ECD, EPA 552.2
ORG076	2	Mar-02		Instrument Maintenance for Organic Analysis
ORG077	4	**May-08**	218.6	Analysis of Hexavalent Chromium in Water by Ion Chromatography, EPA 218.6
ORG078	1	Apr-01	524.2M	Analysis of tert-butyl alcohol (TBA) in drinking water by EPA 524.2M
ORG079			luft	Analysis of TPH and BTEX by GC/MS LUFT Method
ORG080	1	Jan-02	528	Analysis of Phenols in Drinking Water by SPE and GC/MS, EPA Method 528
ORG081	1	Jan-02	526	Analysis of Selected SVOA in Drinking Water by SPE and GC/MS, EPA Method 526
ORG082	1	Apr-02	TCP-E	Analysis of Low Levels of 1,2,3-Trichloropropane by L-L extraction and GC/MS SIM mode, SRL Method
ORG083	1	May-02	TCP-PT	Analysis of Low Levels of 1,2,3-Trichloropropane by Purge and Trap and GC/MS SIM mode, SRL Method
ORG085	2	Aug-07	556	Analysis of Aldehydes by Microextraction and GC-ECD, EPA Method 556
ORG086	1	Jul-02	3535	Solid Phase Extraction Procedures - Manual and Automated, EPA Method 3535
ORG087	2	**May-08**	300.1	Analysis of Low Levels of Oxyhalides by Ion chromatography, EPA Method 300.1
ORG088	2	**May-08**	532	Analysis of Diuron and Linuron in Water by SPE and HPLC-UV, EPA Method 532
ORG089	1	Feb-04	1624	Analysis of Acrolein and Acrylonitrile in Water by EPA 1624
ORG090	1	Mar-04	8270SIM	Analysis of Low Level Phenols in Water and Solid by GC/MS in SIM Mode, EPA Method 8270 Modified
ORG091	3	**Jun-08**	326	Analysis of Low Level Chlorite, Chlorate and Bromate by Ion Chromatography and Post-column derivatization, EPA Method 326
ORG092	2	**Jan-08**	OSHA 20M	Analysis of Hydrazine by HPLC, OSHA Method 20M (Modified)
ORG094	2	**May-09**	8316	Analysis of Acrylamide by HPLC, EPA Method 8316
ORG095	1	Sep-05	1614M	Analysis of PBDEs by isotopic dilution GC/MS-EI, EPA Method 1614 Modified
ORG096	1	Nov-06	orgtin	Determination of Low Levels Organotins by GC-MS.
ORG097	2	**Jun-08**	332	Analysis of Low Level Perchlorate by IC-MS/MS, EPA Method 332.0
ORG098	1	Aug-06	8310	Analysis of Polynuclear Aromatic Hydrocarbons by HPLC, EPA Method 8310
ORG099	2	**Oct-08**	331	Analysis of Low Level Perchlorate by LC-MS/MS, EPA Method 331.0
ORG100	1	Mar-06	535	Analysis of Chloroacetanilide/acetamide Herbicides by LC/MS, EPA Method 535
ORG101	1	Mar-06	521	Analysis of Nitrosamines by SPE-GC/MS/MS EPA Method 521
ORG102	2	**Mar-08**	527	Analysis of Pesticides and Flame Retardants by SPE-GC/MS EPA Method 527
ORG103	2	**Nov-08**	529	Analysis of Explosives by SPE-GC/MS EPA Method 529
ORG104	1	May-06	300M	Analysis of Iodide by Ion Chromatography, EPA Method 300 Modified
ORG105	1	Apr-06	LCMS	Tuning the Varian 1200L LC/MS

ORG106	1	Aug-06	610	Analysis of Polynuclear Aromatic Hydrocarbons by HPLC, EPA Method 610
ORG107	1	Oct-06	DOD-ClO4	Analysis of Low Level Perchlorate in Water and Soil by LC-MS/MS, DoD Method
ORG108	1	Jan-07	556M	Analysis of Aldehydes in Solid/Soil by GC-ECD, EPA Method 556 Modified
ORG109	1	Sep-07	1671	Analysis of Triethanolamine by Direct Injection and GC-FID
ORG110	1	Dec-07	D7065	Analysis of Alkyl Phenols and Alkyl Phenol Ethoxylates by L-L extraction and GC/MS full scan and SIM, ASTM Method D7065
ORG111	2	**Mar-09**	LCMS	Analysis of Pharmaceuticals, Personal Care Products and Endocrine Disruptive Compounds LC-MS/MS.
ORG113	1	**May-08**	632M	Determination of Diuron in solid matrices
ORG114	1	**Jun-08**	IC/MS/MS	Analysis of 4-Chlorobenzenesulfonic acid (pCBSA) by IC/MS/MS
ORG115	1	**Jun-08**	525.2	Determination of organophosphorous pesticides in drinking water by liquid-solid extraction and capillary column GC/MS, via EPA Method 525.2
ORG116	1	**Aug-08**	8316M	Analysis of Acrylamide by LC/MS/MS
ORG117	1	**Nov-08**	GCMS CI	Analysis of Pyrethroid Pesticides in Water and Soil/Sediment by Extraction and GC/MS in NCI mode and SIM
ORG118	1	**Apr-09**	537	Analysis of Perfluorinated Compounds in Water by LC-MS/MS
ORG119	1	**Apr-09**	607M	Analysis of NDMA and DMN and Bromacil by EPA Method 607 modified
ORG120	1	**May-09**	SM6040D	Analysis of MIB and Geosmin by on line SPME and GC/MS/MS, SM6040D

APPENDIX 8

Acceptance Limits for QC Determinations

The Acceptance Limits for QC determinations are in some cases mandatory limits and in other cases the limits are updated periodically from past results. This process is performed though the LIMS. For current acceptance limits please refer to the LIMS.

APPENDIX 9

DEMONSTRATION OF CAPABILITY

A demonstration of capability (DOC) must be made prior to using any test method, and at any time there is a change in instrument type, personnel or test method.

All demonstrations shall be documented through the use of the form in this appendix.

The following steps are performed.

a) A quality control sample shall be obtained from an outside source. If not available, the QC sample may be prepared by the laboratory using stock standards that are prepared independently from those used in instrument calibration.

b) The analyte(s) shall be diluted in a volume of clean matrix sufficient to prepare four aliquots at the concentration specified, or if unspecified, to a concentration approximately 10 times the method-stated or laboratory-calculated method detection limit.

c) At least four aliquots shall be prepared and analyzed according to the test method either concurrently or over a period of days.

d) Using all of the results, calculate the mean recovery in the appropriate reporting units and the standard deviations of the population sample for each parameter of interest. When it is not possible to determine mean and standard deviations, such as for presence/absence and logarithmic values, the laboratory must assess performance against established and documented criteria.

e) The calculated mean and standard deviation are compared to the corresponding acceptance criteria for precision and accuracy in the test method (if applicable) or in laboratory-generated acceptance criteria (if they are not established mandatory criteria). If all parameters meet the acceptance criteria, the analysis of actual samples may begin. If any one of the parameters do not meet the acceptance criteria, the performance is unacceptable for that parameter.

f) When one or more of the tested parameters fail at least one of the acceptance criteria, the analyst must proceed according to 1) or 2) below.

    1) Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with c) above.

    2) Beginning with c) above, repeat the test for all parameters that failed to meet criteria. Repeated failure, however, confirms a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with c).

<u>CERTIFICATION STATEMENT</u>

The following certification statement shall be used to document the completion of each demonstration of capability. A copy of the certification statement shall be retained in the personnel records of each affected employee.

Training Record (Method and Technique) and Demonstration of Capability Statement

- **Analyte(s)/Description:** ______
- **Analyst name:** ______
- **Matrix:** ______ **Date:** ______
- **Method:** ______ **SOP:** ______

I have read, understand, and agree to use the latest version of the test method and SOP.

______ Analyst's Signature ______ Date

- **Training courses or workshops on equipments, analytical techniques and lab procedures:**

Standard and sample preparation, dilution, and spiking using syringes and volumetric flasks. On-site training for familiarization and operation of both software and hardware of GC/MS#1, 8(Agilent 5890,6890)provided by Ricci Tipon. GC and GC/MS seminars provided by Full Spectrum and Tekmar.

______ Analyst's Signature ______ Date

______ Technical Director's Name and Signature ______ Date

- **IDOC Certification Statement:**
- **Proficiency Demonstrated by:** (See attachment)

a. ____ Acceptable performance of a blind sample.
b. ____ Another demonstration of capability.
c. ____ Acceptable at least 4 consecutive LCS.
d. ____ Analysis of authentic sample analyzed by another trained analyst with statistically indistinguishable results

We, the undersigned, CERTIFY that:

1.- The Analyst identified above, using the cited test method(s), which is in use at this facility for the analyses of samples under the National Environmental Laboratory accreditation Program, have met the Demonstration of Capability
2.- The test method(s) was performed by the analyst(s) identified on this certification.
3.- A copy of the test method(s) and the laboratory-specific SOPs are available for all personnel on-site
4.- The data associated with the demonstration capability are true, accurate, complete and self-explanatory (*)
5.- All raw data (including a copy of this certification form) necessary to reconstruct and validate these analyses have been retained at the facility, and that the associated information is well organized and available for review by authorized assessors

______ Technical Director's Name and Signature ______ Date

______ QA Officer's Name and Signature ______ Date

Notes: The demonstration of Capability is performed as per Section 12.5 of Quality Assurance Manual

*: True: Consistent with supporting data; Accurate: Based on good laboratory practices consistent with sound scientific principles/practices; Complete: Includes results of all supporting performance testing; Self-Explanatory: Data properly labeled and stored so that the results are clear and require no additional explanation.

APPENDIX 10
Corrective Action Report

QUALITY ASSURANCE
CORRECTIVE ACTION REPORT

Date: ______________ Name of Analyst: _____________________________________

Sample ID Number(s) Involved: ____

Corrective action to be implemented (1):

Were samples reanalyzed and acceptable QC obtained: **YES - NO**
Were samples reported with qualifiers: **YES - NO**

Approval of corrective action by Technical Director:

Signed: ______________________________ Date: ____________
Technical Director
Comments by TD:

Verification of Implementation of corrective action by QA Officer:

Signed: ______________________________ Date: ____________
QA Officer
Comments by QA Officer:

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(1): Describe whether the samples were reanalyzed and/or reported with qualifiers, steps taken to investigate the problem, probable cause of problem and how to prevent from happening again.

APPENDIX 11

Laboratory Accreditations

- NELAC #04229CA
- State of California ELAP #1132
- USEPA UCMR 2 certification
- State of Nevada Division of Environmental Protection Certificate No. CA211-2004-41
- State of Hawaii
- State of New Jersey, certificate # CA015
- Guam Environmental Protection Agency, Certificate # 09-007r
- Los Angeles County Sanitation Districts Industrial Wastewater Testing Number 10143
- South Coast Air Quality Management District Ambient air testing Certificate number 93LA107

APPENDIX 12
Flags used for Data Qualifiers

Qualifier	Description
*	The recommended holding time for this analysis is only 15 minutes. The sample was analyzed as soon as it was possible but it was received and analyzed past holding time.
**	The recommended holding time for field filtering is only 15 minutes. The sample was filtered as soon as possible but it was filtered past holding time. However, the sample was analyzed within holding time.
<	<
>	>
>1000	> 1000
>1500	>/= 1500
_<fis	< 0.588
_<FL	No free liquids
_<FP65	< 65
_>=1.6M	>/= 1,600,000
_>=1600	>/= 1600
_>=160K	>/= 160,000
_>=160M	>/= 160,000,000
_>=16K	>/= 16000
_>=16M	>/= 16,000,000
_>=23	>/= 23
_>=230	>/= 230
_>=3.2M	>/= 3,200,000
_>=5700	>/= 5700
_>=57K	>/= 57000
_>2419.6	>2419.6
_>FB	> 750
_>fis	> 750
_>FP200	> 200
_0.000	0.000
_100	100 % Survival
_A	Absent
_C	Canceled
_ext	Extracted
_ND	ND
_No Reac	No reaction
_None Vis	None Visible
_P	Present
_pH<2	<2
_seeA	See Attached
_Sub	SUB
_t<2.78	t < 2.78
A-01	[Custom Value]
A-02	[Custom Value]
AS-1	None Detected
B	Blank contamination. The analyte was found in the associated blank as well as in the sample.
B-01	This analyte was found in the method blank, which was possibly contaminated in the lab during preparation. The reporting limit was raised due to the contamination.
B-04	Analyte was found in the travel blank, which was possibly contaminated in the lab during preparation. The batch was accepted since this analyte was not detected for all the samples in the batch.

Qualifier	Description
B-06	This analyte was found in the method blank, which was possibly contaminated during sample preparation. The batch was accepted since this analyte was either not detected or more than 10 times of the blank value for all the samples in the batch.
B-07	This analyte was found in the method blank at levels above the MDL but below the reporting limit.
B-08	Analyte is found in the method blank, which was possibly contaminated during sample preparation.
B-field	No field blank was either received or specified in this batch. Therefore, samples were analyzed without field blank.
BOD-01	The sample dilutions set-up for the BOD analysis did not meet the oxygen depletion criterion of at least 2 mg/l, therefore the reported result is an estimated value only.
BOD-02	The sample dilutions set up for the BOD analysis did not meet the criterion of a residual dissolved oxygen of at least 1 mg/l, therefore the reported result is an estimated value only.
BR	Analyte was found in the method blank, which was possibly contaminated in the lab during preparation. The reporting limit was raised to account for the contamination.
BS-01	The recovery of this analyte in the BS/LCS was over the control limit due to a possible contamination. The batch was accepted based on another acceptable BS and/or MS and MSD that meet the BS criteria.
BS-03	The recovery of this analyte in the BS/LCS was outside the control limits. The sample result was accepted based on another acceptable BS/LCS and/or MS and MSD that meet BS criteria.
BS-04	The recovery of this analyte in LCS or LCSD was outside control limit. Sample was accepted based on the remaining LCS, LCSD or LCS-LL.
BS-H	The recovery of this analyte in the BS/LCS was over the control limit. Sample result is suspect.
BS-L	The recovery of this analyte in the BS/LCS was below the control limit. Sample result is suspect.
CN-1	See case narrative for an explanation of results.
CN-2	See Case Narrative
COD_Cl	COD result is analyzed with chloride correction.
DryWt	The result is in dry weight basis.
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate (CLP E-flag).
E-01	The concentration indicated for this analyte is an estimated value above the calibration range.
FILT	The sample was filtered prior to analysis.
GB-Ad	Adjusted Gross Beta equal to total Gross Beta activity minus Potassium-40 activity
HC-02	Hydrocarbon pattern present in the requested fuel quantitation range but does not resemble the pattern of the requested fuel.
I-03	Low internal standard recovery possibly due to matrix interference or leak in system. The result is suspect.
I-05	Low internal standard recovery possibly due to matrix interference. The result is suspect.
J	Detected but below the Reporting Limit; therefore, result is an estimated concentration.
J-01	No J value detected.
K-40	Potassium-40 calculated based on the concentration of total potassium in mg/L multiplied by the factor 0.82 to convert to activity in pCi/L.
M	Sample result is matrix suspect.
M-01	Result is not valid due to high sample background
M-02	Due to the nature of matrix interferences, sample was diluted prior to extraction. The reporting limits were raised due to the dilution.
M-03	Due to insufficient sample volume, sample was diluted prior to extraction. The reporting limits were raised due to the dilution.
M-04	Due to the nature of matrix interferences, sample extract was diluted prior to analysis. The reporting limits were raised due to the dilution.
M-05	Due to the nature of matrix interferences, sample was diluted prior to analysis. The reporting limits were raised due to the dilution.

Qualifier	Description
M-06	Due to the high concentration of analyte in the sample, sample extract was diluted prior to analysis. The reporting limit was raised due to this dilution.
M-07	Due to high concentration of solid particles in the sample, a smaller volume was used for analysis. The reporting limit was raised due to this dilution.
MIC-2	Result is suspect due to QC failure.
MS-01	The spike recovery for this QC sample is outside of established control limits possibly due to sample matrix interference.
MS-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
MS-03	Multiple analyses indicate the percent recovery is out of acceptance limits due to a possible matrix effect.
MS-04	Visual evaluation of the sample indicates the RPD or QC spike is above the control limit due to a non-homogeneous sample matrix.
MS-05	The spike recovery and/or RPD were outside acceptance limits for the MS and/or MSD due to possible matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
MS-06	Due to noted non-homogeneity of the QC sample matrix, the MS/MSD did not provide reliable results for accuracy and precision. Sample results for the QC batch were accepted based on LCS/LCSD percent recoveries and RPD values.
MS-07	The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
MS-08	Due to the nature of matrix interferences, sample was diluted prior to analysis. The MS/MSD could not be quantitated due to the dilution. The batch was accepted based on acceptable LCS recovery.
MS-09	The recoveries of MS/MSD are not valid due to high sample background
MS-10	Due to insufficient sample, LCS/LCSD were analyzed in place of MS/MSD.
MS-11	The QC limits for MS/MSD are not applicable due to positive sample background.
MS-4X	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
MS-BG	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to sample background. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
O-02	This result was analyzed outside of the EPA recommended holding time.
O-04	This analysis was performed outside the EPA recommended holding time.
O-05	The extraction for this analyte was performed outside of the EPA recommended holding time.
O-07	Sample date and/or time not provided by client. Therefore, default date and/or time has been entered. The analysis may be outside of recommended holding time.
O-08	The original extraction and/or analysis of this sample yielded QC recoveries outside acceptance criteria. It was re-extracted/re-analyzed after the recommended maximum hold time.
O-09	This sample was received with the EPA recommended holding time expired.
O-10	The original analysis of this sample yielded QC recoveries outside acceptance criteria. It was re-analyzed after the recommended maximum hold time.
O-11	The sample was originally analyzed within holding time. However, it required a dilution and the re-analysis was performed after the recommended holding time had expired.
O-12	The sample was originally analyzed within holding time. However, it was reanalyzed without dilution that exceeded the recommended holding time.
O-14	This analysis was requested by the client after the holding time was exceeded.
O-15	The sample was received with the recommended holding time nearly expired. It was analyzed as soon as possible but the maximum holding time was slightly exceeded.

Qualifier	Description
O-21	This sample was analyzed 1 hour past the EPA recommended holding time.
O-22	This sample was analyzed 2 hours past the EPA recommended holding time.
O-25	This sample was received unpreserved and with the recommended holding time for preservation of 48 hours expired.
P-01	Low recovery due to preservative. Sample data accepted based on passing LCS result.
P-2	Sample received without proper preservation and was preserved at the lab upon receiving.
P-5	Due to the nature of the sample matrix a 1:10 dilution was necessary to perform a corrosivity measurement.
Q	One or more quality control criteria failed.
Q-01	The recovery of this analyte in QC sample was outside control limits. Sample was justified as ND based on the low level standard at or below the reporting limit.
Q-02	Low recovery of this analyte in the QC sample. The analysis of the low level standard produced acceptable recovery indicating that the sample result might be accurately reported as Not Detected.
Q-08	High bias in the QC sample does not affect sample result since analyte was not detected.
Q-09	This analyte bias high in QC sample. A fresh spiking solution is going to be prepared.
Q-10	This analyte has high bias in QC sample, the result is suspect.
Q-11	This analyte is low in QC sample, the result is suspect.
Q-12	The RPD result exceeded the QC control limits possibly due to a possible matrix effect; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on the percent recoveries and/or other acceptable QC data.
Q-H-1	High bias, data was accepted since sample was not detected.
Q-L-03	This analyte is low in QC sample. Sample data is accepted based on acceptable CCVs.
Q-R-01	Analyses are not controlled on RPD values from sample concentrations less than the reporting limit. QC batch accepted based on LCS and/or LCSD QC results.
QR-03	The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.
QR-04	The RPD value for the MS/MSD was outside of QC acceptance limits however both recoveries were acceptable. The QC batch was accepted based on acceptable results for the recoveries and RPD for the LCS and LCSD.
R-01	The Reporting Limit for this analyte has been raised to account for matrix interference.
R-02	Elevated Reporting Limits due to limited sample volume.
R-03	The RPD is not applicable for result below the reporting limit (either ND or J value).
R-04	Due to foaming, the sample was diluted prior to analysis. The reporting limits were raised due to the dilution.
R-05	The sample was diluted due to the presence of high levels of non-target analytes resulting in elevated reporting limits.
R-06	Sample was diluted prior to extraction due to high sample concentration, reporting limit was raised due to the dilution.
RAD-1	Gross Alpha: DLR (Detection Limits for Purposes of Reporting) = 3 pCi/L, and MCL (Maximum contaminant Level) = 15 pCi/L.
RAD-2	Gross Beta: DLR (Detection Limits for Purposes of Reporting) = 4 pCi/L, and MCL (Maximum contaminant Level) = 50 pCi/L.
RAD-3	The elevated counting error and MDA was caused by smaller sample aliquot used for analysis due to matrix effect (high TDS).
S-01	The surrogate recovery could not be calculated due to sample dilution required from high analyte concentration and/or matrix interferences.
S-02	The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample extract.

Qualifier	Description
S-03	High surrogate recovery for this sample is possibly due to a sample matrix effect. The data was accepted since all target analytes were not detected.
S-04	The surrogate recovery for this sample is outside of established control limits due to possible sample matrix effect.
S-05	Surrogate recovery was below acceptance limit possibly due to matrix effect. Sample data was justified as acceptable since all target analytes were still not-detected or below the reporting limits when adjusted accordingly to surrogate recovery.
S-06	The recovery of this surrogate is outside control limits due to sample dilution required from high analyte concentration and/or matrix interference's.
S-07	Surrogate recovery out of acceptance limits for this sample is possibly due to sample matrix effect, confirmed by re-extracting and/or re-analyzing the sample.
S-08	No surrogate recovery, possibly surrogate spiking was missed.
S-09	Wrong amount spiked, quantification is not accurate
S-10	Surrogate recovery outside method QC limits due to extraction related problems
S-AC	Acid surrogate recovery outside of control limits due to a possible matrix effect. The data was accepted based on valid recovery of remaining two acid surrogates.
S-BLK	Surrogate recovery outside of control limits for Method Blank. The data was accepted since all target analytes were not detected
S-BN	Base/Neutral surrogate recovery outside of control limits due to a possible matrix effect. The data was accepted based on valid recovery of remaining two base/neutral surrogates.
S-BS	Surrogate recovery outside of control limits for LCS. The data was accepted based on valid recovery of the target analytes.
S-DUP	Duplicate analysis confirmed surrogate failure due to matrix effects.
S-GC	Surrogate recovery outside of control limits due to a possible matrix effect. The data was accepted based on valid recovery of the remaining surrogate.
S-HI	High surrogate recovery was confirmed as a matrix effect by a second analysis.
S-LOW	Low surrogate recovery confirmed as a matrix effect by a second analysis.
S-MS	Surrogate recovery outside of control limits for MS/MSD. The data was accepted based on valid recovery of the target analytes.
S-MS1	Surrogate recovery outside of acceptance window confirmed as matrix effect by analysis of MS/MSD on this sample.
S_ABC	Analysis subcontracted to Aquatic Bioassay & Consulting Laboratories, Inc., non NELAP certified, but is ELAP certified (ELAP Certificate 1907)
S_AIR	Analysis subcontracted to Air Technology Laboratories, Inc., NELAP Certificate # E87847
S_BIO	Analysis subcontracted to Biovir Laboratories, NELAC Certificate #05234CA, ELAP Certificate #1795.
S_CAL	Analysis subcontracted to Caltest Analytical Laboratory, NELAP Certificate 01103CA, ELAP Certificate 1664
TIC	Tentatively Identified Compound using mass spectrometry. The reported concentration is relative concentration based on the nearest internal standard. If the library search produces no matches at, or above 85%, the compound is reported as unknown.
U-01	The sample was received without the proper preservation.
U-02	The sample was received at the lab without proper preservation. However, the sample was then preserved at the lab.
S_CEL	Analysis subcontracted to Calscience Environmental Laboratories, NELAP Certificate 03220CA, ELAP Certificate 1230.
S_COL	Analysis subcontracted to Columbia Analytical Services, NELAP Accredited.
S_CRG	Analysis subcontracted to CRG Marine Laboratories Inc... Non-NELAP certified, ELAP Certificate 2261.

Qualifier	Description
S_EMS	Analysis subcontracted to EMS Laboratories, non NELAP certified, but is ELAP certified (ELAP Certificate 1119)
S_EMSL	Analysis subcontracted to EMSL Analytical, Inc., non NELAP certified, but is ELAP certified (ELAP Certificate 1620).
S_FAL	Analysis subcontracted to Frontier Analytical Laboratory, NELAP Certificate 02113CA
S_FGL	Analysis subcontracted to FGL Laboratories, NELAC Certificate 01110CA
S_MAX	Analysis subcontracted to Maxxam Analytics INC., NELAP Certificate 02106A
S_NCL	Analysis subcontracted to North Coast Laboratories, ELAP Certificate 1247
S_PAR	Analysis subcontracted to Paradigm Analytical, NELAP Certificate E87634, ELAP Certificate 2451.
S_PTS	Analysis subcontracted to PTS Laboratories, Inc.
S_RSE	Analysis subcontracted to Radiation Safety Engineering, Inc., Nevada certified.
SeeAtt	See Attachment
T-AgBaH	The sample was treated with Silver, Barium and H+ cartridges to minimize chloride and sulfates interferences prior to analysis.
T-AgBaHRP	The sample was treated with Silver, Barium, H+, and Organics cartridges to minimize chloride, sulfates, and organic interferences prior to analysis.
T-AgH	The sample was treated with silver, and H+ cartridges to minimize chloride interferences prior to analysis.
T-BaH	The sample was treated with Ba and H cartridges to reduce sulfates background interferences.

APPENDIX F

STANDARD OPERATING PROCEDURES FOR DECONTAMINATION OF THE NEW ZEALAND MUD SNAIL (CA DFG, 2005)

Proposed Cleaning Procedure for New Zealand Mud Snail Infested Wading Gear

The following procedures for cleaning NZMS infested wading gear can be followed upon exiting NZMS infested waters. Wading gear should be cleaned prior to leaving the site. If this is not possible then wading gear should be completely sealed inside of a large plastic bag and cleaned before it is used in any other waters. Three different cleaning protocols have been tested and found to be effective using specific cleaning solutions:

1) Immersion Procedure

a. Remove wading gear upon exiting NZMS infested waters. **Avoid allowing infested wading gear to come in contact with interior surfaces of vehicles or camping gear such as tents or trailers.** NZMS can be transferred to any surface they come in contact with and they could later be transferred back to cleaned wading gear. Turn waders right side out and remove insoles from wading boots.
b. Place waders, wading boots, boot insoles and the streambed contact end of a wading stick, if used, in a container of sufficient size to allow the gear to be completely covered by a cleaning solution.
c. Pour sufficient cleaning solution into the container with the infested wading gear to completely cover the gear. It may be necessary to weight down the gear to ensure that it remains immersed in the cleaning solution.
d. Allow the wading gear to remain in the cleaning solution for at least 5 minutes.
e. Remove the wading gear from the cleaning solution one piece at a time and inspect it to make sure that all debris that could harbor NZMS has been removed from the gear as well as any NZMS that could be lodged in cracks or crevices. If necessary, use a stiff plastic bristled brush such as a kitchen brush to remove any remaining debris and mud.
f. Rinse wading gear in clean water. **DO NOT USE WATER FROM THE NZMS INFESTED SOURCE**. This may reintroduce NZMS to the wading gear.
g. Return cleaned wading gear to it appropriate storage container.

2) Dry Sack Procedure

a. Remove wading gear upon exiting NZMS infested waters. **Avoid allowing infested wading gear to come in contact with interior surfaces of vehicles or camping gear such as tents or trailers.** NZMS can be transferred to any surface they come in contact with and they could later be transferred back to cleaned wading gear. Turn waders right side out and remove insoles from wading boots.
b. Place waders, wading boots, and boot insoles into a dry sack (recommended size: 65 liter). Walking sticks will need to be cleaned separately outside of the dry sack to avoid rupturing the sack.
c. Add 8 to 10 liters of cleaning solution to dry sack and the seal dry sack.
d. Pick up the dry sack and shake it back and forth using a rolling motion to ensure that the contents are thoroughly coated with the cleaning solution. Continue shaking for approximately 30 seconds.

e. Let dry sack sit undisturbed for at least 5 minutes. Then repeat the shaking and mixing for another 30 seconds.
f. Open the dry sack and remove the contents one piece at a time and inspect it to make sure that all debris that could harbor NZMS has been removed from the gear as well as any NZMS that could be lodged in cracks or crevices. If necessary, use a stiff plastic bristled brush such as a kitchen brush to remove any remaining debris and mud.
g. Rinse wading gear in clean water. **DO NOT USE WATER FROM THE NZMS INFESTED SOURCE**. This may reintroduce NZMS to the wading gear.
h. Return cleaned wading gear to it appropriate storage container.

3) Spray Bottle Procedure (**Note:** this procedure has only been tested using a copper sulfate cleaning solution).

a. Remove wading gear upon exiting NZMS infested waters. **Avoid allowing infested wading gear to come in contact with interior surfaces of vehicles or camping gear such as tents or trailers.** NZMS can be transferred to any surface they come in contact with and they could later be transferred back to cleaned wading gear. Turn waders right side out and remove insoles from wading boots.
b. Place waders, wading boots, boot insoles and the streambed contact end of a wading stick, if used, in a container of sufficient size to allow the gear to be easily accessed.
c. Using a standard 1 liter squeeze-trigger type spray bottle containing the cleaning solution, spray the wading gear to the point of saturation and runoff with the cleaning solution. Be sure to treat the inside of the wading boots as well as the outside. Use the stream setting to be sure and dislodge any debris from the wading boots. Be sure to treat both top and under side of gravel guards if they are permanently attached to the waders.
d. Allow the wading gear to set for at least 5 minutes with the cleaning solution on it. Remove the wading gear one piece at a time and inspect it to make sure that all debris that could harbor NZMS has been removed from the gear as well as any NZMS that could be lodged in cracks or crevices. If necessary, use a stiff plastic bristled brush such as a kitchen brush to remove any remaining debris and mud.
e. Rinse wading gear in clean water. **DO NOT USE WATER FROM THE NZMS INFESTED SOURCE**. This may reintroduce NZMS to the wading gear.
f. Return cleaned wading gear to it appropriate storage container.

4) Cleaning Solutions.

a. Copper sulfate: Dissolve 3.785 grams of copper sulfate pentahydrate crystals (99.1% purity) for each gallon of solution you want to make. This will achieve a concentration of 252 mg/L of copper in the cleaning solution.
b. Benzethonium chloride: Dissolve 7.57 grams of benzethonium chloride (97% purity) for each gallon of cleaning solution you want to make. This will achieve a concentration of 1,947 mg/L in the cleaning solution.
c. Formula 409® Disinfectant: Dilute the commercially available solution 1:1 with clean water to achieve the needed concentration for the cleaning solution (i.e. 1 gallon of Formula 409® Disinfectant to 1 gallon of water).

APPENDIX G

CALIBRATION LOG SHEET

EQUIPMENT CALIBRATION LOG

SAN DIEGO REGION IRRIGATED LANDS GROUP

Date (DD/MM/YYYY))	Time (24hr)	Instruments (HORIBA U10)	Calibrated (X)	Name

MONITORING AND REPORTING PROGRAM PLAN

SAN DIEGO REGION IRRIGATED LANDS GROUP

December 16, 2011

MONITORING AND REPORTING PROGRAM PLAN

December 16, 2011

Prepared by:

PW ENVIRONMENTAL
230 Dove Court
Santa Paula CA 93060
(805) 656-4677

Prepared for:

San Diego Region Irrigated Lands Group
Billing Address: 1670 East Valley Parkway
Escondido CA 92027

SDRWQCB Conditional Waiver No. 4

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SAN DIEGO REGION IRRIGATED LANDS GROUP

1.0 PROJECT PERSONNEL

The San Diego Region Irrigated Lands Group (SDRILG) was formed to comply with the California Regional Water Quality Control Board, San Diego Region's (SDRWQCB) *Conditional Waiver No. 4 – Discharges from Agriculture and Nursery Operations* (Waiver). Mr. Eric Larson is the Administrator and primary contact for the SDRILG. PW Environmental (PW) was contracted to assist the SDRILG with the technical requirements of the Waiver. Mr. Zachary Moran is the Project Manager for the program, Mr. Bryn Home is the Quality Assurance (QA) Officer, and Mr. Ed De La Llave is the Field Supervisor.

The SDRILG is responsible for organizing and managing the administrative aspect of the SDRILG while PW manages the technical aspect of the SDRILG. The SDRILG assisted the individual participants in completing and submitting the Notice of Intent (NOI) forms. PW developed the required Quality Assurance Project Plan (QAPP) and this Monitoring and Reporting Program Plan (MRPP), on behalf of the SDRILG. PW is also currently responsible for the oversight of field monitoring and sampling at the selected sites for the SDRILG, and all additional reporting. Weck Laboratories, Inc. (Weck) is responsible for the laboratory analytical testing for the group.

Weck is certified by the California Environmental Laboratory Accreditation Program; their certification numbers is 1132. Mr. Brandon Gee of Weck is the Laboratory Project Manager for this waiver program, and Alan Ching is the QA officer. The contact information for Weck is:

Weck Laboratories, Inc.
Brandon Gee (626) 336-2139 x133
14859 E. Clark Ave
Industry, CA 91745

2.0 INTRODUCTION AND BACKGROUND

The SDRWQCB is a State of California Agency that regulates water quality within the San Diego Region. The San Diego Region includes the coastal watersheds of San Diego County, the southern portion of Orange County and a small portion of Riverside County. The SDRILG operates throughout the entirety of the San Diego Region.

All eleven Watersheds in the region have impacted waterbodies that appear on the Federal 303(d) list, and listed contaminants include constituents that could be related to agricultural uses. In accordance with section 303 (d) of the Clean Water Act, the SDRWQCB is in the process of developing Total Maximum Daily Loads (TMDLs) for these impacted waterbodies. Currently, TMDLs have been adopted for Chollas Creek, Rainbow Creek, and the Shelter Island Yacht Basin, and TMDLs are in progress for areas of the San Diego Bay, the Tijuana River and Estuary, Los Penasquitos Lagoon, Santa Margarita Lagoon, Loma Alta Slough, Buena Vista Lagoon, Agua Hedionda Lagoon, lower Agua Hedionda Creek, San Elijo Lagoon, Famosa Slough and Channel, the shoreline of Buena Vista Creek, the shoreline of Escondito Creek, and the shoreline of Loma Alta. The SDRWQCB also adopted indicator bacteria TMDLs for twenty beaches and creeks in the region, and for Baby Beach and Shelter Island Shoreline Park.

Water quality impacts associated with agriculture can be primarily traced to discharges resulting from irrigation or stormwater. These discharges may contain pollutants that have been imported or introduced into the irrigation or stormwater; in addition, irrigation practices can mobilize and or concentrate some pollutants. In order to evaluate the potential impacts of discharges from agricultural land on beneficial uses of water bodies within the San Diego Region, the SDRWQCB adopted Conditional Waiver No. 4 (as part of Resolution R9-2007-0104; Waiver) on October 10, 2007, as mandated by state law and policy.

To comply under the Waiver, agricultural and nursery operations were required to form or join a monitoring group or submit an individual NOI by January 1, 2011. In addition to the general conditions listed in the Waiver, dischargers are required to implement monitoring programs to assess the impacts of discharges from irrigated lands. SDRILG's MRPP is prepared to address this general condition. Monitoring groups are required to submit a MRPP to the SDRWQCB by December 31, 2011. The Waiver was adopted in its current form for five years and is set to expire December 31, 2012.

The key questions that will be addressed by SDRILG throughout the life of the program are as follows:

1) Are beneficial uses being protected in waters of the state that receive discharges from members enrolled in the SDRILG, as a result of agricultural activities, as indicated by water quality conditions stated in the San Diego Basin Plan?
2) Based on monitoring information, what is the extent and magnitude of water quality issues, in relation to SDRILG's agricultural activities or the affects of agricultural activities?
3) What contributing sources from agriculture activities are impairing water quality in receiving water bodies?
4) What BMPs are being implemented by SDRILG to reduce impacts, and are these BMPs reducing the impacts from agricultural activities to waters of the State? Where are BMPs being applied?
5) Are water quality conditions improving, staying the same, or declining in receiving water bodies after the implementation of BMPs?

As the current Waiver is set to expire at they end of 2012, the entirety of these questions will not be able to be addressed during the first Waiver period. The first year of monitoring and assessment will be focused on providing baseline conditions at sampling sites selected for group monitoring. Until the next Waiver is released by the SDRWQCB, a long-term monitoring and water quality management plan will not be developed. However, the above questions should serve as a general basis for further actions and plans implemented by the SDRILG.

3.0 DESCRIPTION OF SAN DIEGO REGION AND AGRICULTURE

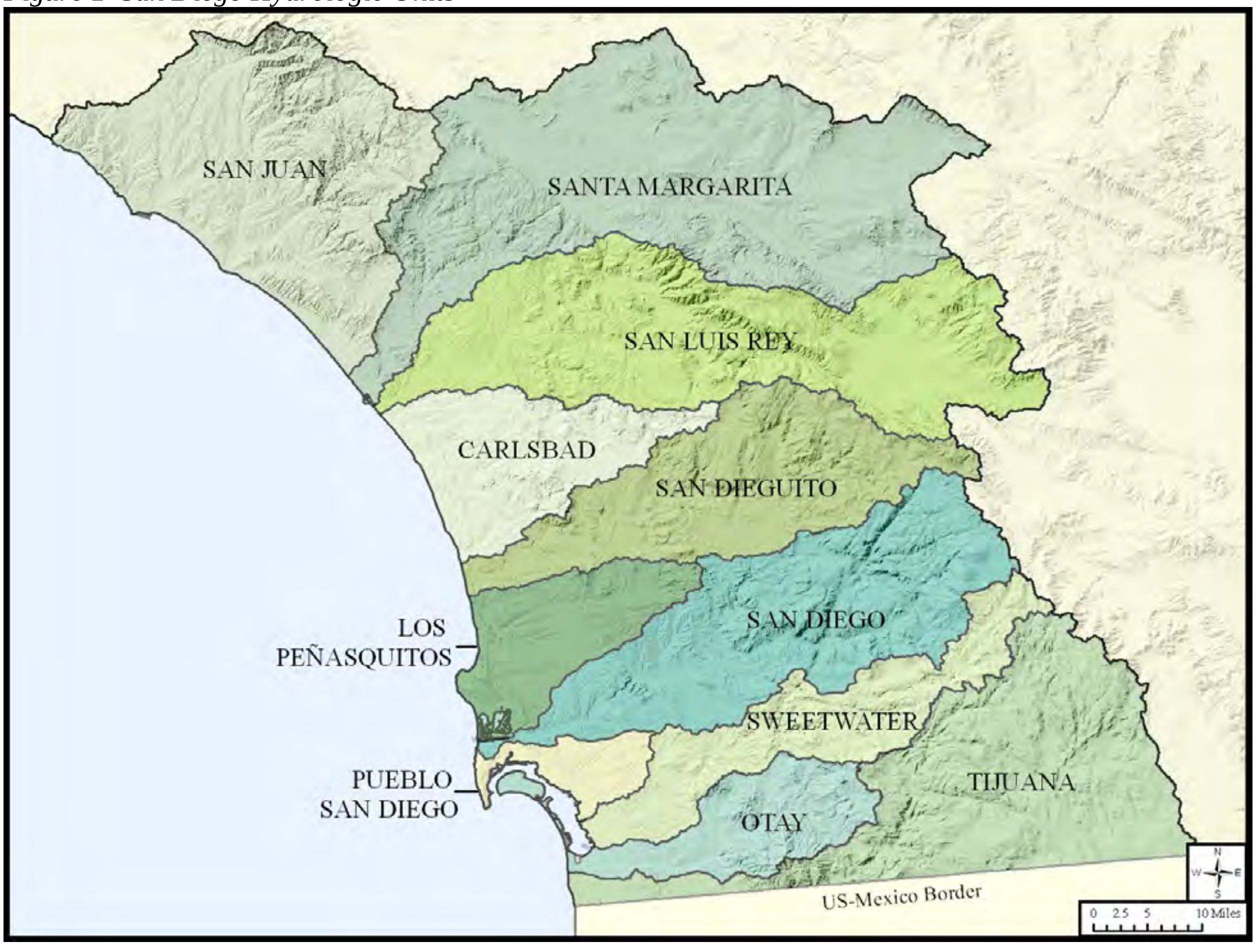
3.1 San Diego Region Geographical Setting

The San Diego Region includes watersheds south of the Santa Ana River and north of the Mexican border. It is bounded to north by a hydrologic divide that extends from Laguna Beach into the Cleveland National Forest, to the east by the Laguna Mountains and mountains in the Cleveland National Forest, to the south by the Mexican border, and to the west by the Pacific Ocean. It encompasses approximately 3,900 square miles, and contains most of San Diego County, and parts of southwestern Riverside County and southwestern Orange County.

The Region is located in the Peninsula Range Physiographic Province of California. It is generally divided into a coastal plain area, a central mountain-valley area, and an eastern mountain-valley area. The most prominent feature in the area is the northwest-trending Peninsula Range, which includes the Santa Ana, Agua Tibia, Palomar, Volcan, Cuyamaca, and Laguna Mountains. The climate in the area is generally an arid Mediterranean climate. The Region has an average temperature of approximately 65° Fahrenheit and an average precipitation of 10 to 13 inches per year, although precipitation in the mountainous areas can reach up to 45 inches a year. Generally speaking, precipitation and temperature variations increase as you head inland from the Pacific Ocean. The majority of the precipitation falls from November through February throughout the region. Surface and groundwater flow in the region is generally in an east to west direction towards the Pacific Ocean.

Hydrologically, the region is divided into 11 major hydrologic units, 54 hydrologic areas, and 147 hydrologic subareas. The major hydrologic units, listed from north to south, are: the San Juan, Santa Margarita, San Luis Rey, Carlsbad, San Dieguito, Los Penasquitos, San Diego, Pueblo San Diego, Sweetwater, Otay, and Tijuana. A map of the major hydrologic units is presented as Figure 1.

Figure 1 San Diego Hydrologic Units



Land use in the San Diego Region varies significantly. The majority of the coast consists of urban development, although undeveloped swatches of land lay in the northern county near Camp Pendleton Marine Base. Large portions of the interior of the region are open space, and agriculture exists throughout the region, but is concentrated in the San Luis Rey and San Dieguito watersheds. The approximate percentages of land use for the total watershed and each hydrologic unit are presented in Table 1.

Table 1 Land Use, San Diego Hydrologic Units

Watershed	Area (sq mile)	% Open	% Developed	% Agriculture
San Juan	496	92%	7%	1%
Santa Margarita	750	81%	13%	6%
San Luis Rey	560	61%	15%	24%
Carlsbad	211	38%	50%	12%
San Dieguito	346	18%	61%	21%
Los Penasquitos	162	43%	53%	4%
San Diego	440	72%	26%	2%
Pueble San Diego	56	12%	88%	0%
Sweetwater	230	67%	29%	4%
Otay	154	70%	20%	10%
Tijuana	463	90%	6%	4%
TOTAL	3868	68%	23%	9%

3.2 San Diego County Agriculture

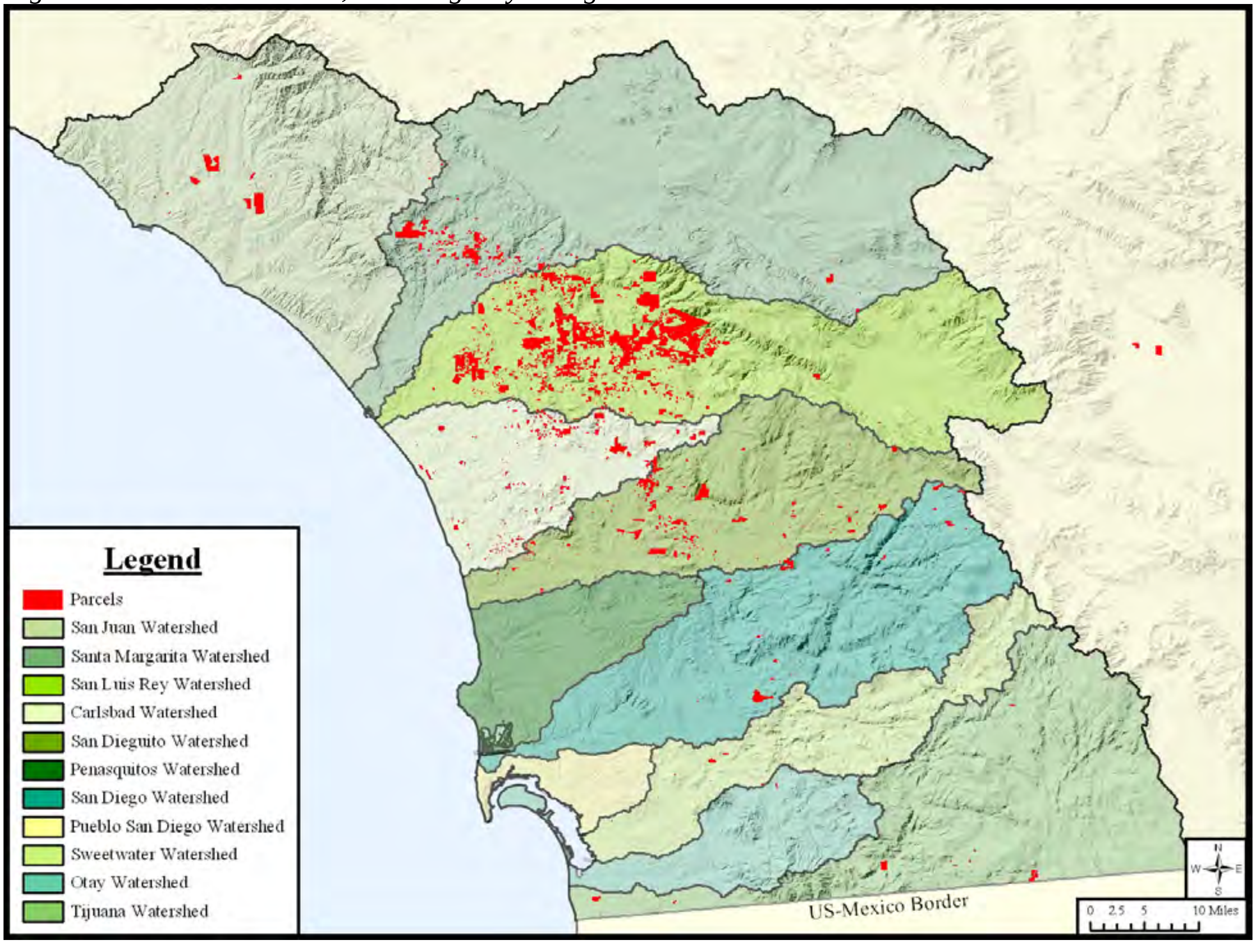
Based on 2010 County of San Diego, Department of Agriculture, Weights and Measures statistics, there was 302,713 total acres of agricultural in production in 2010. General range land accounted for approximately 240,630 of the reported acres, and is not covered under the Waiver. In decreasing order, the largest crops, by acre, were: total avocados, total citrus, nursery products, vegetables, and cut flowers. Generally speaking, total nursery and cut flower products were far and away the largest value of crops in the county, while total fruit and nuts (not including range land) accounted for the largest land area. Please note that these statistics are for San Diego County only, and do not account for land outside of the County lines but within the San Diego Regional Water Board boundaries.

The varied topography of the region creates numerous microclimates, which results in nearly 30 different types of vegetation communities and the ability to grow over 200 different agricultural commodities in the region. A unique aspect of San Diego County agriculture is that a large number of the agricultural community is made up of small farms. There are more farms in the county than any other county in the United States, and it is estimated that of the 6,687 farms in the county, 68% are between one and nine acres. The median size farm in the county is just 4 acres. The high cost of both land and water encourages many growers to raise products with a high dollar per acre value, and San Diego County produces the highest dollar value per acre of any county in California.

4.0 DESCRIPTION OF SDRILG

The SDRILG has members within all eleven of the major watersheds. However, the vast majority of growers and acreage is located within the San Luis Rey Hydrologic Unit (HU). A map presenting the location of SDRILG members throughout the San Diego Region is presented as Figure 2. The complete list of enrolled members is included as Appendix A.

Figure 2 SDRILG Enrollees, San Diego Hydrologic Units



For the purpose of the program, crop types in the group were broken into seven major subtypes: container nurseries; field grown nursery or floral crops; grapes, berries and vine fruit; greenhouse crops; row and field crops; tree fruit; and other. The majority of the acreage associated with the SDRILG falls within the tree crop category, which accounts for avocado and citrus fruits. Nursery operations, which account for the container, field grown or floral, and greenhouse subtypes, make up the second largest acreage in the group. Table 2 presents the enrolled total and irrigated acreage of SDRILG within each HU, acreage associated with each crop type in each HU, and the percentage of the crop associated with SDRILG membership.

Table 2 SDRILG Distribution and Crop Types

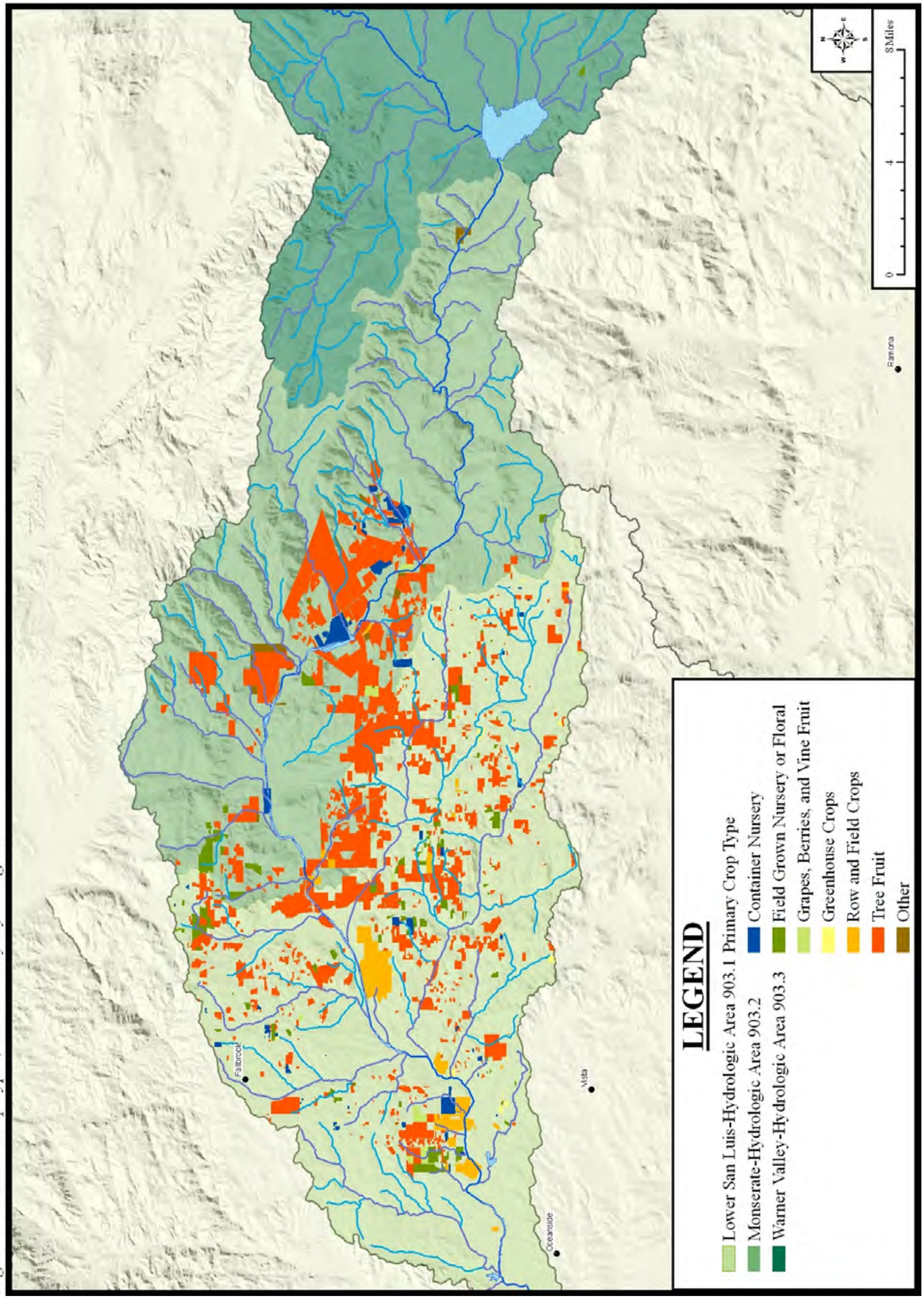
	Container Nursery	Field Nursery or Floral	Vine Fruit	Greenhouse Crops	Other	Row and Field Crop	Tree Fruit	**TOTAL ACRES**	**% TOTAL**
Irrigated Acreage									
TOTAL IRRIGATED ACRES	**2,155.26**	**2,073.61**	**530.75**	**175.47**	**191.89**	**1,320.42**	**25,020.36**	**31,467.76**	
San Juan Acreage	15.60	8.00	8.00	0.00	14.00	0.00	344.40	390.00	1.24%
Santa Margarita Acreage	244.16	133.30	17.00	3.39	1.00	42.00	2,257.59	2,698.44	8.58%
San Luis Rey Acreage	1,265.46	1,543.62	392.85	60.59	112.59	1,048.95	17,197.82	21,621.88	68.71%
Carlsbad Acreage	448.17	313.23	13.50	104.19	20.75	69.00	1,826.09	2,794.93	8.88%
San Dieguito Acreage	154.01	23.95	65.10	7.00	4.00	80.05	2,574.06	2,908.17	9.24%
Los Penasquitos Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.00%
San Diego Acreage	10.57	45.01	9.55	0.00	7.55	35.42	785.10	893.20	2.84%
Pueble San Diego Acreage	1.00	0.00	0.00	0.30	0.00	0.00	0.00	1.30	0.00%
Sweetwater Acreage	9.29	3.50	1.75	0.00	0.00	0.00	5.00	19.54	0.06%
Otay Acreage	0.00	3.00	3.00	0.00	0.00	0.00	28.00	34.00	0.11%
Tijuana Acreage	7.00	0.00	20.00	0.00	32.00	45.00	2.00	106.00	0.34%
% TOTAL	6.85%	6.59%	1.69%	0.56%	0.61%	4.20%	79.51%		

Table 2(cont) SDRILG Distribution and Crop Types

	Container Nursery	Field Nursery or Floral	Vine Fruit	Greenhouse Crops	Other	Row and Field Crop	Tree Fruit	**TOTAL ACRES**	**% TOTAL**
Total Acreage									
TOTAL ACRES	**3,021.00**	**3,435.87**	**1,646.87**	**492.02**	**1,901.27**	**3,288.58**	**40,548.11**	**54,333.72**	
San Juan Acreage	16.71	35.50	11.30	0.00	38.41	0.00	2,230.83	2,332.75	4.29%
Santa Margarita Acreage	387.16	392.44	131.47	7.44	111.39	203.06	3,815.40	5,048.36	9.29%
San Luis Rey Acreage	1,800.81	2,467.85	720.12	197.01	733.13	2,493.90	26,631.51	35,044.33	64.50%
Carlsbad Acreage	578.88	435.51	27.40	271.57	252.29	124.00	2,929.32	4,618.97	8.50%
San Dieguito Acreage	192.81	45.91	295.30	15.00	260.58	345.20	3,650.05	4,804.85	8.84%
Los Penasquitos Acreage	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.00%
San Diego Acreage	14.27	45.01	111.65	0.50	105.47	35.42	1,217.61	1,529.93	2.82%
Pueble San Diego Acreage	1.00	0.00	0.00	0.50	0.00	0.00	0.00	1.50	0.00%
Sweetwater Acreage	17.86	5.65	17.50	0.00	116.00	0.00	7.89	164.90	0.30%
Otay Acreage	0.00	8.00	15.13	0.00	0.00	0.00	40.00	63.13	0.12%
Tijuana Acreage	11.50	0.00	317.00	0.00	284.00	87.00	25.00	724.50	1.33%
% TOTAL	5.56%	6.32%	3.03%	0.91%	3.50%	6.05%	74.63%		

As is displayed on Table 2, the largest constituent of growers are located within the San Luis Rey Watershed, which accounts for approximately 68.7% of the irrigated acres and 64.5% of the total acres enrolled in the group. Due to the concentration of enrolled growers in the San Luis Rey HU, the SDRILG will focus monitoring efforts on the agricultural impacts to waterbodies in this HU. Figure 3 presents the crop types enrolled in the SDRILG throughout the San Luis Rey HU.

Figure 3 SDRILG Crop Types, San Luis Rey Hydrologic Area



5.0 SAN LUIS REY WATERSHED DESCRIPTION

5.1 San Luis Rey Hydrologic Unit

The San Luis Rey Hydrologic Unit, or San Luis Rey River Watershed (SLR), is located in northern San Diego County and is approximately 560 square miles. It includes the cities of Oceanside and Valley Center, and portions of Fallbrook and Camp Pendleton. Several Indian Reservations are located in the unit. The SLR is bordered to the north by the Santa Margarita Watershed, and is bordered to the south by the Carlsbad and San Dieguito Watersheds.

The main water body in the watershed is the San Luis Rey River, which is ephemeral and dry in the upper and middle reaches for most of the year. The river extends approximately 55 miles, and ultimately discharges to the Pacific Ocean in Oceanside. The San Luis Rey River originates primarily from the Palomar and Hot Springs Mountains, and is interrupted by Lake Henshaw, Henshaw Dam, and the Escondido Canal. Historically, when water is released from Henshaw Dam the Escondido Canal has diverted approximately 90% of the San Luis Rey River from the lower reaches to the Local Entities of the City of Escondito and the Vista Irrigation District. Flood flow in the river is typically limited to short durations. The majority of the river is unchannelized, except the lower seven miles, which are contained within a channel bounded by earthen levees on both sides and generally contains water year round.

The SLR is unique in the aspect that groundwater and surface water have become an integrated system, and are not hydrologically separate. Groundwater impairments can have an impact on surface water quality, and surface water quality impairments may directly influence groundwater quality. There are six shallow alluvial groundwater aquifers that are currently used for agricultural, industrial, and municipal supplies: Warner, Pauma, Pala, Bonsall, Moosa Canyon, and Mission Basin. Groundwater levels in these areas have a direct effect on surface flows present in the region. Additionally, much of the anthropogenic runoff is supplemented with Colorado River water, which inherently has a higher salt content and can affect groundwater conditions.

The SLR HU is comprised of three hydrologic areas (HA) and eleven hydrologic sub areas (HAS), which were delineated by the SDRWQCB based on drainage patterns. Figure 4 presents the HA and HAS located within the SLR HU, and Table 3 presents the acreage enrolled in each HA and HAS.

Figure 4 San Luis Rey Hydrologic Areas and Subareas

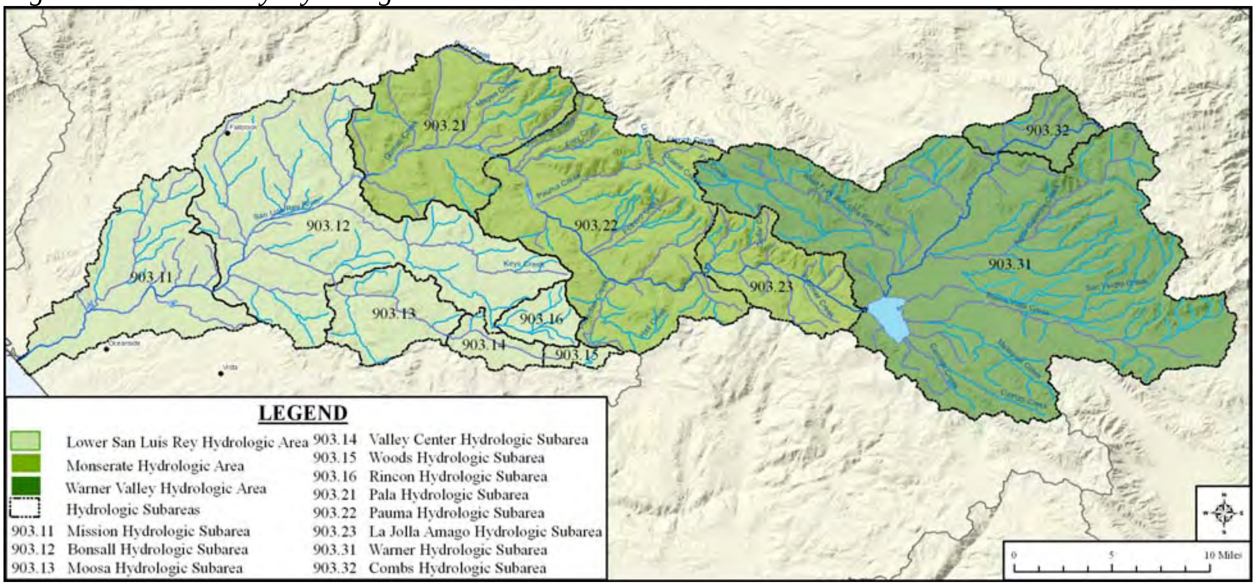


Table 3 SDRILG Distribution in San Luis Rey Hydrologic Unit

Hydrologic Unit	Hydrologic Area	Hydrologic Subarea Code	Hydrologic Subarea Name	Total Acreage	% Acreage	
San Luis Rey	Lower San Luis Rey	903.11	Mission	2,710.39	7.73%	54.95%
		903.12	Bonsall	13,924.04	39.73%	
		903.13	Moosa	1,784.46	5.09%	
		903.14	Valley Center	312.52	0.89%	
		903.15	Woods	135.99	0.39%	
		903.16	Rincon	389.64	1.11%	
	Monserate	903.21	Pala	5,507.61	15.72%	44.97%
		903.22	Pauma	10,136.12	28.92%	
		903.23	La Jolla Amago	114.87	0.33%	
	Warner	903.31	Warner	28.70	0.08%	0.08%
		903.32	Combs	0.00	0.00%	
				35,044.33		

5.1.1 Lower San Luis HA

The Lower San Luis HA is the furthest west (most downstream) watershed. From west to east, it contains the communities of Oceanside, the southern portion of Camp Pendleton, portions of Fallbrook, Bonsall, Hidden Valley, and Valley Center. Oceanside is the most densely populated and developed area, while Valley Center is a developing area mostly comprised of large lot, low density areas. Agriculture is prevalent throughout the region, and is often integrated near and within residential areas throughout the HA, increasingly as you travel east from Oceanside.

The Lower San Luis HA is broken into six HAS: Mission, Bonsall, Moosa, Valley Center, Woods, and Rincon. Moosa Creek originates in the Woods HAS, and passes through Valley Center, Moosa, and Bonsal HAS before merging with the San Luis Rey River. The south fork of Keys Creek originates in the Rincon HAS, and merges with the main stem of Keys Creek, which originates in the Bonsall HAS. Gopher Canyon, Ostrich Creek, and Live Oak Creek are additional tributaries in the Bonsall HAS, and Pilgrim Creek is the major tributary in the Mission HAS. Much of the flow in Moosa Creek and Keys Creek is influenced by anthropogenic uses, such as urban, landscaping, and agricultural runoff. The majority of the creeks in the HA are intermittent, with portions of Moosa Creek and Keys Creek maintaining perennial flow, depending on precipitation. Currently, the HAS most populated with SDRILG members is Bonsall.

5.1.2 Monserate HA

The Monserate HA extends from the western border of the Lower San Luis HA to below Henshaw Dam. It includes the small communities of Pala, Pauma Valley, and Rincon, and portions of the Pala, Pauma, La Jolla, Rincon, and Yuima Indian Reservations. The area is located in a valley, with tributaries to the San Luis Rey River generally running from mountains to the north and south. A large portion of the HA is undeveloped, and agriculture is the most dominant land use, with smaller residential areas scattered throughout. Industrial activity in the area historically consisted of sand and gravel mining, some of which occurred in-stream. Currently the Rosemary Mountain Quarry operates just to the east of Interstate 15 and directly north of the San Luis Rey River.

The Monserate HA is broken into three HAS: Pala, Pauma, and La Jolla Amago. Pala Creek is the major tributary in the Pala HAS; Pauma Creek, Agua Tibia Creek, Frey Creek, Paradise Creek and Hells Creek are the major tributaries in the Pauma HAS; and Cedar Creek and Lusardi Canyon are the major tributaries in the La Jolla Amago HAS. The vast majority of the creeks in the HA are intermittent, although portions of some streams will contain perennial flow, depending on precipitation and releases from Henshaw Dam. Currently, the HAS most populated with SDRILG members is Pauma.

5.1.3 Warner Valley HA

The Warner Valley HA is the furthest east, and contains the headwaters of the San Luis Rey, the Henshaw Dam and Henshaw Reservoir, and the Escondito Canal. It is generally high elevation brush and forest land, and the area drains directly to Lake Henshaw. The majority of the Warner Valley HA is undeveloped, with open space and rangeland the predominant land uses. Residences are sparsely scattered throughout the area, but the residential area is centered on and around Warner Springs. Although there is some agriculture also situated around Warner Springs, there are no SDRILG enrolled growers in the area.

The Warner Valley HA is also broken into two HAS: Warner and Combs. The West Fork of the San Luis Rey River, Agua Caliente Creek, Buena Vista Creek, San Ysidro Creek, and Carrita Creek are the major tributaries in the Warner HAS. Creeks in the area are primarily intermittent, although sections of the West Fork, Agua Caliente, and San Ysidro contain perennial flow. Currently, there is only 28.7 acres associated with the SDRILG located in the Warner Valley HA.

5.2 Beneficial Uses and Impaired Waterbodies

The San Luis Rey HU is listed for a number of beneficial uses, including: municipal; industrial; agricultural; freshwater replenishment; hydropower; recreation 1 and recreation 2; warm and cold freshwater habitats; wildlife habitats; spawning habitats; and rare, threatened, or endangered species habitats. Table 4 presents the beneficial uses of inland surface waters of the San Luis Rey, as determined by the SDRWQCB.

Table 4 Beneficial Uses, San Luis Rey Hydrologic Unit

INLAND SURFACE WATERBODY[1,2]	Hydrologic Unit	MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River	3.32	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Johnson Canyon	3.32	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
San Luis Rey River	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Canada Aguanga	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Dark Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Bear Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Cow Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Blue Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Rock Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Agua Caliente Creek	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
unnamed Tributary	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		**X**
Canada Agua Caliente	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Canada Verde	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Ward Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Lake Henshaw	3.31	See Resevoirs and Lakes Below														
West Fork San Luis Rey River	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		**X**
Fry Creek	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Iron Springs Creek	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		**X**
Buena Vista Creek	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Cherry Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**		**X**		
Bertha Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**		**X**		
Hoover Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**		**X**		
Buck Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**		**X**		
Bergstrom Canyon	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**		**X**		
San Ysidro Creek	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**		**X**		
Matagual Creek	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Carrizo Creek	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
Carrista Creek	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**		**X**		
Kumpohui Creek	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**		**X**		
San Luis Rey River	3.31	**X**	**X**	**X**			**X**	**X**	**X**	**X**		**X**	**X**	**X**		
San Luis Rey River	3.23	**X**	**X**	**X**				**X**	**X**	**X**		**X**	**X**	**X**		**X**
Wigham Creek	3.23	**X**	**X**	**X**				**X**	**X**	**X**		**X**	**X**	**X**		
Prisoner Creek	3.23	**X**	**X**	**X**				**X**	**X**	**X**		**X**	**X**	**X**		
Lusardi Canyon	3.23	**X**	**X**	**X**				**X**	**X**	**X**		**X**	**X**	**X**		
Cedar Creek	3.23	**X**	**X**	**X**				**X**	**X**	**X**		**X**	**X**	**X**		

Table 4 (cont.) Beneficial Uses, San Luis Rey Hydrologic Unit

INLAND SURFACE WATERBODY[1,2]	Hydrologic Unit	MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Luis Rey River	3.22	X	X	X				X	X	X		X	X	X		
Bee Canyon	3.22	X	X	X				X	X	X		X	X	X		
Paradise Creek	3.22	X	X	X				X	X	X		X	X	X		
Hell Creek	3.22	X	X	X				X	X	X		X	X	X		
Horsethief Canyon	3.22	X	X	X				X	X	X		X	X	X		
Potrero Creek	3.22	X	X	X				X	X	X		X	X	X		
Plaisted Creek	3.22	X	X	X				X	X	X	X	X	X	X		
Yuima Creek	3.22	X	X	X				X	X	X		X	X	X		
Sycamore Canyon	3.22	X	X	X				X	X	X		X	X	X		
Pauma Creek	3.22	X	X	X				X	X	X		X	X	X		X
Doane Creek	3.22	X	X	X				X	X	X		X	X	X		X
Chimney Creek	3.22	X	X	X				X	X	X		X	X	X		
French Creek	3.22	X	X	X				X	X	X		X	X	X		X
Lion Creek	3.22	X	X	X				X	X	X		X	X	X		X
Harrison Canyon	3.22	X	X	X				X	X	X		X	X	X		
Jaybird Creek	3.22	X	X	X				X	X	X		X	X	X		
Frey Creek	3.22	X	X	X				X	X	X		X	X	X		
Agua Tibia Creek	3.22	X	X	X				X	X	X		X	X	X		X
San Luis Rey River	3.21	X	X	X					X	X		X	X	X		
Marion Canyon	3.21	X	X	X					X	X		X	X	X		
Magee Creek	3.21	X	X	X					X	X		X	X	X		
Castro Canyon	3.21	X	X	X					X	X		X	X	X		
Trujillo Creek	3.21	X	X	X					X	X		X	X	X		
Pala Creek	3.21	X	X	X					X	X		X	X	X		X
Gomez Creek	3.21	X	X	X					X	X		X	X	X		
Couser Canyon	3.21	X	X	X					X	X		X	X	X		
Double Canyon	3.21	X	X	X					X	X		X	X	X		
Rice Canyon	3.21	X	X	X					X	X		X	X	X		
San Luis Rey River	3.12	O	X	X					X	X	X	X		X	X	
Live Oak Creek	3.12	O	X	X					X	X		X		X	X	
Keys Creek	3.12	O	X	X					X	X		X		X		
Moosa Canyon	3.15	O	X	X					X	X		X		X		
unnamed intermittent streams	3.16	O	X	X				X	X			X		X		
Moosa Canyon	3.14	O	X	X				X	X			X		X		

Table 4 (cont.) Beneficial Uses, San Luis Rey Hydrologic Unit

INLAND SURFACE WATERBODY[1,2]	Hydrologic Unit	MUM	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Moosa Canyon	3.13	**O**	**X**	**X**				**X**	**X**			**X**		**X**		
Turner Lake	3.13	See Resevoirs and Lakes Below														
South Fork Moosa Canyon	3.13	**O**	**X**	**X**				**X**	**X**			**X**		**X**		
Moosa Canyon	3.12	**O**	**X**	**X**				**X**	**X**			**X**		**X**		
Gopher Canyon	3.12	**O**	**X**	**X**				**X**	**X**			**X**		**X**		
South Fork Gopher Canyon	3.12	**O**	**X**	**X**				**X**	**X**			**X**		**X**		
San Luis Rey River	3.11	**O**	**X**	**X**				**X**	**X**			**X**		**X**		
Pilgrim Creek	3.11	**O**	**X**	**X**				**X**	**X**		**X**	**X**	**X**	**X**	**X**	
Windmill Canyon	3.11	**O**	**X**	**X**				**X**	**X**			**X**	**X**	**X**	**X**	
Tuley Canyon	3.11	**O**	**X**	**X**				**X**	**X**			**X**		**X**		
Lawerence Canyon	3.11	**O**	**X**	**X**				**X**	**X**			**X**		**X**		
Mouth of San Luis Rey River	3.11	See Coastal Waters Below														

RESEVOIRS AND LAKES	Hydrologic Unit	MUM	AGR	IND	PROC	GWR	FRSH	REC1	REC2	WARM	COLD	WILD	RARE	POW		
Turner Lake	3.13	**X**	**X**	**X**				**P**	**X**	**X**						
Lake Henshaw	3.31	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**		**X**	**X**	**X**		

COASTAL WATERS	Hydrologic Unit	IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Mouth of San Luis Rey River	3.11			**X**	**X**				**X**	**X**	**X**		**X**			

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

X Existing Beneficial Use
P Potential Beneficial Use
O Exempted from MUN

MUN	Municipal and Domestic Supply	WILD	Wildlife Habitat
AGR	Agricultural Supply	RARE	Rare, Threatened, or Endangered Species
IND	Industrial Service Supply	SPWN	Spawning, Reproduction, and/or Early Development
PROC	Industrial Process Supply	IND	Industrial service supply
GRW	Ground Water Recharge	NAV	Navigation
FRSH	Freshwater Replenishment	COMM	Commercial and sport fishing
POW	Hydropower Generation	EST	Estuarine habitat
REC1	Contact Water Recreation	MAR	Marine habitat
REC2	Non-Contact Water Recreation	AQUA	Aquaculture
WARM	Warm Freshwater Habitat	MIGR	Migration of aquatic organisms
COLD	Cold Freshwater Habitat	SHELL	Shellfish harvesting
BIOL	Preservation of Biological Habitats of Special Significance		

In the SLR HU, the San Luis Rey River south of Lake Henshaw and Keys Creek are on the 303(d) list. Figure 5 and Table 5 present the specific impairments associated with the watershed.

Figure 5 303 (d) Waterbodies, San Luis Rey Hydrologic Unit

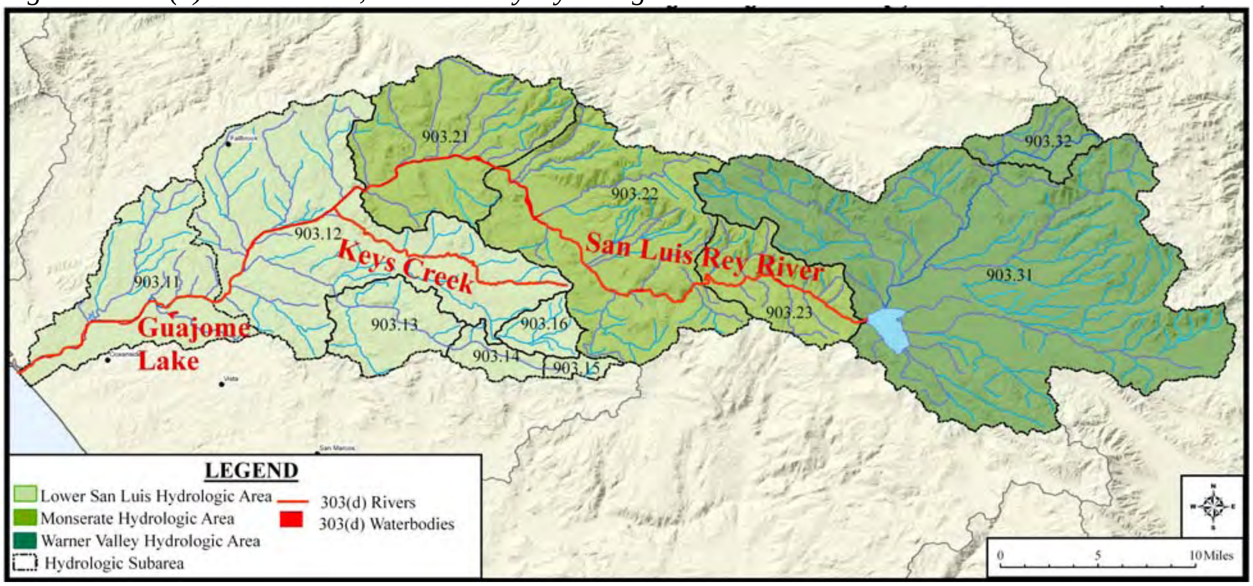


Table 5 303 (d) Listed Waterbodies, San Luis Rey Hydrologic Units

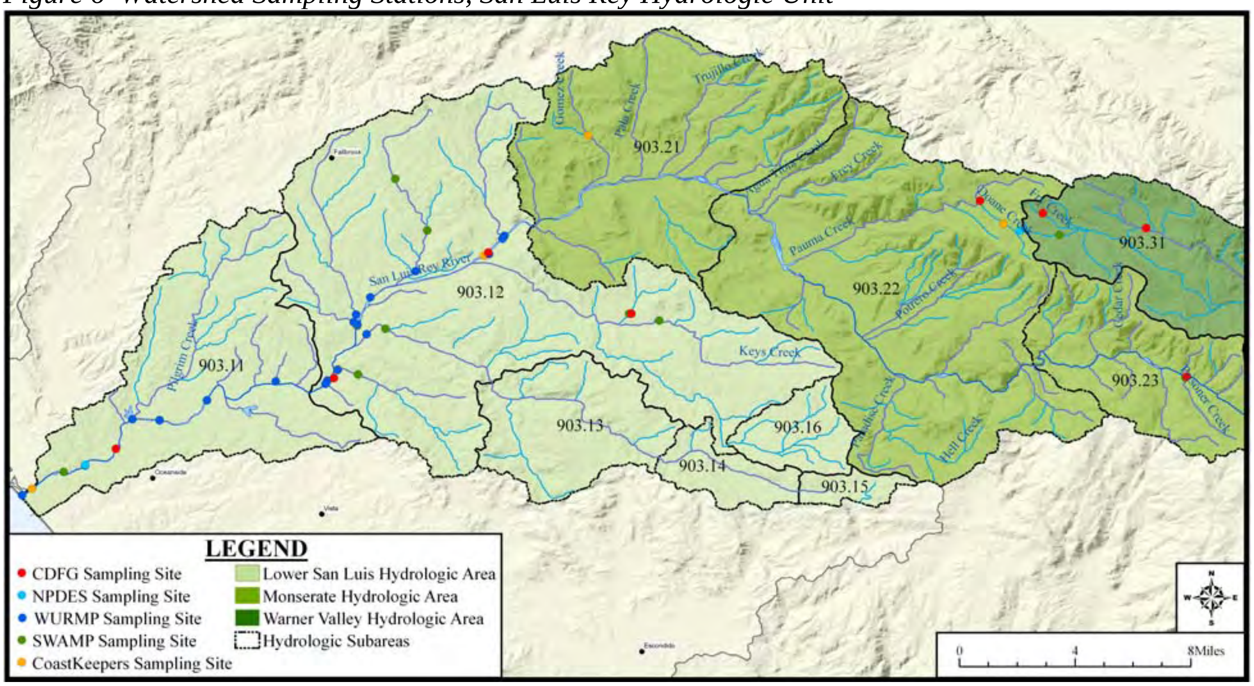
WATER BODY NAME	WATER BODY TYPE	HA	ESTIMATED SIZE	UNIT	POLLUTANT	POLLUTANT CATEGORY
Keys Creek	River & Stream	903.12	13	Miles	Selenium	Metals
SLR River, Upper[1]	River & Stream	903.12	35	Miles	Total Nitrogen as N	Nutrients
Guajome Lake	Lake & Reservoir	903.11	33	Acres	Eutrophic	Nutrients
Pacific Ocean Shoreline, at SLR River mouth	Coastal & Bay Shoreline	903.11	0	Miles	Enterococcus, Total Coliform	Pathogens
SLR River, Lower[2]	River & Stream	903.11	lower 13	Miles	Chloride	Salinity
SLR River, Lower[2]	River & Stream	903.11	19	Miles	Enterococcus, Fecal Coliform	Pathogens
SLR River, Lower[2]	River & Stream	903.11	19	Miles	Phosphorus, Total Nitrogen as N	Nutrients
SLR River, Lower[2]	River & Stream	903.11	19	Miles	Total Dissolved Solids	Salinity
SLR River, Lower[2]	River & Stream	903.11	19	Miles	Toxicity	Toxicity

1	East of Interstate 15	SLR	San Luis Rey
2	West of Interstate 15	HA	Hydrologic Area

5.3 Review of Current Monitoring Data in San Luis Rey

Currently, the SLR HU is being sampled by a number of programs, including, but not limited to: National Pollution Discharge Elimination System Permittees, the California Surface Water Ambient Monitoring Program, the Watershed Urban Runoff Management Program, the California Department of Fish and Game, and the San Diego Coastkeepers. While the sampling sites are spread throughout the HU, the majority of the sites focus on the San Luis Rey River, west of Interstate 15. Water quality impairments in this area have been extensively studied and well defined through the existing monitoring programs. Figure 6 displays the location of current and recent sampling sites that were monitored under the programs listed above.

Figure 6 Watershed Sampling Stations, San Luis Rey Hydrologic Unit



6.0 SAMPLING SITE SELECTION APPROACH

Based on the distribution of members and previous conversations with the SDRWQCB and its affiliates, SDRILG will focus on the SLR for the monitoring and sampling portion of the program from the onset. The SLR is the most representative population of growers and the most densely utilized area for the group.

Water samples will be collected from sites evenly distributed throughout the portions of the SLR that contain members associated with the SDRILG. The following criteria was used in the selection of sampling sites:

- Potential runoff characteristics;
- Watershed and Subwatershed representation;
- Proximity to members enrolled in the SDRILG;
- Previous or existing monitoring locations;
- Ultimate drainage into waterbodies listed on the 303 (d) list of impaired waterbodies;
- Types of crops grown near each site;
- Safety considerations for the sampling crew; and
- Access to sampling locations.

Sampling locations were not selected in major waterbodies located in the SLR. Previous programs have extensively studied the lower section of the San Luis Rey River (below Interstate 15), much of which is perennial, and the associated impacts have been well established. While impacts in Moosa Creek and Keys Creek have not been studied extensively, these tributaries drain large areas that may also be impacted by anthropogenic sources not related to agricultural operations. Discerning the direct agricultural contributions to impacts reported in these waterbodies would be difficult, if not impossible, due to the variety of uses that ultimately drain to the streams.

In general, sampling locations were selected in waterbodies that are primarily influenced and surrounded by agricultural land, in locations that will provide the most representative data on SDILG's potential impacts to the watershed. This will allow the SDRILG evaluate various growing areas, impacts directly related to agricultural operations, and to disseminate results throughout the group from these areas in order to implement Best Management Practices (BMPs) in the most efficient and practical manner. A background site was also selected upstream from agricultural operations in the San Luis Rey River, in order to determine the conditions of water primarily influenced by open space land prior to entering the portion of the watershed containing agricultural land. A residential background sample was not selected for the program, as other programs being conducted in the SLR are studying impact associated with residentially developed land.

Sampling locations were primarily selected at the lower ends of tributaries, or directly downstream from agriculturally drained areas. Much of the smaller tributaries, especially in the southern portion throughout the SLR, run through private land and would not be readily accessible without obtaining permission from multiple landowners to cross and sample streams on their land. With these considerations in mind, sampling sites were selected that were near public roads, and had unfettered access.

Water samples collected from the sites will be analyzed for constituents typically associated with agricultural activities, including suspended sediment and nutrients. Water sampling will be focused on the wet season. Field measurements and observations of the general stream conditions will be recorded as discussed in Section 9. Generated data will be compared to benchmarks set in the San Diego Basin Plan, where applicable, and estimated loading rates of contaminants of concern will be calculated to determine potential impacts to the watershed.

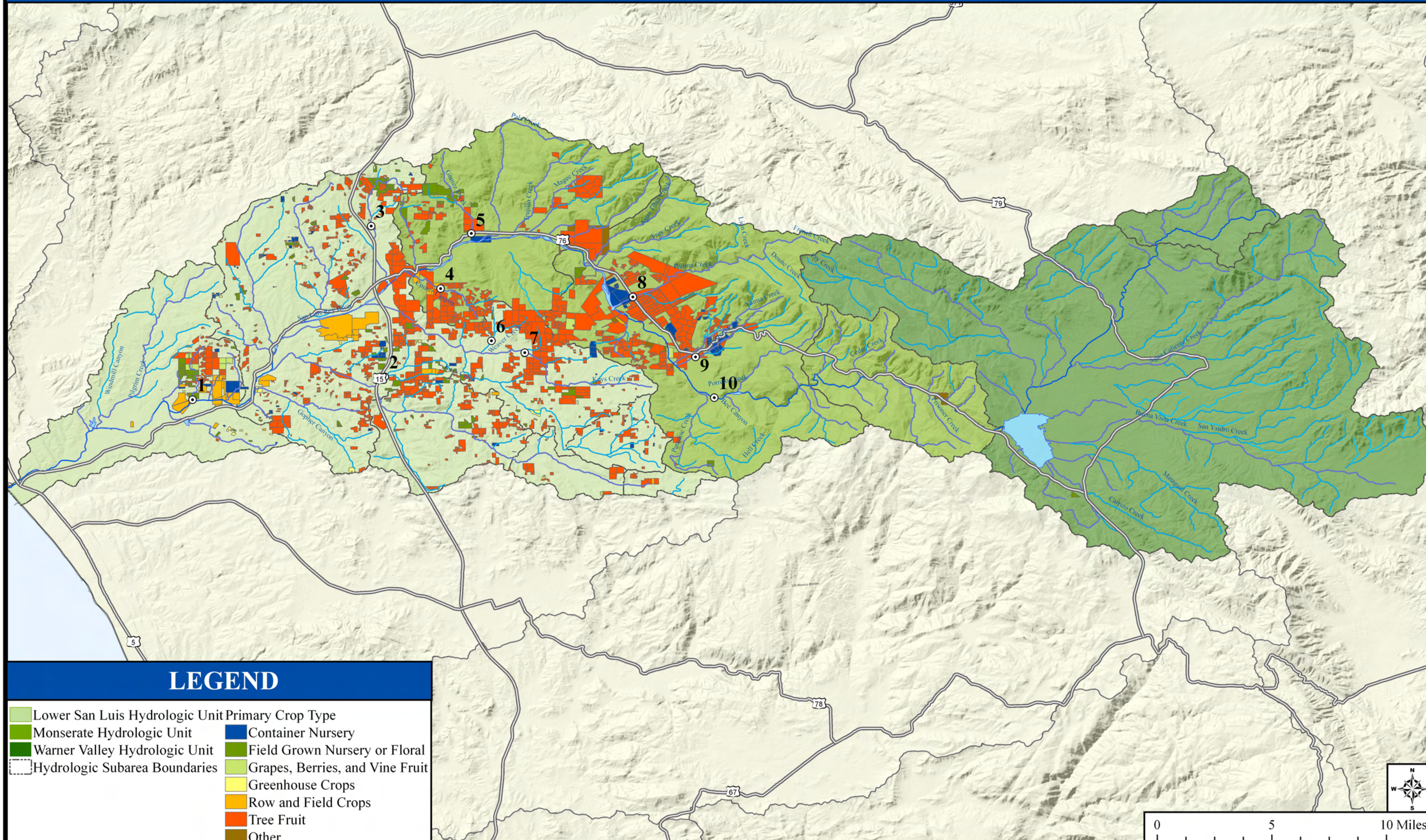
7.0 SAMPLING SITES

The SDRILG will collect water quality data at 10 sampling sites in the SLR. A regional map showing sampling locations, growing parcels enrolled in the SDRILG, blue stream waters in the region, and crop types in HA and HAS is presented as Figures 7 through 7.6. Table 6 presents information on the sample site locations.

Table 6 Sampling Sites, SDRILG

Sampling Site ID	Geographic Coordinates	San Luis Rey Hydrologic Sub-Area	Sampling River	City
SDRILG01	N 33^o 15’ 31.78” W 117^o 16’ 33.0”	903.11	San Luis Rey Unnamed Tributary	Oceanside, CA
SDRILG02	N 33^o 16’ 24.23” W 117^o 09’ 11.60”	903.12	Moosa Creek Tributary	Escondido, CA
SDRILG03	N 33^o 22’ 7.07” W 117^o 09’ 41.77”	903.12	San Luis Rey Unnamed Tributary	Fallbrook, CA
SDRILG04	N 33^o 19’ 44.73” W 117^o 07’ 4.48”	903.21	Couser Canyon	Valley Center, CA
SDRILG05	N 33^o 21’ 50.25” W 117^o 05’ 56.53”	903.21	Gomez Creek	Bonsall, CA
SDRILG06	N 33^o 17’ 46.32” W 117^o 05’ 8.83”	903.12	Weaver Creek	Valley Center, CA
SDRILG07	N 33^o 16’ 19.32” W 117^o 03’ 52.84”	903.21	Keys Creek Tributary	Valley Center, CA
SDRILG08	N 33^o 19’ 25.95” W 116^o 59’ 47.05”	903.22	Pauma Creek	Pauma Valley, CA
SDRILG09	N 33^o 17’ 9.43” W 116^o 57’ 22.18”	903.22	Potrero Creek	Pauma Valley, CA
SDRILG10	N 33^o 15’ 38.05” W 116^o 56’ 41.89”	903.22	San Luis Rey River	Valley Center, CA

Figure 7 SDRILG Sampling Stations and Surrounding Crop Type



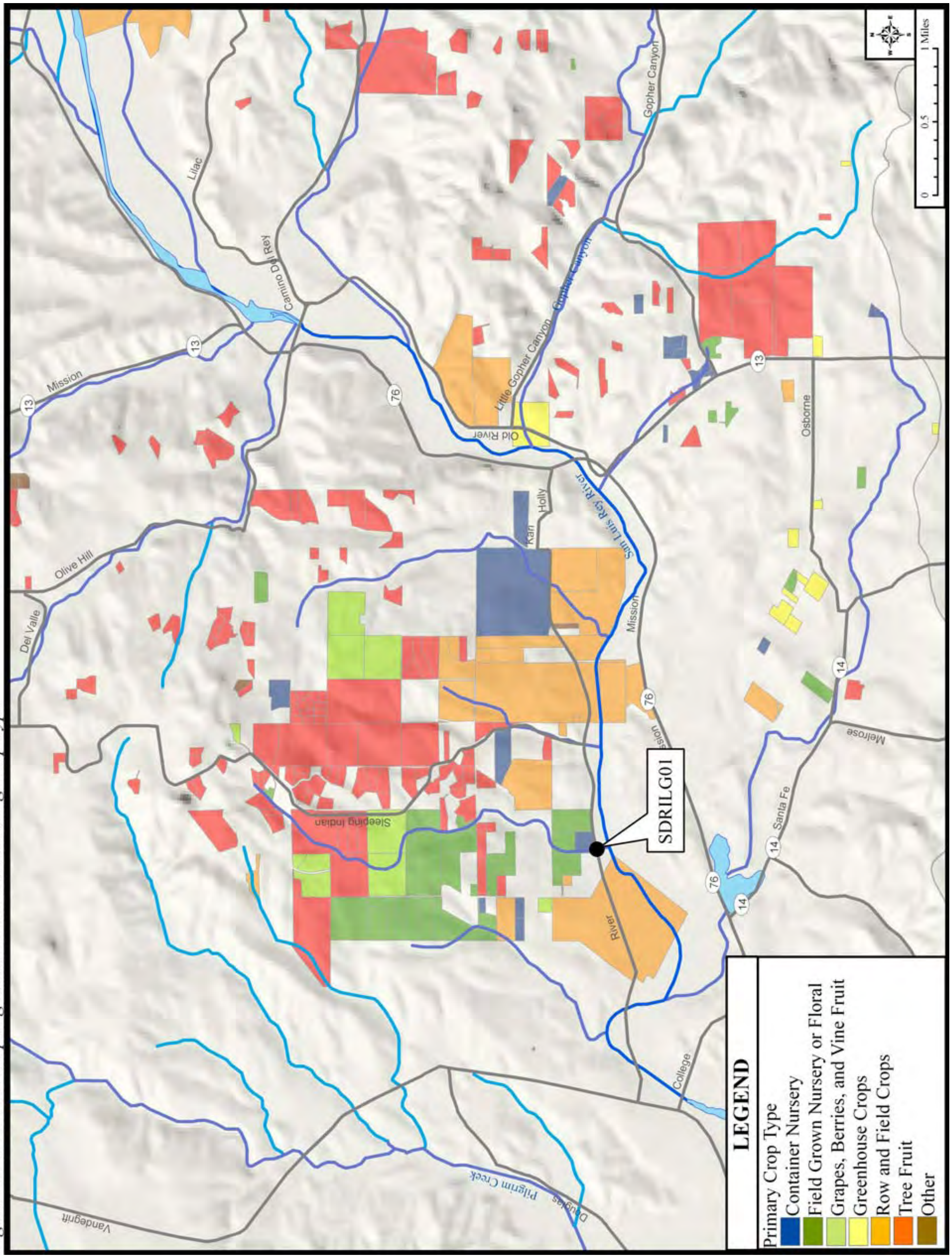


Figure 7.1 SDRILG Sampling Stations and Surrounding Crop Type

Figure 7.2 SDRILG Sampling Stations and Surrounding Crop Type

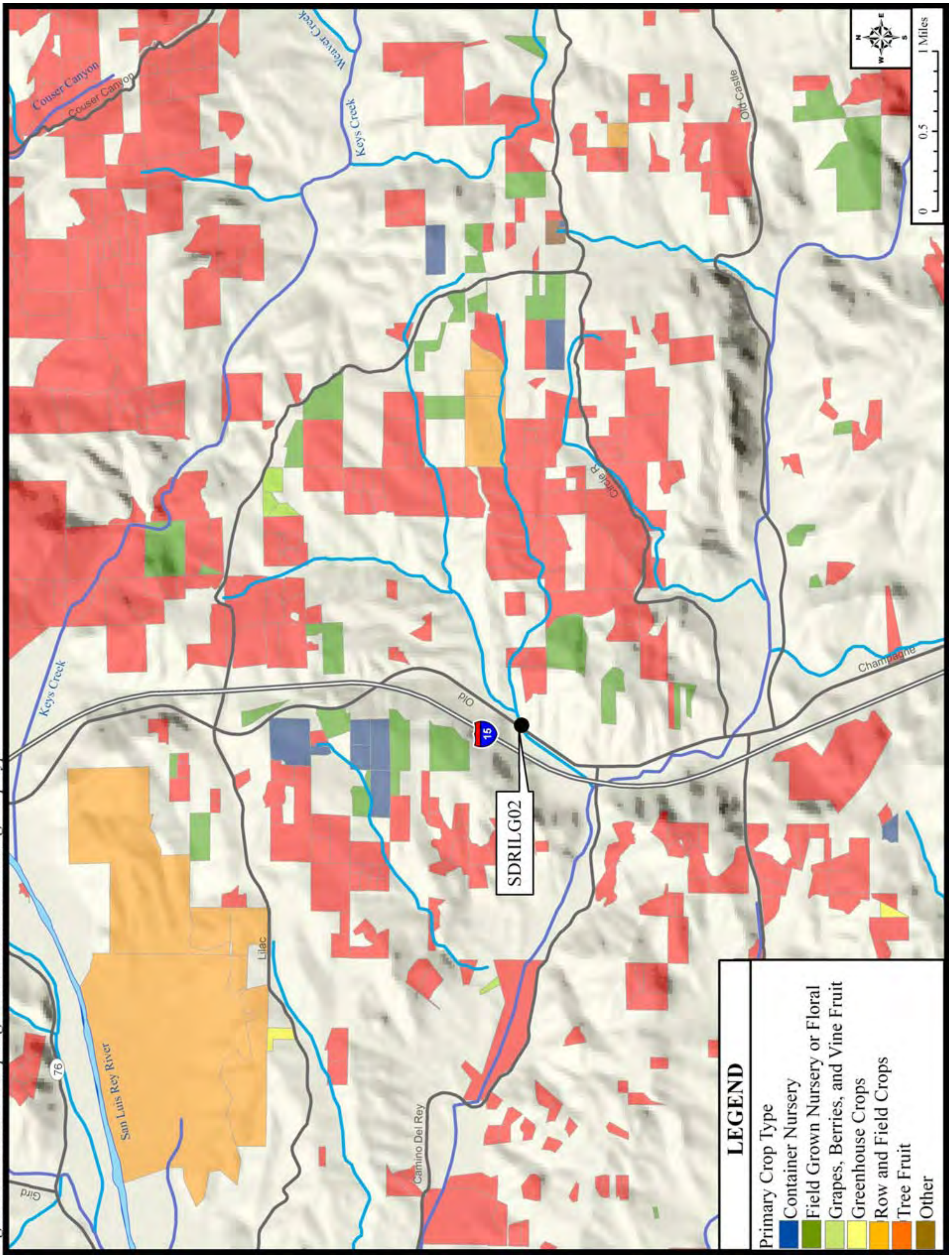


Figure 7.3 SDRILG Sampling Stations and Surrounding Crop Type

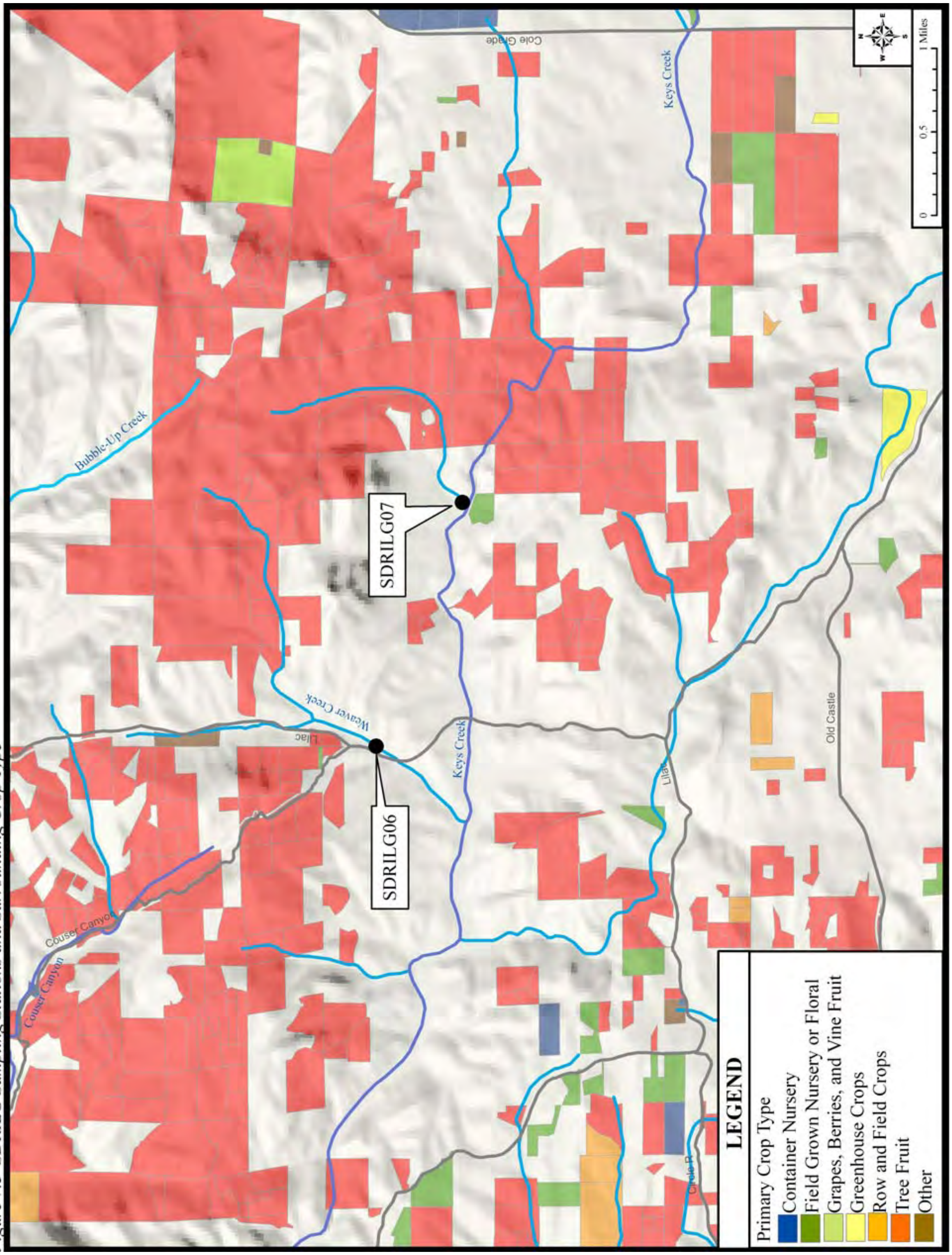


Figure 7.4 SDRILG Sampling Stations and Surrounding Crop Type

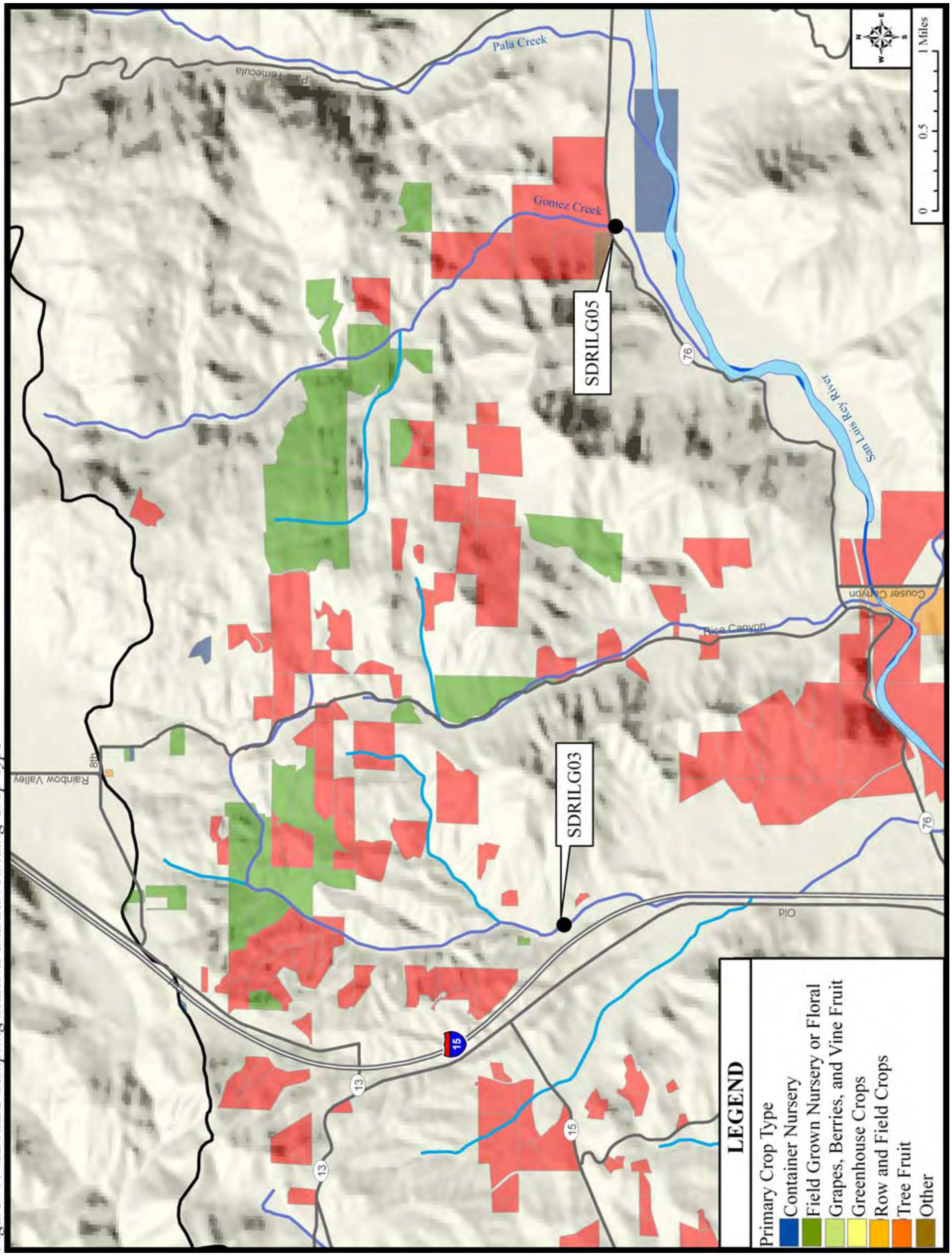


Figure 7.5 SDRILG Sampling Stations and Surrounding Crop Type

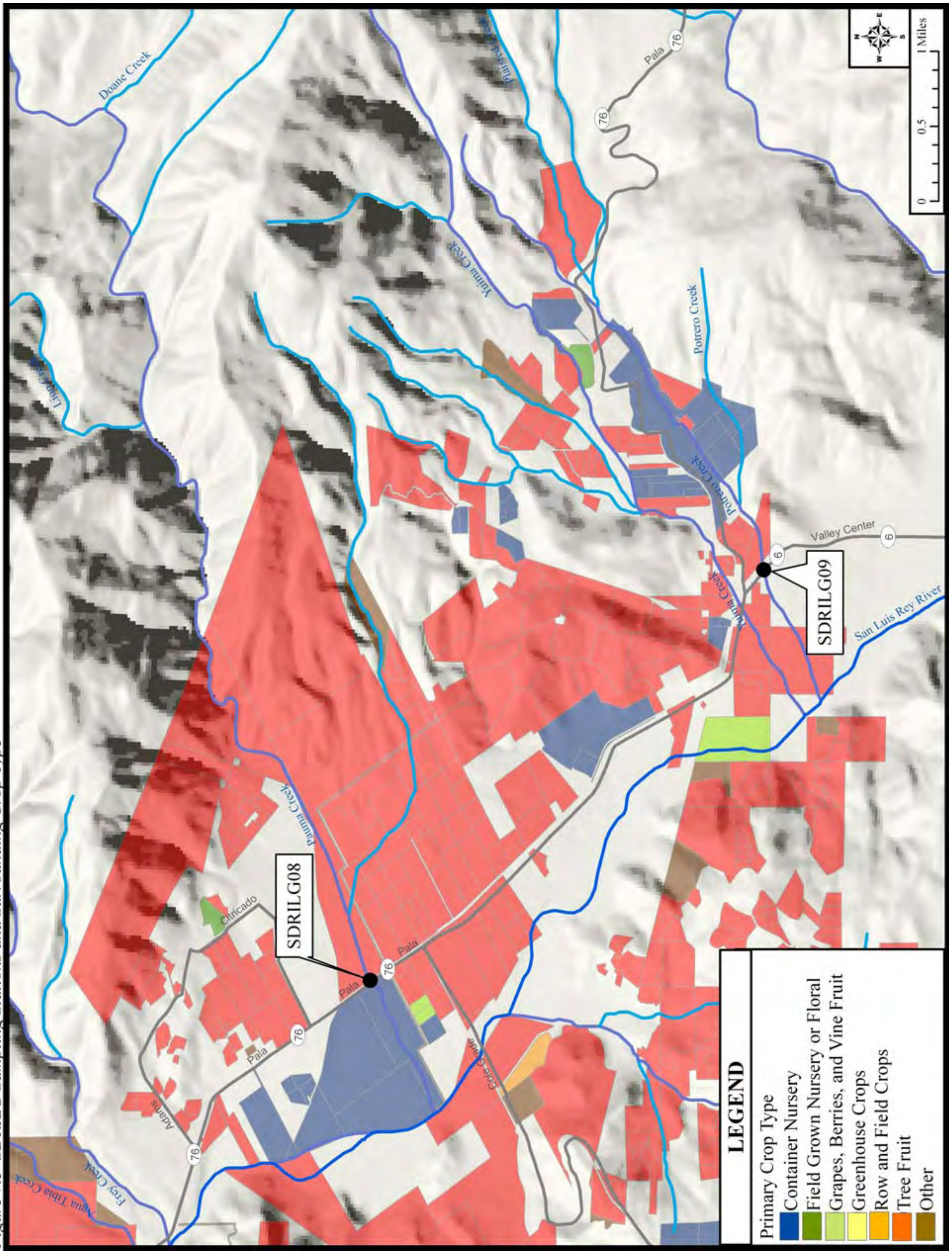
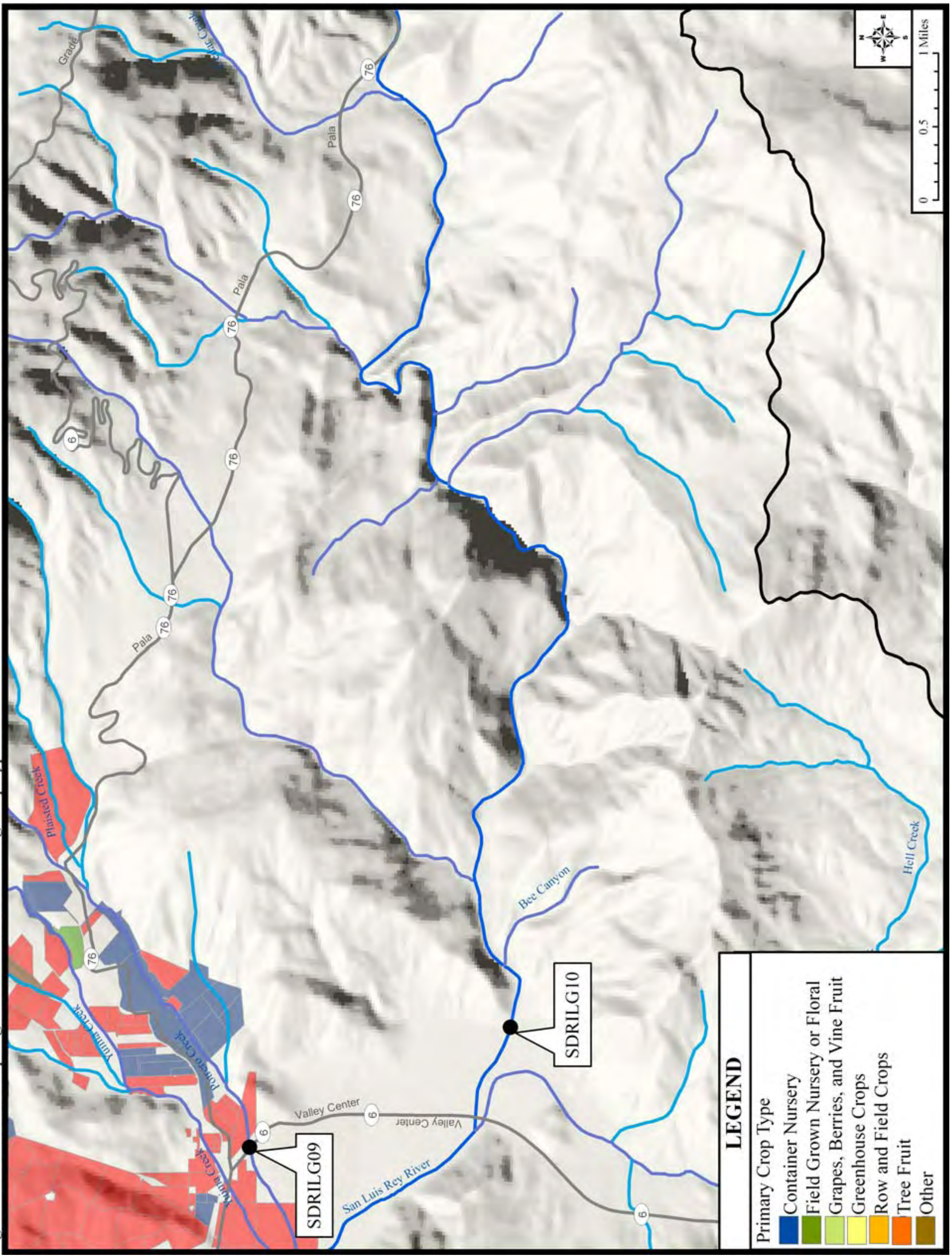


Figure 7.6 SDRILG Sampling Stations and Surrounding Crop Type



7.1 Sampling Site 1-SLR Unnamed Tributary

Station ID: SDRILG01
Sub basin: 903.11
Primary Crop Type Draining to Site: Field Grown Nursery or Floral
Nearest City: Oceanside
Stream Type: Intermittent or Ephemeral
Sample site GPS location:
N 33° 15’ 31.78” W 117° 16’ 33.0”

Nearest Cross Streets

North River Road and Wilshire Road.

Site Description

During the site visit on October 26, 2011, no running water was observed. The dry streambed was approximated to be 4 feet wide and 1-1 1/2 feet deep. The streambed contained a low to moderate amount of large rocks and a moderate amount of vegetation on the banks. Low hanging stream canopy cover appeared moderate to heavy.

Two large corrugated drainpipes (approximately 5 in feet diameter) channel the stream under North River Road. Locations directly up and down stream from the site are only accessible by wading in the stream, however heavy vegetation is present and there is evidence of periodic high flows.

7.2 Sampling Site 2-Moosa Creek Tributary

Station ID: SDRILG02
Sub basin: 903.12
Primary Crop Type Draining to Site: Tree Fruit
Nearest City: Bonsall
Stream Type: Perennial or Intermittent
Sample site GPS location:
N 33^{o} 16’ 24.23” W 117^{o} 09’ 11.60”

<u>Nearest Cross Streets</u>

Old Highway 395 and Nelson Way.

<u>Site Description</u>

During the site visit on October 27, 2011, running water was observed with low flow. The wet streambed was approximated to be 1-2 feet wide and ¼-½ foot deep. The streambed appeared absent of large boulders and contained a moderate to heavy amount of vegetation on the banks. Low hanging stream canopy cover appeared heavy.

A large corrugated drainpipe (approximately 8 feet in diameter) channels the stream under Highway 395. Locations directly up and down stream from the site are only accessible by wading in the stream, however heavy vegetation is present. A man made dam consisting of sand bags pools the creek on the west side of Old Highway 395.

7.3 Sampling Site 3-SLR Unnamed Tributary

Station ID: SDRILG03
Sub basin: 903.12
Primary Crop Type Draining to Site: Tree Fruit
Nearest City: Fallbrook
Stream Type: Perennial or Intermittent
Sample site GPS location:
N 33^{o} 22' 7.07" W 117^{o} 09' 41.77"

Nearest Cross Streets

Pankey Road and Stewart Canyon Drive.

Site Description

During the site visit on October 26, 2011, running water was observed with low flow. The wet streambed was approximated to be 4 feet wide and ½-1 foot deep. The streambed appeared absent of large boulders and contained a moderate amount of live tree roots and heavy vegetation on the banks. Low hanging stream canopy cover appeared heavy.

A corrugated drainpipe that would discharge water directly to the creek during rain events was located nearby. Locations directly up and down stream from the site are only accessible by wading in the stream, however heavy vegetation is present.

7.4 Sampling Site 4-SLR Unnamed Tributary

Station ID: SDRILG04
Sub basin: 903.21
Primary Crop Type Draining to Site: Tree Fruit
Nearest City: Bonsall
Stream Type: Perennial or Intermittent
Sample site GPS location:
N 33° 19’ 44.73” W 117° 07’ 4.48”

Nearest Cross Streets

Couser Canyon Road and Deseret Road.

Site Description

During the site visit on October 27, 2011, running water was observed with low flow. The wet streambed was approximated to be 6 feet wide and ½ foot deep. The streambed appeared absent of large boulders and contained a heavy amount of live tree roots and vegetation on the banks. Low hanging stream canopy cover appeared heavy.

The streambed crosses a concrete paved portion of Deseret Road. Locations directly up and down stream from the site are not accessible due to heavy vegetation.

7.5 Sampling Site 5-Gomez Creek

Station ID: SDRILG05
Sub basin: 903.21
Primary Crop Type Draining to Site: Field Grown Nursery or Floral / Tree Fruit
Nearest City: Pala
Stream Type: Intermittent or Ephemeral
Sample site GPS location:
N 33° 21’ 50.25” W 117° 05’ 56.53”

Nearest Cross Streets

Highway 76, dirt road approximately 0.25 miles west of Rancho Luna Ranch Road.

Site Description

During the site visit on October 26, 2011, no running water was observed. The dry streambed was approximated to be 5-8 feet wide and ½-1 foot deep. The streambed ranged from only sand to portions with moderate amount of large rocks, and had contained a moderate amount of vegetation on the banks. Low hanging stream canopy cover ranged from sparse to heavy.

Signs of human influences (drain pipes, diversions, concrete channels, etc.) were not noted in or near the stream channel. The creek passes directly under a bridge on Highway 76. Locations directly up and down stream from the site are only accessible by wading in the stream. The right bank south of Highway 76 appears to be eroding, and evidence of periodic high flows is evident.

7.6 Sampling Site 6-Weaver Creek

Station ID: SDRILG06
Sub basin: 903.12
Primary Crop Type Draining to Site: Tree Fruit
Nearest City: Valley Center
Stream Type: Perennial or Intermittent
Sample site GPS location:
N 33^o 17’ 46.32”   W 117^o 05’ 8.83”

<u>Nearest Cross Streets</u>

Lilac Road and Old Lilac Road.

<u>Site Description</u>

During the site visit on October 27, 2011, running water was observed with low flow. The wet streambed was approximated to be 5 feet wide and ½-1 foot deep. The streambed appeared absent of large boulders and contained a heavy amount of live tree roots and vegetation. Low hanging stream canopy cover appeared very heavy and made access to the streambed unlikely. Samples will need to be collected from the Lilac Bridge using a drop sampler, or another access point directly up or down stream will need to be found.

Signs of human influences (drain pipes, diversions, concrete channels, etc.) were not noted in or near the stream channel. The majority of the stream channel appears inaccessible near the sampling location.

7.7 Sampling Site 7-Keys Creek Tributary

Station ID: SDRILG07
Sub basin: 903.21
Primary Crop Type Draining to Site: Tree Fruit
Nearest City: Valley Center
Stream Type: Perennial or Intermittent
Sample site GPS location:
N 33^{o} 17’ 19.32” W 117^{o} 03’ 52.84”

Nearest Cross Streets

Keys Creek Road, dirt turnoff approximately 0.1 miles east of Gentle Oaks Trail.

Site Description

During the site visit on October 27, 2011, running water was observed with low flow. The wet streambed was approximated to be 2 feet wide and 1/4 foot deep. The streambed appeared absent of large boulders and contained a moderate amount of live tree roots and moderate to heavy vegetation. Low hanging stream canopy cover appeared moderate to heavy up and down stream.

Signs of human influences (drain pipes, diversions, concrete channels, etc.) were not noted in or near the stream channel. Locations directly up and down stream from the site are easy accessible by wading in the stream.

7.8 Sampling Site 8-Pauma Creek

Station ID: SDRILG08
Sub basin: 903.22
Primary Crop Type Draining to Site: Tree Fruit
Nearest City: Pauma Valley
Stream Type: Intermittent or Ephemeral
Sample site GPS location:
N 33^o 19' 25.95" W 116^o 59' 47.05"

Nearest Cross Streets

Highway 76, bridge crossing labeled Pauma Creek, approximately 0.15 miles northwest of Grassy Meadow Road.

Site Description

During the site visit on October 26, 2011, no running water was observed. The stream channel was approximately 60 feet wide and 10-15 feet deep at its maximum point. The streambed is rocky and the banks moderately vegetated. The stream transitions to a concrete channel as the streambed passes beneath Highway 76. Stream cover is sparse to nonexistent, with the exception of the freeway bridge.

Locations directly up and down stream from the site are accessible along the stream. Wading may not to be safe during high flows.

7.9 Sampling Site 9-Potrero Creek

Station ID: SDRILG09
Sub basin: 903.22
Primary Crop Type Draining to Site: Container Nursery
Nearest City: Pauma Valley
Stream Type: Intermittent or Ephemeral
Sample site GPS location:
N 33^{o} 17’ 9.43 W 116^{o} 57’ 22.18”

Nearest Cross Streets

Co Highway S6, bridge crossing, near Valley Circle Road.

Site Description

During the site visit on October 26, 2011, no running water was observed. The dry streambed was approximated to be 10 feet wide and 1 foot deep. The streambed was rocky at intervals and contained a moderate amount of woody shrubs and dry grasses. Stream cover appeared was sparse with some large trees.

The streambed passes through a concrete lined channel as it passes under the Highway S6 freeway. Locations directly up and down stream from the site are accessible along the stream.

7.10 Sampling Site 10-Background, Open Space

Station ID: SDRILG10
Sub basin: 903.22
Primary Crop Type Draining to Site: Open Space
Nearest City: Pauma Valley
Stream Type: Perennial
Sample site GPS location:
N 33^o 15’ 38.05” W 116^o 56’ 41.89”

Nearest Cross Streets

North Calac Road, dirt road crossing river approximately 0.4 miles south of Morales Road.

Site Description

During the site visit on October 26, 2011, running water was observed with moderate flow. The wet streambed was approximated to be 6-8 feet wide and ½-1 foot deep. The streambed contained sparse large boulders and contained a moderate amount vegetation. Water conditions were noted to be clear. Stream cover appeared sparse to nonexistent.

Signs of human influences (drain pipes, diversions, concrete channels, etc.) were not noted in or near the stream channel, except where North Calac Road passes through the river. Locations directly up and down stream from the site are accessible along the stream. There is evidence of periodic high flows in the area, and wading may not be safe during high flows.

8.0 SAMPLING SCHEDULE

The field studies will be initiated once the Notice of Applicability is received from the SDRWQCB. The seasons will be broken into the wet season and the dry season. In conformance with similar monitoring programs throughout the State, the wet season is from October 1 – April 30, and the dry season is from May 1 – September 30. As the majority of the sampling sites are located within intermittent, ephemeral streams, sampling will only be conducted during the wet season. Wet season samples will be conducted following the first rain event with at least 1.0 inches of rain.

In order to identify the storm events large enough to trigger a wet season monitoring event, a third party weather forecasting service will be contracted to monitor the 10-day forecast for the sampling region. Once a rain event starts, data provided by the weather forecasting service will be used to evaluate when a threshold of 1.0 inch of rain throughout the sampling area has been met. Once the rain threshold has been met, sampling personnel will be mobilized for sample collection. If required, sampling events may be initiated on weekends as well as weekdays; however, sampling will not be performed during late nighttime hours due to safety concerns involving field crews. If 1.0 inch of rain has fallen but the rain event has ceased, SDRILG will evaluate if there is enough potential runoff to yield sufficient water for sampling based on communications with contacts in the area.

The primary tasks presented in this MRPP are the collection of field data and the reporting of monitoring results to the SDRWQCB. Table 7 shows an anticipated schedule for when monitoring will be conducted and when annual reports demonstrating the monitoring results are due to the SDRWQCB.

Table 7 Anticipated Schedule for Monitoring and Reporting

TASK	SCHEDULE	ANTICIPATED SAMPLING SCHEDULE	NUMBER OF SAMPLING EVENTS
Submit NOI	January 1, 2011		
Submit MRPP and QAPP	January 1, 2012		
Conduct Monitoring	Schedule starts two weeks after receipt of NOA	October 1- April 30	1
Submit MPR	Reporting period ends Septebmer 30. Report due by December 31, 2012.		

9.0 FIELD MONITORING AND LABORATORY ANALYTICAL METHODS

9.1 MONITORING AND SAMPLING PROCEDURES

Although no specialized training is required, field sampling employees have received training in water sampling techniques as outlined in ASTM standard D3370 and SWAMP guidelines for surface water collection; are 40-hour HAZWOPR certified under CCR Title 8, Section 5192 guidelines and 29 CFR (Code of Federal Regulations) 1910.120; and have received first aid and CPR training. Standard Operating Procedures (SOPs) for inputting data on field sheets, collecting field measurements, and the collection of water samples that are applicable to this MRPP will follow the guidelines outlined in the *Marine Pollution Studies Laboratory – Department of Fish and Game Standard Operating Procedures for Conduction Field Measurements and Field Collections of Water and Bed Sediment Samples in the Surface Water Ambient Monitoring Program* (Appendix B; parts not applicable are omitted). An in-house refresher course will be undertaken prior to sampling on a yearly basis. The Project Manager and the QA Officer will supervise training.

Field Observations and Records

Field data sheets will be utilized to record field observations, sampling information, water measurements, stream characteristics, and flow at each sampling station. Each sampling station will have a dedicated field logbook that contains the field data sheets, maps of the site, directions to and from sample locations, and copies of all pertinent SOPs and guidelines. The original copies and digital copies of field logbooks will be kept on-file for future review.

General observation that are included on the field data sheets include: the dominant substrate, wadeability, wind speed and direction (Beaufort scale), picture identification, odors, weather, water and stream appearance, precipitation amounts, sampling method, sampling crew, sampling coordinates, hydromodifications, biological activity, sample location and personnel access to the stream, stream characteristics, and any other pertinent information, as determined by the sampling crew. Sampling information, including the time of sampling, sample code, station ID, analysis and matrix type, project ID, and date will be recorded on the field data sheets and verified to match the COC submitted for laboratory samples collected at the site. The field data sheets to be utilized during the duration of the program are included in Appendix C. Detailed information on the SOPs for recording data and information on the field data sheets is included in Appendix B.

Sample Collection

Sample containers will be provided by Weck, certified clean, and delivered to field personnel before each sampling event. The sample containers will be properly labeled, and the labels completed before filling the container with sample water. Water samples will be collected prior to collecting field measurements, to limit unnatural disturbances to the stream. When feasible, based on stream conditions, samples will be collected as grabs by filling the container directly from the most completely mixed portion of the stream flow (generally the centroid of the stream). For sampling containers that do not contain a preservative agent, this will be accomplished by directly submerging the container approximately 0.1 meters (4 inches) below the water surface, opening, filling, and recapping the container while submerged. If the stream depth is less than 0.1 meters, samples will be collected from the surface. Sample containers that are pre-prepped with preservatives will not be directly submerged in the stream. An intermediary sampling bottle or devise will collect the sample under the aforementioned conditions, and the contents of the bottle and/or devise will be immediately transferred to the preserved sample container.

All intermediary containers will be pre-cleaned prior to sample collection, in between sampling stations, and blank QAQC samples will be collected from the equipment, as outlined in the QAPP for this program. The Chain of Custody (COC) for each sample will be completed in the field, and water samples will be stored at the appropriate temperature and delivered to the laboratory for analysis within the allocated time for each sample type, as outlined in the QAPP. Please refer to Appendix B for a more in-depth discussion of sample collection procedures.

Field Measurements

The recording of field measurements will take place after water sample collection has been undertaken at the site. A multiparameter probe will be utilized to collect routine field measurements, such as dissolved oxygen, pH, electrical conductivity, temperature, and turbidity. When feasible, based on stream conditions, field measurements will be collected by directly submerging the probe approximately 0.2 meters (8 inches) in the most completely mixed portion of the stream flow (generally the centroid of the stream). The probe will be allowed to equilibrate for at least one minute, and measurements will be recorded in triplicate approximately one minute apart. If measurements are not able to be conducted in-stream, stream water will be transferred to an intermediary container for measurements. When utilizing an intermediary devise, care must be taken to ensure that the container is at the same temperature of the stream, is shaded from sunlight and breezes, and that the probe is allowed to equilibrate. Please refer to Appendix B for a more in-depth discussion of collecting field measurements with a multiparameter probe.

Flow measurements will be collected at each site to determine the potential loading of contaminants of concern at each sampling station. Any sampling station located near an active United States Geological Survey (USGS) gauging station will utilize information from the flow gauge height and communications with the USGS to determine the flow in the stream. If there are no nearby USGS flow gauges, instantaneous flow measurements will be recorded and calculated in the stream.

Instantaneous flows will be calculated using an electromagnetic meter or a vertical axis meter (AA and Pygmy types), a top-setting wading rod, and a tape measure. Prior to taking measurements, a reach of the stream will be selected with straight, laminar, bank to bank flow and an even streambed that has a limited amount of turbulence, back eddies, and dead water areas, to the extent practical. A flat cross section of the streambed will be generated by measuring the stream width, dividing the width into flow cross sections, and locating the midpoint of each cross section. Flow measurements will then be taken at the midpoint of each cross section, at depths outlined in the SOP. A detailed description of calculating instantaneous flow, including determining cross sections, measuring velocity, recording measurements, and calculating flow is included in Appendix B.

9.2 SAMPLING CONSTITUENTS

Table 4 presents a listing of the constituents to be tested under the Waiver monitoring program. Field measurements and laboratory Analytical methods for each constituent shall be US Environmental Protection Agency Standard or Approved Methods. A detailed description of monitoring constituents, reporting requirements, and QAQC parameters is presented in the QAPP.

Table 8 List of Constituents for Testing

CONSTITUENT	UNITS	FIELD/LABORATORY TEST
Total Phosphorous (TP)	mg/L	Laboratory
Orthohosphate (as P)	mg/L	Laboratory
Nitrate as N (NO_3)	µg/L	Laboratory
Nitrate + Nitrite (Sum as N)	mg/L	Laboratory
Nitrite (as nitrogen)	µg/L	Laboratory
Ammonia as N	mg/L	Laboratory
Total Kjeldahl Nitrogen	mg/L	Laboratory
Chloride	mg/L	Laboratory
Sulfate	mg/L	Laboratory
Total Disolved Solids	mg/L	Laboratory
Total Suspended Solids	mg/L	Laboratory
pH	pH units	Field
Temperature	°C	Field
Dissolved Oxygen	mg/L	Field
Conductivity	µS/cm	Field
Flow Volume	cfs	Field
Flow Velocity	ft/sec	Field
Stream Depth and Width	ft	Field
Percent Canopy Cover Over Stream	%	Field
Water Turbidity	NTU	Field

mg/l	milligrams per liter
µg/L	micrograms per liter
°C	degrees Celsius
NTU	nephalitic turbidity units
µS/cm	micro Siemens
ft	feet

9.3 QUALITY ASSURANCE QUALITY CONTROL

In addition to regular samples, equipment blanks, field blanks, and field duplicates will be used to ensure data quality. The laboratory will also employ the use of method control blanks, laboratory duplicates, laboratory control samples and surrogates, matrix spikes, matrix spike duplicates, and surrogate spikes. Matrix Spikes, matrix spike duplicates, equipment blanks, field blanks and field duplicates will be collected at a frequency of one per 20 normal samples, or one per sampling event or lab batch, whichever is greater. The laboratory will report the results of the equipment blank, field blank, and the field duplicate along with the results of the regular field samples.

The SDRILG will follow procedures outlined by SWAMP to ensure the quality of the field monitoring data. Additionally, sampling teams will conduct a pre-field meeting prior to completing sampling events to review sampling protocol and site specific considerations, to ensure the field data is most representative of actual watershed or surface water conditions. A detailed description of quality assurance quality control methods is presented in the QAPP.

10.0 DATA MANAGEMENT AND REPORTING

10.1 FIELD DOCUMENTS

Prior to collecting water samples, sample identification labels will be completed. Labels will be applied directly after the collection of samples at each location. During field monitoring and sampling, the SDRILG will record monitoring data and the required COC documentation in the field, including visual inspections and observations of the conditions of the monitoring sites. An example of the COC documentation to be used during the project is included in Appendix D. Once the field monitoring is completed, the field records will be entered into a computer database immediately following completion of field activities. Copies will be submitted to the SDRWQCB upon request. Handwritten copies of the field records will be filed and maintained following data entry.

10.2 MONITORING PROGRAM REPORT

The Monitoring Program Report (MPR) will include data collected up to September 30 of each calendar year, and will be submitted to the SDRWQCB by December 31 of each year. Any data collected from September 30 to December 31 will be included in the subsequent year's monitoring report. The MPR will contain, at a minimum, the following components:

1. Introduction: title page, table of contents, description of group membership, updated membership list, and objectives of MPR.
2. Monitoring: location of samples collected, descriptions and photographs of sampling sites, location map of sampling sites and enrolled growers, constituents monitored and frequency, objective, and analytical methods.
3. Results and Discussion: tabulated data, summary of data to demonstrate compliance or non-compliance, comparison of data to basin plan goals, quality control results, data interpretation.
4. Quality control data interpretation and affirmation that analyses were with the QA limits, as stated in the QAPP.
5. Perjury Statement.
6. Conclusion and recommendations.
7. References and Appendices including, but not limited to, copies of field data/sample log sheets, COC forms and laboratory and field quality control samples results.

10.3 CHAIN OF CUSTODY DOCUMENTATION

Upon collection of samples in the field, the Field Technician will complete standard COC documentation in the field, recording the sample identification, site location/address, sample time, and the required analytical suite. The COC documents will be maintained and kept with the samples upon transport to Weck. Once the samples are delivered to the laboratory, the SDRILG will release the samples to a laboratory representative and retain a copy of the COC record. This copy will be maintained in the SDRILG files.

10.4 LABORATORY ANALYTICAL RESULTS

Analytical data from the laboratory will be included in the MPR. Data will be tabulated and maintained in an electronic database, and digital and hard copies of the original reports will be maintained on file for future review. All data that does not meet the Quality Control and Quality Assurance parameters outline in the QAPP will either be flagged and considered estimated, or flagged as unusable with an explanation, and will not be utilized for data interpretation.

10.5 USABLE DATA, PROGRAMS NOT ASSOCIATED WITH SDRILG

Any data not collected directly by SDRILG, but used as reference or to assist in evaluating the watershed, will be verified to comply with requirements outlined in the QAPP and this MRPP. Collected watershed sampling data that does not conform to SWAMP or comparable standards will not be utilized by SDRILG. All data that is collected outside of the SDRILG program will be noted as such on all applicable reports.

11.0 REFERENCES

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APPENDIX A

ENROLLED MEMBERS
SAN DIEGO REGION IRRIGATED LANDS GROUP

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
112	C419896	1852604600	4.00	2.00	Field Grown Nursery or Floral
112	C419896	1852604800	6.00	4.00	Field Grown Nursery or Floral
112	C419896	1852604700	14.00	12.00	Field Grown Nursery or Floral
116	C402763	1820720900	17.00	6.00	Greenhouse Crops
117	C786950	2900901700	55.00	5.00	Tree Fruit
118	ME70681	2761301700	7.00	1.00	Tree Fruit
119	C665677	1322800700	9.00	3.00	Container Nursery
120	C182378	2256616200	2.00	2.00	Tree Fruit
121	W251887	1072903100	2.00	2.00	Tree Fruit
122	C753595	1691900900	2.00	1.00	Greenhouse Crops
123	C990672	7601704500	40.00	25.00	Field Grown Nursery or Floral
124	C664853	2770413900	10.00	9.00	Tree Fruit
124	C664853	2770414000	11.00	11.00	Tree Fruit
125	C180838	2760806400	6.00	4.00	Tree Fruit
126	C181813	277050011	16.00	7.00	Tree Fruit
127	C182232	2660921300	2.00	1.00	Tree Fruit
131	C182637	2324910200	5.00	1.00	Grapes, Berries, and Vine Fruit
132	C182454	1084410100	9.00	9.00	Tree Fruit
133	C182616	2671471900	2.00	1.00	Tree Fruit
134	C708214	1073704400	10.00	4.00	Container Nursery
134	C708214	1073704500	2.00	1.00	Container Nursery
135	C182425	1270903300	8.00	7.00	Tree Fruit
135	C182425	1270903500	6.00	4.00	Tree Fruit
136	ME97580	1274901300	4.00	2.00	Tree Fruit
137	C182463	1071704400	2.00	1.00	Field Grown Nursery or Floral
138	C905729	1223100200	4.00	4.00	Tree Fruit
139	C182688	1321700300	3.00	3.00	Container Nursery
139	C182688	1321703800	10.00	10.00	Container Nursery
139	C182688	1321703900	10.00	10.00	Container Nursery
139	C182688	1322300400	38.00	35.00	Container Nursery
139	C182688	1322802700	4.00	4.00	Container Nursery
139	C182688	1322802800	4.00	2.00	Container Nursery
140	C512985	2761004900	7.00	0.00	Tree Fruit
141	0026274	1812602500	2.00	2.00	Container Nursery
141	0026274	1812602600	2.00	2.00	Container Nursery
141	0026274	1812004900	3.00	2.00	Container Nursery
141	0026274	1812005000	3.00	2.00	Container Nursery
141	0026274	1812005100	3.00	2.00	Container Nursery
143	C182365	1332032400	2.00	2.00	Tree Fruit
144	C182625	1291621100	30.00	8.00	Tree Fruit
145	C182248	1212601300	2.00	2.00	Tree Fruit
146	C574454	1274000100	3.00	3.00	Tree Fruit
146	C574454	1274000200	2.00	2.00	Tree Fruit
147	C531794	2771111500	10.00	5.00	Tree Fruit
148	C622865	1213210600	1.49	0.75	Container Nursery
148	C622865	1213220100	4.83	2.90	Container Nursery
148	C622865	1213220200	4.85	3.70	Container Nursery
148	C622865	1213220300	1.92	1.50	Container Nursery

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
148	C622865	1213221800	2.60	1.75	Container Nursery
148	C622865	1213210900	5.18	3.50	Container Nursery
148	C622865	1213221600	1.29	0.95	Greenhouse Crops
148	C622865	1213221700	1.01	0.75	Greenhouse Crops
149	C893035	2791511700	4.00	2.00	Other
149	C893035	2791511800	4.00	2.00	Tree Fruit
150	C846481	1875402800	14.00	12.00	Container Nursery
152	C180785	1290802100	44.00	19.00	Tree Fruit
152	C180785	1290802400	24.00	19.00	Tree Fruit
154	C182034	1057612500	3.00	2.50	Tree Fruit
155	C180761	1330601000	22.51	12.00	Container Nursery
155	C180761	1330602700	15.45	10.00	Container Nursery
155	C180761	1330603100	17.73	10.00	Container Nursery
155	C180761	1330603300	33.80	0.00	Container Nursery
155	C180761	1330603400	8.51	8.51	Container Nursery
155	C180761	1330603500	10.22	0.00	Container Nursery
155	C180761	1330603600	14.31	10.00	Container Nursery
155	C180761	1330603700	113.45	57.49	Container Nursery
155	C180761	2370905100	5.00	5.00	Container Nursery
155	C180761	2371003800	6.00	6.00	Container Nursery
155	C180761	2371003910	9.00	9.00	Container Nursery
157	C180660	1300905300	25.52	3.00	Row and Field Crops
157	C180660	1300905500	59.39	25.00	Tree Fruit
158	C182549	1292913300	4.25	3.00	Tree Fruit
159	C182440	1021805600	4.70	4.00	Tree Fruit
160	C783581	1853420300	29.50	4.00	Tree Fruit
161	C867299	1111004600	2.74	2.30	Tree Fruit
162	C880176	1213120600	10.00	10.00	Tree Fruit
162	C880176	1890211000	43.37	43.37	Tree Fruit
163	C182649	2861012000	6.30	1.00	Grapes, Berries, and Vine Fruit
164	9752470	1272808100	14.49	12.00	Tree Fruit
165	C772802	1741420700	1.00	1.00	Container Nursery
166	9752470	1272808200	10.20	10.20	Tree Fruit
167	W251726	1212010300	2.70	2.00	Tree Fruit
168	C182415	1272710500	8.00	6.00	Tree Fruit
169	W251758	2670101300	1.00	1.00	Tree Fruit
171	W250136	1222800900	5.50	5.00	Tree Fruit
172	C901721	1210905600	2.83	2.00	Tree Fruit
172	C901721	1243405000	8.93	8.93	Tree Fruit
172	C901721	1243405100	2.02	2.02	Tree Fruit
172	C901721	1243405200	3.77	3.77	Tree Fruit
172	C901721	1243405300	63.36	63.36	Tree Fruit
173	C182223	1025800600	21.00	4.80	Tree Fruit
174	C990434	1272902000	18.89	6.00	Tree Fruit
175	C292428	2411801100	30.00	7.50	Tree Fruit
176	C182030	2780304700	8.86	2.00	Tree Fruit
177	C182268	1850901500	20.00	12.00	Tree Fruit
178	C182543	1274401400	3.00	1.00	Row and Field Crops

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
179	C564069	1721902400	1.00	1.00	Greenhouse Crops
179	C564069	1742408400	1.00	1.00	Greenhouse Crops
179	C564069	1781703000	4.00	3.00	Greenhouse Crops
179	C564069	1822004900	7.00	4.00	Greenhouse Crops
180	C182396	1271510100	4.00	4.00	Tree Fruit
181	C789137	1020820200	33.00	2.00	Field Grown Nursery or Floral
181	C789137	1020820400	72.00	5.00	Field Grown Nursery or Floral
181	C789137	1853410300	2.80	2.00	Field Grown Nursery or Floral
181	C789137	1853410400	2.80	2.00	Field Grown Nursery or Floral
181	C789137	1853410700	2.80	2.00	Field Grown Nursery or Floral
182	C781029	1050204900	7.09	4.50	Tree Fruit
183	8978712	1822302400	1.81	0.50	Container Nursery
183	8978712	1822302500	9.59	3.00	Container Nursery
184	C182393	1054911800	2.00	1.00	Tree Fruit
184	C182393	1954911700	2.00	1.00	Tree Fruit
185	5723440	1283300700	16.00	16.00	Tree Fruit
186	C182533	2671202100	10.00	10.00	Tree Fruit
187	C182244	1013614100	4.70	3.50	Tree Fruit
188	C182261	2650621500	11.84	3.60	Tree Fruit
189	C181976	1332020700	17.00	9.00	Tree Fruit
190	C876405	1852307300	17.00	8.00	Tree Fruit
191	C905671	1700901300	1.50	1.00	Field Grown Nursery or Floral
191	C905671	1702500700	3.50	3.00	Field Grown Nursery or Floral
191	C905671	1270714100	4.00	3.00	Field Grown Nursery or Floral
191	C905671	1270714200	4.00	3.00	Field Grown Nursery or Floral
191	C905671	1270714300	4.00	3.00	Field Grown Nursery or Floral
191	C905671	1270714400	4.00	3.00	Field Grown Nursery or Floral
192	C182361	1311502600	22.04	22.04	Tree Fruit
192	C182361	1311502700	15.00	2.00	Tree Fruit
193	C944643	2841410900	3.75	1.25	Grapes, Berries, and Vine Fruit
193	C944643	2841510500	8.75	3.50	Tree Fruit
194	C713904	1072902900	3.50	3.00	Tree Fruit
195	C180864	1853900100	19.80	9.00	Tree Fruit
196	C182567	2814903600	5.75	3.00	Grapes, Berries, and Vine Fruit
197	C181887	1323203000	30.00	27.00	Container Nursery
197	C181887	1323520100	30.00	27.00	Container Nursery
197	C181887	1323520200	44.00	30.00	Container Nursery
198	W251868	1212209100	3.75	3.00	Tree Fruit
199	C182402	1021800900	12.60	8.00	Tree Fruit
200	C643066	2341604400	2.10	1.10	Tree Fruit
201	C182557	1021044600	6.36	2.00	Row and Field Crops
202	A031049	1322202500	41.00	22.00	Other
203	C182285	1275123200	9.00	8.00	Tree Fruit
204	C733747	1232003500	1.32	1.00	Container Nursery
205	C182343	1073102300	2.50	1.00	Tree Fruit
206	C181644	1222802100	2.91	1.50	Tree Fruit
206	C181644	1222802200	2.62	2.50	Tree Fruit
206	C181644	1222802400	3.16	3.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
207	C990124	5961803600	6.00	6.00	Container Nursery
208	C180863	1012904900	5.08	5.08	Field Grown Nursery or Floral
208	C180863	1012903200	9.81	9.00	Tree Fruit
208	C180863	1012904000	7.12	6.00	Tree Fruit
208	C180863	1012905000	4.85	4.00	Tree Fruit
209	ME65063	1026103200	3.19	2.10	Tree Fruit
210	C739928	1293906700	3.00	1.00	Tree Fruit
210	C739928	1293903800	15.00	10.00	Tree Fruit
211	C899491	1027321300	10.00	8.00	Tree Fruit
212	C899491	1014401200	14.00	13.00	Tree Fruit
212	C899491	1015720400	41.00	34.00	Tree Fruit
212	C899491	1020713100	15.50	14.00	Tree Fruit
212	C899491	1020713200	8.70	7.00	Tree Fruit
212	C899491	1020713300	8.00	7.00	Tree Fruit
212	C899491	1242031500	3.00	1.00	Tree Fruit
213	C182277	1021805900	16.00	8.00	Tree Fruit
214	W251827	1271110200	5.00	1.00	Tree Fruit
215	C182361	1311501200	1.29	1.00	Tree Fruit
216	C182294	1281011800	1.50	1.00	Tree Fruit
216	C182294	1281011900	3.50	3.00	Tree Fruit
218	C777848	2543621300	1.00	1.00	Container Nursery
218	C777848	2543621400	2.00	2.00	Container Nursery
218	C777848	2543624500	1.00	1.00	Container Nursery
218	C777848	2620412500	1.50	1.00	Container Nursery
218	C777848	7601654500	1.00	1.00	Container Nursery
219	C180854	1093201800	7.00	1.00	Container Nursery
220	C182363	1024402000	1.20	0.30	Tree Fruit
220	C182363	1024404100	3.63	3.33	Tree Fruit
220	C182363	1024404200	2.12	2.12	Tree Fruit
221	C770003	1060512300	12.00	9.00	Tree Fruit
222	C182284	1281704200	2.68	2.68	Tree Fruit
222	C182284	1281704300	2.75	2.75	Tree Fruit
223	C182516	1014602200	8.93	4.60	Tree Fruit
235	C777799	1274204300	5.00	3.00	Tree Fruit
236	C182523	1290802200	20.00	20.00	Tree Fruit
237	1639129	2683200100	53.00	47.00	Tree Fruit
238	C665133	1283104900	2.00	1.00	Tree Fruit
239	C292009	1030103100	3.50	2.50	Field Grown Nursery or Floral
240	C182392	1275902700	4.50	4.00	Tree Fruit
241	9236844	1891713400	37.00	14.00	Tree Fruit
241	9236844	1290915600	16.00	10.00	Tree Fruit
242	C182482	1283103400	7.00	3.00	Tree Fruit
243	C361349	1285210400	27.00	17.00	Tree Fruit
244	H061261	2371600600	9.77	1.00	Tree Fruit
245	C182031	1860423100	5.40	4.00	Tree Fruit
246	C180714	1021043900	3.01	1.00	Container Nursery
247	C182650	1290700700	9.22	9.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
248	C182569	1000000000	8.70	3.50	Tree Fruit
249	C291937	1054724800	5.34	4.00	Tree Fruit
250	C182453	2641103400	3.00	3.00	Container Nursery
251	C990379	7601076000	128.00	110.00	Field Grown Nursery or Floral
251	C990379	7601708700	250.00	250.00	Field Grown Nursery or Floral
251	C990379	7602422000	63.93	0.00	Field Grown Nursery or Floral
252	C182408	1651120300	5.00	3.00	Tree Fruit
253	C378351	2441203700	9.88	1.00	Grapes, Berries, and Vine Fruit
254	C361303	1101300200	40.00	0.00	Other
254	C361303	1101900700	15.00	0.00	Other
254	C361303	1110500200	40.00	0.00	Other
254	C361303	1110500300	120.00	0.00	Other
254	C361303	1110700300	40.00	0.00	Other
254	C361303	1110700900	69.00	0.00	Other
254	C361303	1110800100	10.00	0.00	Other
254	C361303	1101300300	160.00	25.00	Tree Fruit
254	C361303	1101901100	60.00	29.00	Tree Fruit
254	C361303	1110500100	520.00	100.00	Tree Fruit
254	C361303	1110700100	198.00	50.00	Tree Fruit
254	C361303	1110700200	80.00	45.00	Tree Fruit
255	C657621	1013604000	130.00	55.00	Tree Fruit
256	W252375	1221801200	5.00	5.00	Tree Fruit
257	C940299	1275002300	10.45	8.00	Tree Fruit
258	C182258	1242012600	4.00	3.00	Tree Fruit
259	8331300	7601701800	330.00	330.00	Field Grown Nursery or Floral
259	8331300	7601700300	40.00	40.00	Tree Fruit
259	8331300	7601701900	32.00	32.00	Tree Fruit
259	8331300	7601703600	17.00	17.00	Tree Fruit
259	8331300	7601704300	155.00	120.00	Tree Fruit
259	8331300	7601704900	85.00	40.00	Tree Fruit
259	8331300	7601705400	33.00	33.00	Tree Fruit
259	8331300	7601705700	135.00	135.00	Tree Fruit
259	8331300	7601706200	2.00	2.00	Tree Fruit
259	8331300	7601706800	25.00	25.00	Tree Fruit
259	8331300	7602440105	52.00	52.00	Tree Fruit
260	C772943	1293905900	4.10	4.10	Tree Fruit
260	C772943	1293906000	3.80	3.80	Tree Fruit
260	C772943	1293905700	2.30	2.30	Tree Fruit
260	C772943	1293905800	2.50	2.50	Tree Fruit
260	C772943	1293906100	6.00	6.00	Tree Fruit
261	W252132	2660915500	4.50	2.50	Tree Fruit
262	C955253	2861022800	10.00	10.00	Grapes, Berries, and Vine Fruit
262	C955253	2861022100	48.10	48.10	Tree Fruit
262	C955253	2861112400	31.50	31.50	Tree Fruit
263	C182538	1212601200	2.53	1.50	Tree Fruit
264	C738098	277012050	9.50	8.50	Tree Fruit
265	C182706	1027113800	2.50	2.00	Tree Fruit
267	C990324	1294002000	4.50	3.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
267	C990324	1294002100	4.50	3.00	Tree Fruit
269	C406791	1281221200	19.44	16.00	Tree Fruit
269	C406791	1281705000	10.57	9.00	Tree Fruit
269	C406791	1285001000	20.87	16.00	Tree Fruit
269	C406791	1285001200	20.00	16.00	Tree Fruit
269	C406791	1285001300	16.00	12.00	Tree Fruit
270	C182526	1071510700	5.14	3.50	Tree Fruit
271	C182622	1074002600	2.00	1.50	Tree Fruit
272	ME10667	1850714900	2.50	1.00	Tree Fruit
273	C182636	5240600900	9.00	0.25	Grapes, Berries, and Vine Fruit
273	C182636	5240601100	7.50	0.50	Grapes, Berries, and Vine Fruit
274	C762713	1701110300	2.79	2.00	Container Nursery
274	C762713	1701110500	1.13	1.00	Container Nursery
274	C762713	1701620500	4.50	3.00	Container Nursery
274	C762713	1702301600	4.79	3.50	Container Nursery
275	C842407	2410803500	14.51	8.00	Tree Fruit
276	C990272	2241001200	40.00	35.00	Tree Fruit
276	C990272	2241005700	11.43	5.00	Tree Fruit
276	C990272	2241005800	55.40	45.00	Tree Fruit
276	C990272	2241005900	37.90	30.00	Tree Fruit
276	C990272	2241006000	5.22	2.00	Tree Fruit
276	C990272	2250100800	80.00	60.00	Tree Fruit
276	C990272	2250101900	8.26	5.00	Tree Fruit
276	C990272	2250102500	39.52	30.00	Tree Fruit
276	C990272	2250102600	31.62	20.00	Tree Fruit
276	C990272	2257003200	3.56	1.00	Tree Fruit
276	C990272	2257003400	2.28	1.00	Tree Fruit
276	C990272	2770703300	194.95	150.00	Tree Fruit
276	C990272	2770800300	200.00	150.00	Tree Fruit
276	C990272	2770802200	20.00	20.00	Tree Fruit
276	C990272	5790140200	1.00	1.00	Tree Fruit
276	C990272	5790140800	1.00	1.00	Tree Fruit
276	C990272	5790140900	1.00	1.00	Tree Fruit
276	C990272	5790150200	1.00	1.00	Tree Fruit
276	C990272	5790150300	3.89	1.00	Tree Fruit
277	C182635	1212304500	8.00	7.00	Tree Fruit
278	C825506	1290701500	22.51	10.00	Tree Fruit
279	C990409	1291007400	37.06	25.00	Tree Fruit
279	C990409	1291620100	15.90	7.00	Tree Fruit
279	C990409	1292002100	5.18	3.00	Tree Fruit
279	C990409	1292002200	4.21	3.00	Tree Fruit
279	C990409	1292003000	4.76	3.00	Tree Fruit
279	C990409	1292003100	16.54	15.00	Tree Fruit
279	C990409	1293901100	37.13	26.00	Tree Fruit
279	C990409	1293901900	42.65	28.00	Tree Fruit
279	C990409	2761003800	21.60	17.00	Tree Fruit
279	C990409	2814861600	35.47	30.00	Tree Fruit
279	C990409	2815503500	1.00	0.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
279	C990409	2815503600	10.75	6.00	Tree Fruit
279	C990409	1290701400	16.90	8.00	Tree Fruit
280	C800526	1026806100	2.60	1.00	Tree Fruit
281	C182368	1851813000	5.00	4.00	Tree Fruit
282	C663438	2771010600	9.50	1.00	Tree Fruit
283	C182435	1293107300	2.00	2.00	Tree Fruit
284	C588904	1281220700	5.00	5.00	Tree Fruit
285	C182226	1055601200	5.00	2.00	Container Nursery
286	C436493	1300803800	4.31	0.00	Other
286	C436493	1311401000	5.14	0.00	Other
286	C436493	1311801500	43.50	0.00	Other
286	C436493	1330101400	17.92	17.92	Other
286	C436493	1334200500	8.57	8.57	Other
286	C436493	1311700500	20.00	20.00	Tree Fruit
286	C436493	1311701500	8.50	8.50	Tree Fruit
286	C436493	1311701700	15.00	15.00	Tree Fruit
286	C436493	1311702400	16.50	16.50	Tree Fruit
286	C436493	1320814200	83.00	83.00	Tree Fruit
286	C436493	1321100300	25.00	25.00	Tree Fruit
286	C436493	1321501500	31.00	31.00	Tree Fruit
286	C436493	1321504100	54.00	54.00	Tree Fruit
286	C436493	1321504200	3.14	3.14	Tree Fruit
286	C436493	1330101200	16.04	16.04	Tree Fruit
286	C436493	1330101300	25.31	25.31	Tree Fruit
286	C436493	1330101500	8.73	8.73	Tree Fruit
286	C436493	1330101600	17.79	17.79	Tree Fruit
286	C436493	1333014300	4.88	4.88	Tree Fruit
286	C436493	1334200400	19.77	19.77	Tree Fruit
286	C436493	1334200600	10.55	10.55	Tree Fruit
286	C436493	1334200700	9.51	9.51	Tree Fruit
286	C436493	1334200800	30.86	30.86	Tree Fruit
286	C436493	1334201500	28.54	28.54	Tree Fruit
286	C436493	1334201900	13.80	13.80	Tree Fruit
287	C182050	1212204700	2.50	2.50	Tree Fruit
287	C182050	1212204800	2.50	2.50	Tree Fruit
287	C182050	1212206300	5.50	5.50	Tree Fruit
287	C182050	1212206400	2.50	2.50	Tree Fruit
288	C402402	1620500700	3.37	3.37	Container Nursery
288	C402402	1620500899	27.71	27.71	Container Nursery
288	C402402	1620501000	12.33	12.33	Container Nursery
288	C402402	1620501100	0.12	0.12	Container Nursery
288	C402402	1620501200	0.76	0.76	Container Nursery
288	C402402	1620501300	23.64	23.64	Container Nursery
288	C402402	3060101700	10.04	5.00	Container Nursery
288	C402402	3060101800	10.00	6.00	Container Nursery
288	C402402	3060101900	17.45	15.00	Container Nursery
288	C402402	3060102200	15.81	15.00	Container Nursery
288	C402402	3062603400	0.51	0.51	Container Nursery

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
288	C402402	3961003800	3.07	3.07	Container Nursery
288	C402402	1291117200	9.43	9.43	Container Nursery
288	C402402	1861110900	3.68	3.68	Field Grown Nursery or Floral
288	C402402	1861111100	3.04	3.04	Field Grown Nursery or Floral
288	C402402	1861111300	2.58	2.58	Field Grown Nursery or Floral
288	C402402	1861210800	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861210900	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861211000	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861211100	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861211200	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861211300	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861212700	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861220100	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861222000	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861222100	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1861222200	1.00	0.00	Field Grown Nursery or Floral
288	C402402	1870500300	0.90	0.50	Field Grown Nursery or Floral
288	C402402	1870501000	1.00	1.00	Field Grown Nursery or Floral
288	C402402	2760710600	3.96	3.96	Field Grown Nursery or Floral
288	C402402	7601591200	100.00	100.00	Field Grown Nursery or Floral
288	C402402	7602441100	8.00	8.00	Field Grown Nursery or Floral
288	C402402	3960700700	45.01	45.01	Field Grown Nursery or Floral
288	C402402	1291117100	0.96	0.00	Other
288	C402402	1861111000	2.80	0.00	Other
288	C402402	1861111200	3.13	0.00	Other
288	C402402	1861111400	3.85	0.00	Other
288	C402402	1861111900	24.80	0.00	Other
288	C402402	1861112000	8.05	0.00	Other
288	C402402	1861112100	7.65	0.00	Other
288	C402402	1861111500	3.93	3.93	Tree Fruit
288	C402402	1861111600	4.80	1.80	Tree Fruit
288	C402402	1861111700	2.27	2.27	Tree Fruit
288	C402402	1861111800	3.74	3.74	Tree Fruit
288	C402402	1861112200	7.00	7.00	Tree Fruit
288	C402402	1861112300	3.20	3.20	Tree Fruit
288	C402402	1861112400	6.00	6.00	Tree Fruit
288	C402402	1861112500	4.33	4.33	Tree Fruit
288	C402402	1861112600	3.98	3.98	Tree Fruit
288	C402402	1861112700	5.36	5.36	Tree Fruit
288	C402402	1861113000	2.61	2.61	Tree Fruit
288	C402402	1861113100	89.22	50.00	Tree Fruit
288	C402402	1861226200	3.31	3.31	Tree Fruit
288	C402402	1861112800	5.23	5.23	Tree Fruit
288	C402402	1861112900	24.60	24.60	Tree Fruit
289	C407242	2250201400	5.50	3.90	Tree Fruit
289	C407242	2250201500	1.00	0.10	Tree Fruit
290	C402406	1591500800	5.00	2.50	Greenhouse Crops
290	C402406	1591704600	1.00	1.00	Greenhouse Crops

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
290	C402406	1591800300	9.00	4.00	Greenhouse Crops
290	C402406	1691500900	5.00	2.50	Greenhouse Crops
290	C402406	1691601900	8.00	3.00	Greenhouse Crops
290	C402406	1820741200	4.00	2.50	Greenhouse Crops
290	C402406	1820820100	5.00	3.00	Greenhouse Crops
291	C567839	1710322300	1.50	1.50	Greenhouse Crops
292	C567839	1591704000	3.00	3.00	Greenhouse Crops
292	C567839	1710115600	4.00	4.00	Greenhouse Crops
293	C443304	1282112600	9.33	9.13	Tree Fruit
293	C443304	1282112700	8.74	8.62	Tree Fruit
293	C443304	1284601900	10.00	6.50	Tree Fruit
293	C443304	1290604700	7.00	6.00	Tree Fruit
293	C443304	1290700900	13.34	12.00	Tree Fruit
293	C443304	1291111800	3.53	2.88	Tree Fruit
293	C443304	1291807800	3.81	3.60	Tree Fruit
293	C443304	1291807900	3.78	3.60	Tree Fruit
293	C443304	1291808000	3.02	2.80	Tree Fruit
293	C443304	1293401400	5.00	4.68	Tree Fruit
293	C443304	1293401500	5.09	4.36	Tree Fruit
293	C443304	1320814300	2.49	2.23	Tree Fruit
293	C443304	1320814400	2.31	1.81	Tree Fruit
293	C443304	1320814500	3.01	2.51	Tree Fruit
293	C443304	1320814600	7.37	6.45	Tree Fruit
293	C443304	1320814700	2.46	2.11	Tree Fruit
293	C443304	1320814800	6.40	6.00	Tree Fruit
293	C443304	1322513000	2.24	1.50	Tree Fruit
293	C443304	1322800100	15.17	11.60	Tree Fruit
293	C443304	1323512900	6.53	4.19	Tree Fruit
293	C443304	1330810500	20.00	18.00	Tree Fruit
293	C443304	1332900900	4.27	3.97	Tree Fruit
293	C443304	1332901000	4.17	2.67	Tree Fruit
293	C443304	1332901100	2.50	2.50	Tree Fruit
293	C443304	1332901200	3.85	3.85	Tree Fruit
293	C443304	1332901700	3.10	2.77	Tree Fruit
293	C443304	1333421600	13.04	8.51	Tree Fruit
293	C443304	1591124400	7.32	0.64	Tree Fruit
293	C443304	1851220600	4.86	4.63	Tree Fruit
293	C443304	1853520200	9.37	9.00	Tree Fruit
293	C443304	1853520300	10.14	9.75	Tree Fruit
293	C443304	1853520400	9.66	9.25	Tree Fruit
293	C443304	1853520500	4.63	4.10	Tree Fruit
293	C443304	1853812100	8.85	8.78	Tree Fruit
293	C443304	1853812200	4.36	4.33	Tree Fruit
293	C443304	1853812300	3.12	3.00	Tree Fruit
293	C443304	1853812400	5.04	5.00	Tree Fruit
293	C443304	1862106000	4.24	3.52	Tree Fruit
293	C443304	1862308200	1.60	1.27	Tree Fruit
293	C443304	1881305300	2.00	1.90	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
293	C443304	1881305400	3.85	2.12	Tree Fruit
293	C443304	1881305500	2.16	2.00	Tree Fruit
293	C443304	1881505000	8.06	5.08	Tree Fruit
293	C443304	1882230600	1.51	1.38	Tree Fruit
293	C443304	1882230700	2.40	2.27	Tree Fruit
293	C443304	1882230800	2.40	1.14	Tree Fruit
293	C443304	1882230900	2.40	2.23	Tree Fruit
293	C443304	1882231100	2.82	2.69	Tree Fruit
293	C443304	1882231200	2.29	2.16	Tree Fruit
293	C443304	1890603100	6.44	4.86	Tree Fruit
293	C443304	9272600060	2.89	2.64	Tree Fruit
293	C443304	9383300093	10.71	3.50	Tree Fruit
294	C568545	1282010300	23.78	23.00	Tree Fruit
294	C568545	1282010400	36.19	35.00	Tree Fruit
296	C888016	1015720100	30.00	19.00	Tree Fruit
297	C182046	2760911700	18.47	17.00	Tree Fruit
298	C805059	1722104800	3.50	2.00	Tree Fruit
299	C182282	1333013800	5.00	2.00	Tree Fruit
300	C182578	1242034300	2.00	1.00	Tree Fruit
301	C182361	1234561231	2.20	1.10	Tree Fruit
302	C182291	1323206000	2.50	2.00	Tree Fruit
303	C645682	1881410800	7.40	4.30	Tree Fruit
304	C182691	1021807000	6.51	5.50	Tree Fruit
304	C182691	1021807100	4.59	1.00	Tree Fruit
304	C182691	1021807200	5.03	1.00	Tree Fruit
305	C182215	1020830800	40.00	36.00	Tree Fruit
307	C450453	1280910200	4.30	3.00	Tree Fruit
308	C182036	1083201300	3.35	2.60	Tree Fruit
309	C182355	1102300600	11.27	9.00	Tree Fruit
310	C872263	1220306100	40.00	40.00	Grapes, Berries, and Vine Fruit
310	C872263	1570601700	15.00	15.00	Row and Field Crops
310	C872263	1211501600	3.00	3.00	Tree Fruit
310	C872263	1220306900	15.00	15.00	Tree Fruit
312	C182280	1852900800	7.58	6.50	Tree Fruit
312	C182280	1852901500	8.49	5.00	Tree Fruit
312	C182280	1852910200	2.83	2.50	Tree Fruit
314	C827685	1281903100	5.00	1.00	Other
314	C827685	1281221600	15.00	10.00	Tree Fruit
314	C827685	1284300500	15.00	10.00	Tree Fruit
315	C892872	1875304200	12.80	10.00	Tree Fruit
316	C436420	1311500400	35.00	33.00	Tree Fruit
317	0396500	1850410100	40.00	20.00	Tree Fruit
318	C180822	1261802400	5.50	5.00	Tree Fruit
319	C888008	1283303800	18.00	10.50	Tree Fruit
320	C665102	2700100900	3.17	3.17	Tree Fruit
320	C665102	2790100900	40.00	40.00	Tree Fruit
320	C665102	2790300200	33.35	33.35	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
320	C665102	2790300600	37.76	37.00	Tree Fruit
320	C665102	2790300700	36.80	36.80	Tree Fruit
320	C665102	2790300800	36.58	36.58	Tree Fruit
320	C665102	2790301000	8.46	8.46	Tree Fruit
320	C665102	2790301100	8.11	8.11	Tree Fruit
320	C665102	2790301600	80.00	80.00	Tree Fruit
320	C665102	2790300900	2.85	2.85	Tree Fruit
321	C181256	1243402100	6.50	5.00	Tree Fruit
321	C181256	1860421700	5.00	3.00	Tree Fruit
322	C182554	1013605300	24.00	16.00	Tree Fruit
323	C657857	1020840500	10.36	9.00	Tree Fruit
324	C182040	1851812800	5.40	3.00	Tree Fruit
326	C182346	1013707100	11.43	0.25	Tree Fruit
328	C353353	1057712700	4.00	2.00	Tree Fruit
329	W251855	1073901500	3.05	2.50	Tree Fruit
330	C182577	1867200400	4.25	3.00	Tree Fruit
331	C182026	1221000800	9.00	7.00	Tree Fruit
332	C900443	1081920700	2.30	2.00	Tree Fruit
333	C182352	1280910400	4.40	2.00	Tree Fruit
334	C772714	1291110100	21.00	21.00	Container Nursery
334	C772714	1292001100	20.00	20.00	Container Nursery
334	C772714	1742400600	5.00	5.00	Container Nursery
334	C772714	1742401100	6.00	6.00	Container Nursery
334	C772714	1742404500	7.00	7.00	Container Nursery
334	C772714	1742404600	7.00	7.00	Container Nursery
334	C772714	1742404700	3.00	3.00	Container Nursery
334	C772714	1742404900	2.00	2.00	Container Nursery
334	C772714	1742405000	1.00	1.00	Container Nursery
334	C772714	1742405100	7.00	7.00	Container Nursery
334	C772714	1742405400	8.00	8.00	Container Nursery
334	C772714	1742407000	4.00	4.00	Container Nursery
334	C772714	1770912900	1.00	1.00	Container Nursery
334	C772714	1770913300	1.00	1.00	Container Nursery
334	C772714	1770913400	1.00	1.00	Container Nursery
334	C772714	1770923500	2.75	2.75	Container Nursery
334	C772714	1780807100	2.00	2.00	Container Nursery
334	C772714	1780807200	3.00	3.00	Container Nursery
334	C772714	1780807300	2.00	2.00	Container Nursery
334	C772714	1810210300	3.00	3.00	Container Nursery
334	C772714	1810210700	2.00	2.00	Container Nursery
334	C772714	1810415400	1.00	1.00	Container Nursery
334	C772714	1811606400	5.00	5.00	Container Nursery
334	C772714	1811805200	7.00	7.00	Container Nursery
334	C772714	1811806100	1.00	1.00	Container Nursery
334	C772714	1811807200	1.00	1.00	Container Nursery
334	C772714	1811807300	3.00	3.00	Container Nursery
334	C772714	1822001500	8.00	8.00	Container Nursery
334	C772714	1822001600	1.00	1.00	Container Nursery

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
334	C772714	1822003100	3.00	3.00	Container Nursery
334	C772714	1822003200	5.00	5.00	Container Nursery
334	C772714	1822003900	11.00	11.00	Container Nursery
334	C772714	1822004000	11.00	11.00	Container Nursery
334	C772714	1822004430	6.00	6.00	Container Nursery
334	C772714	1822004480	5.00	5.00	Container Nursery
334	C772714	1822300200	1.00	1.00	Container Nursery
334	C772714	1822300900	3.00	3.00	Container Nursery
334	C772714	1822301000	4.00	4.00	Container Nursery
334	C772714	1822301500	5.00	5.00	Container Nursery
334	C772714	1822301600	5.00	5.00	Container Nursery
334	C772714	1822400100	8.00	8.00	Container Nursery
334	C772714	1822402900	8.79	8.79	Container Nursery
334	C772714	1870413700	40.00	40.00	Container Nursery
334	C772714	1870415400	10.00	10.00	Container Nursery
334	C772714	1870415500	10.00	10.00	Container Nursery
334	C772714	1870415600	11.00	11.00	Container Nursery
335	5426169	2090606100	42.00	16.00	Field Grown Nursery or Floral
335	5426169	1300804800	18.60	4.50	Tree Fruit
335	5426169	1300804900	2.00	1.50	Tree Fruit
335	5426169	1311501400	10.00	5.00	Tree Fruit
335	5426169	1311501600	10.00	10.00	Tree Fruit
335	5426169	1311501700	10.00	10.00	Tree Fruit
335	5426169	1311501800	10.00	10.00	Tree Fruit
335	5426169	1311501900	10.00	5.00	Tree Fruit
335	5426169	1311502000	10.00	5.50	Tree Fruit
335	5426169	1311502100	19.80	18.00	Tree Fruit
335	5426169	1311600100	26.70	26.00	Tree Fruit
335	5426169	1311600500	11.60	11.00	Tree Fruit
335	5426169	1311601800	9.80	9.50	Tree Fruit
335	5426169	1311602200	10.00	9.50	Tree Fruit
335	5426169	1311602500	12.50	12.00	Tree Fruit
335	5426169	1311602700	25.00	25.00	Tree Fruit
335	5426169	1311602800	11.60	11.40	Tree Fruit
336	C180651	1072900600	2.61	1.77	Tree Fruit
336	C180651	1072900700	2.23	2.23	Tree Fruit
337	C622790	3291413000	33.92	1.00	Row and Field Crops
337	C622790	3291413100	18.79	2.00	Tree Fruit
338	A052371	1262406500	2.75	1.50	Tree Fruit
339	C182300	1030106800	10.00	10.00	Tree Fruit
339	C182300	1300107100	16.00	16.00	Tree Fruit
340	C182309	1881507700	3.25	2.00	Tree Fruit
341	C181229	1311322800	60.00	3.00	Field Grown Nursery or Floral
342	C182442	2770330200	22.00	5.50	Tree Fruit
342	C182442	2770330300	20.00	2.00	Tree Fruit
343	C182299	3831121700	1.00	1.00	Container Nursery
344	C182566	1073001200	4.50	1.50	Tree Fruit
345	C641834	1284901200	26.00	16.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
345	C641834	1284901400	42.00	30.00	Tree Fruit
345	C641834	1290802300	20.00	18.00	Tree Fruit
346	0028699	1330603900	3.80	2.00	Tree Fruit
347	C787057	1241831800	4.62	3.00	Tree Fruit
348	C182266	1284302300	15.95	13.00	Tree Fruit
349	4147200	1280931300	12.00	11.00	Tree Fruit
349	4147200	1281110200	14.00	13.00	Tree Fruit
349	4147200	1281110300	3.20	3.00	Tree Fruit
349	4147200	1281120600	1.60	1.60	Tree Fruit
349	4147200	1284101000	10.00	9.50	Tree Fruit
349	4147200	1280931000	1.00	1.00	Tree Fruit
350	2558646	2561720500	18.00	2.00	Greenhouse Crops
350	2558646	2561720600	14.40	2.00	Greenhouse Crops
350	2558646	2563306200	15.00	5.00	Greenhouse Crops
350	2558646	2563306300	20.00	3.00	Greenhouse Crops
351	C462169	2546120100	4.00	2.00	Field Grown Nursery or Floral
351	C462169	2546121010	4.00	1.00	Greenhouse Crops
351	C462169	2546121200	20.00	14.00	Greenhouse Crops
351	C462169	2561720300	10.00	2.00	Greenhouse Crops
351	C462169	2561720700	10.00	2.00	Greenhouse Crops
351	C462169	2546120800	4.00	3.00	Row and Field Crops
351	C462169	2546140300	10.00	6.00	Row and Field Crops
352	C182235	1082521800	4.23	4.00	Tree Fruit
353	C182631	1071620300	3.50	1.00	Tree Fruit
354	0008132	1721403200	6.20	3.00	Tree Fruit
355	C182642	1057202200	4.00	2.50	Tree Fruit
356	C182288	2654410900	1.50	1.50	Tree Fruit
357	C558977	1866022000	5.00	2.00	Tree Fruit
358	C182242	2401008300	15.00	8.00	Tree Fruit
359	C717867	1020841400	26.08	25.00	Tree Fruit
359	C717867	1020841600	41.21	36.00	Tree Fruit
359	C717867	1021020700	31.58	25.00	Tree Fruit
359	C717867	1021020800	3.67	2.00	Tree Fruit
359	C717867	1021020900	32.50	25.00	Tree Fruit
359	C717867	1021021000	128.87	90.00	Tree Fruit
359	C717867	1021021100	6.62	5.00	Tree Fruit
359	C717867	1021600200	11.22	5.00	Tree Fruit
359	C717867	1021602400	21.72	10.00	Tree Fruit
359	C717867	1021602500	74.46	50.00	Tree Fruit
360	C381676	1281802800	1.25	0.25	Field Grown Nursery or Floral
360	C381676	1281803800	8.00	5.00	Tree Fruit
360	C381676	1281803700	8.00	5.00	Tree Fruit
361	C571698	6780701200	20.00	20.00	Tree Fruit
362	C571698	2710810200	32.00	32.00	Row and Field Crops
362	C571698	2721310800	100.00	100.00	Row and Field Crops
362	C571698	6780602700	6.00	6.00	Row and Field Crops
362	C571698	6780701300	10.00	10.00	Row and Field Crops
363	C182485	2640313200	3.30	2.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
364	C544991	1081612000	2.04	2.00	Tree Fruit
365	C182555	2801310400	5.00	0.50	Container Nursery
366	C733664	1014602100	11.30	9.50	Tree Fruit
367	W251876	2760803500	5.50	2.00	Tree Fruit
368	C762670	1073200700	30.00	25.00	Tree Fruit
369	6732911	1250630600	96.00	30.00	Tree Fruit
370	C571864	1232704900	4.00	0.00	Other
370	C571864	1232705000	4.00	0.00	Other
370	C571864	1234203500	2.00	1.50	Tree Fruit
370	C571864	1234203600	2.00	1.50	Tree Fruit
370	C571864	1234203700	5.00	2.00	Tree Fruit
370	C571864	1234203800	5.00	3.00	Tree Fruit
371	C905663	1012720800	81.47	6.00	Grapes, Berries, and Vine Fruit
372	8331300	2841101100	14.00	0.00	Other
372	8331300	2841101600	2.00	0.00	Other
372	8331300	2841103500	10.00	0.00	Other
372	8331300	2850800200	90.00	0.00	Other
372	8331300	2850910500	5.00	0.00	Other
372	8331300	2841101500	38.00	6.00	Tree Fruit
372	8331300	2841103700	21.00	15.00	Tree Fruit
372	8331300	2841103800	8.00	5.00	Tree Fruit
372	8331300	2841300900	39.00	15.00	Tree Fruit
372	8331300	2841301000	43.00	32.00	Tree Fruit
372	8331300	2841501500	26.00	26.00	Tree Fruit
372	8331300	2841501600	7.00	7.00	Tree Fruit
372	8331300	2850910600	35.00	35.00	Tree Fruit
373	C772683	2781806600	3.50	3.00	Tree Fruit
374	C182032	1271422600	4.75	4.00	Tree Fruit
375	C181593	1093106000	13.60	4.00	Tree Fruit
375	C181593	1102801900	3.70	3.00	Tree Fruit
376	C777849	2761010400	50.50	15.00	Tree Fruit
377	C182689	1291000300	5.00	5.00	Tree Fruit
377	C182689	1291000700	5.00	5.00	Tree Fruit
378	C119249	1221301900	158.30	60.00	Container Nursery
378	C119249	1221306400	120.00	70.00	Container Nursery
378	C119249	1261700500	20.90	12.00	Container Nursery
379	C182239	2642411100	3.00	3.00	Tree Fruit
380	4099400	2420300301	80.00	0.00	Other
380	4099400	2420301201	12.00	0.00	Other
380	4099400	2340403600	5.00	5.00	Row and Field Crops
380	4099400	2341410900	5.00	1.00	Row and Field Crops
380	4099400	2363331000	1.00	1.00	Row and Field Crops
380	4099400	2363333200	3.00	2.00	Row and Field Crops
380	4099400	2420301400	98.00	20.00	Row and Field Crops
380	4099400	2340404000	34.00	5.00	Tree Fruit
380	4099400	2341420100	4.00	2.00	Tree Fruit
380	4099400	2344400200	5.00	2.00	Tree Fruit
380	4099400	2410411300	20.00	5.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
380	4099400	2410411600	15.00	5.00	Tree Fruit
380	4099400	2410411700	15.00	2.00	Tree Fruit
380	4099400	2410411800	20.00	18.00	Tree Fruit
380	4099400	2420701100	15.00	10.00	Tree Fruit
380	4099400	2420701300	21.00	15.00	Tree Fruit
380	4099400	2421100100	27.00	15.00	Tree Fruit
381	0005239	2341420200	23.00	20.00	Tree Fruit
382	C182501	1024121100	2.44	1.59	Greenhouse Crops
383	C182501	1275410100	8.34	1.89	Greenhouse Crops
384	0523210	2890630100	80.00	10.00	Tree Fruit
384	0523210	2891201400	75.00	27.00	Tree Fruit
385	C774994	2770422800	9.70	6.00	Field Grown Nursery or Floral
386	H008531	1362100700	111.00	3.00	Other
386	H008531	2860210900	8.00	1.00	Other
387	C182702	1012107700	50.00	30.00	Container Nursery
387	C182702	1012108100	100.00	52.00	Container Nursery
387	C182702	1012710800	25.00	8.00	Container Nursery
387	C182702	1015620700	10.00	2.00	Tree Fruit
388	C181982	1050820800	1.00	1.00	Tree Fruit
388	C181982	1050820900	1.00	1.00	Tree Fruit
388	C181982	1050821000	1.00	1.00	Tree Fruit
388	C181982	1050821100	1.00	1.00	Tree Fruit
388	C181982	1050923100	3.00	2.30	Tree Fruit
389	C181877	1639500000	4.75	0.00	Field Grown Nursery or Floral
390	C182464	1211510300	28.00	22.00	Tree Fruit
391	W252949	6753312100	20.00	18.00	Tree Fruit
391	W252949	6753312200	0.00	0.00	Tree Fruit
391	W252949	6753410900	0.00	0.00	Tree Fruit
391	W252949	6753411000	0.00	0.00	Tree Fruit
391	W252949	6753411100	0.00	0.00	Tree Fruit
392	C622846	1291906600	1.00	0.00	Other
392	C622846	1281906000	22.50	18.00	Tree Fruit
393	C181602	1852307800	33.00	19.00	Tree Fruit
393	C181602	1852307900	9.00	7.00	Tree Fruit
394	C733943	1270722800	28.00	14.00	Tree Fruit
394	C733943	1270724800	12.00	4.00	Tree Fruit
394	C733943	1270724900	25.00	10.00	Tree Fruit
395	C419559	1293803400	10.00	8.00	Field Grown Nursery or Floral
396	C182295	1274000500	2.75	2.00	Tree Fruit
397	C182307	1720120100	5.28	5.00	Tree Fruit
398	C182289	1270722000	40.00	25.00	Tree Fruit
399	C567988	2172910200	1.00	1.00	Other
399	C567988	2172910300	1.59	1.00	Other
401	C182350	1701624600	2.00	2.00	Tree Fruit
401	C182350	1701624700	2.00	2.00	Tree Fruit
402	C182319	1721404500	9.70	9.79	Tree Fruit
402	C182319	1721406500	4.50	4.00	Tree Fruit
403	C182325	1272708300	2.97	2.97	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
404	C182551	2941603200	1.50	1.00	Row and Field Crops
406	C182499	2221212000	2.50	1.00	Tree Fruit
407	C182601	1274301400	3.67	3.00	Tree Fruit
408	C182499	2221212200	4.00	1.00	Tree Fruit
409	C182499	2221212100	3.50	0.25	Tree Fruit
410	C182218	1743001100	8.50	8.25	Tree Fruit
412	C182572	1274400400	2.90	2.90	Tree Fruit
413	C182329	1711300800	1.80	1.80	Tree Fruit
414	C867549	1271511200	10.00	10.00	Tree Fruit
415	C182230	1781803500	10.70	7.00	Tree Fruit
417	C104512	1271105500	10.50	10.00	Tree Fruit
418	C182219	1274300200	3.22	3.22	Tree Fruit
418	C182219	1274300300	3.69	3.69	Tree Fruit
419	C182224	1281804600	22.98	20.00	Tree Fruit
420	3387920	1070905100	7.80	5.50	Container Nursery
420	3387920	1070904500	6.26	0.50	Field Grown Nursery or Floral
420	3387920	1070904900	7.50	3.00	Field Grown Nursery or Floral
420	3387920	1070905200	17.83	0.50	Field Grown Nursery or Floral
420	3387920	1210440900	6.51	5.00	Field Grown Nursery or Floral
420	3387920	1210441000	9.75	8.00	Field Grown Nursery or Floral
420	3387920	1210441100	9.85	8.00	Field Grown Nursery or Floral
420	3387920	1070905000	5.96	2.00	Field Grown Nursery or Floral
420	3387920	1234000400	7.65	4.60	Field Grown Nursery or Floral
420	3387920	1234000500	9.78	3.50	Field Grown Nursery or Floral
420	3387920	1234000600	2.34	0.25	Grapes, Berries, and Vine Fruit
420	3387920	1070902700	2.20	1.25	Greenhouse Crops
420	3387920	1070902800	2.40	1.25	Greenhouse Crops
420	3387920	1070904700	7.28	3.00	Greenhouse Crops
420	3387920	1234003400	2.00	1.80	Other
420	3387920	1070905300	10.43	3.00	Tree Fruit
421	C182607	3771314700	1.50	1.00	Tree Fruit
422	C739908	1100900400	12.00	5.00	Other
422	C739908	1101200500	6.00	6.00	Tree Fruit
423	C181183	1850422100	5.00	3.00	Tree Fruit
424	C182290	1280931900	2.50	1.50	Tree Fruit
425	C181874	1890310100	21.70	10.00	Tree Fruit
426	C805077	1283602000	15.00	3.00	Tree Fruit
427	W251817	1722100300	4.60	1.00	Greenhouse Crops
428	9671920	1271511400	10.78	10.78	Tree Fruit
428	9671920	1271511500	6.81	6.81	Tree Fruit
428	9671920	1274205900	8.00	8.00	Tree Fruit
428	9671920	1274206000	4.00	4.00	Tree Fruit
428	9671920	1274207000	12.00	12.00	Tree Fruit
428	9671920	1274207100	16.00	16.00	Tree Fruit
428	9671920	1275120200	20.00	20.00	Tree Fruit
428	9671920	1720210700	5.00	5.00	Tree Fruit
428	9671920	1720213900	19.67	19.67	Tree Fruit
429	9824200	1283105400	2.50	2.50	Field Grown Nursery or Floral

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
429	9824200	1283105500	2.50	2.50	Field Grown Nursery or Floral
429	9824200	1283105600	10.50	10.50	Field Grown Nursery or Floral
429	9824200	1292122800	20.00	16.00	Field Grown Nursery or Floral
429	9824200	1271105600	10.92	10.92	Tree Fruit
429	9824200	1274301800	14.60	14.60	Tree Fruit
429	9824200	1271107600	19.00	19.00	Tree Fruit
429	9824200	1282906600	40.30	40.00	Tree Fruit
429	9824200	1721405800	11.00	11.00	Tree Fruit
430	5311385	1110301600	61.00	40.00	Tree Fruit
430	5311385	1110301800	59.00	3.00	Tree Fruit
430	5311385	1092000900	61.00	5.00	Tree Fruit
430	5311385	1110301400	72.00	30.00	Tree Fruit
431	C182438	2761500800	10.00	9.00	Tree Fruit
432	C783657	1275123400	9.49	9.49	Tree Fruit
433	C880192	2770421200	20.00	12.00	Tree Fruit
434	0031457	1062905300	2.10	1.50	Tree Fruit
434	0031457	1062905400	1.00	0.50	Tree Fruit
435	C919687	2860401300	32.00	2.00	Grapes, Berries, and Vine Fruit
436	C919687	2860401200	32.00	0.00	Grapes, Berries, and Vine Fruit
437	4375703	1281011200	2.25	1.00	Tree Fruit
438	C180643	1283402500	4.93	4.93	Tree Fruit
438	C180643	1283402600	7.05	7.05	Tree Fruit
438	C180643	1283402700	5.30	5.30	Tree Fruit
438	C180643	1283402800	2.95	2.95	Tree Fruit
439	C786357	1102901700	10.00	10.00	Field Grown Nursery or Floral
440	C786357	1022401000	3.00	3.00	Container Nursery
440	C786357	1022401300	2.00	2.00	Container Nursery
440	C786357	1093520800	13.00	13.00	Field Grown Nursery or Floral
440	C786357	1100210800	10.00	10.00	Field Grown Nursery or Floral
440	C786357	1100213400	8.00	8.00	Field Grown Nursery or Floral
440	C786357	1100213500	9.00	9.00	Field Grown Nursery or Floral
440	C786357	1103100100	27.00	27.00	Field Grown Nursery or Floral
440	C786357	1103100600	18.00	18.00	Field Grown Nursery or Floral
440	C786357	1103100700	11.00	11.00	Field Grown Nursery or Floral
441	C786357	1103000500	20.00	20.00	Field Grown Nursery or Floral
441	C786357	1103100500	10.00	10.00	Field Grown Nursery or Floral
442	C182051	1081007000	23.00	20.00	Tree Fruit
443	C572083	1030306400	5.00	1.80	Greenhouse Crops
444	C181648	2634022200	2.00	1.00	Container Nursery
444	C181648	2980812900	1.00	0.00	Container Nursery
445	C844753	1212801000	2.50	2.00	Tree Fruit
446	C844753	1212800900	2.50	0.00	Other
447	C506701	1280203400	2.50	0.50	Field Grown Nursery or Floral
447	C506701	1280203300	10.00	5.00	Tree Fruit
448	0008292	1881003000	39.00	8.00	Tree Fruit
449	0024042	1281703700	14.50	7.00	Tree Fruit
449	0024042	1281704000	2.50	1.00	Tree Fruit
450	C635448	1213111000	10.00	8.00	Field Grown Nursery or Floral

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
450	C635448	1221704900	2.75	1.00	Field Grown Nursery or Floral
451	C182612	1234601800	2.00	2.00	Tree Fruit
452	C182504	2411600400	10.70	9.40	Tree Fruit
452	C182504	2411610100	6.87	6.20	Tree Fruit
453	W251748	1026702000	1.40	0.75	Row and Field Crops
454	C182358	1322703000	104.00	50.00	Tree Fruit
455	C182222	2651014800	5.00	4.00	Tree Fruit
455	C182222	2651014900	5.00	4.00	Tree Fruit
456	ME97632	2411801600	10.00	4.50	Tree Fruit
457	C400133	1300400400	112.24	14.55	Tree Fruit
457	C400133	1300701000	165.10	80.29	Tree Fruit
457	C400133	1300803900	73.40	10.90	Tree Fruit
457	C400133	1300300100	634.10	242.26	Tree Fruit
458	C182313	1242101300	1.55	1.00	Tree Fruit
458	C182313	1242105200	3.83	3.00	Tree Fruit
458	C182313	1242105300	4.61	4.00	Tree Fruit
458	C182313	1242105400	1.42	1.00	Tree Fruit
458	C182313	1242105100	13.39	10.00	Tree Fruit
459	C091714	1592101100	3.00	2.00	Container Nursery
459	C091714	1712601300	3.18	2.75	Container Nursery
459	C091714	1822701500	9.54	5.00	Container Nursery
459	C091714	1822721500	4.42	3.00	Container Nursery
459	C091714	1722103400	18.00	14.00	Tree Fruit
460	C181234	5962510800	8.00	3.00	Field Grown Nursery or Floral
462	C888005	1881507900	6.00	4.50	Field Grown Nursery or Floral
462	C888005	1890317900	6.00	4.00	Field Grown Nursery or Floral
463	C182382	2410810100	25.00	23.00	Tree Fruit
464	C182388	2382402500	0.81	0.75	Tree Fruit
464	C182388	2382810100	9.09	9.00	Tree Fruit
465	C739897	2410800200	6.79	3.00	Tree Fruit
465	C739897	2410801600	0.87	0.25	Tree Fruit
465	C739897	2410804400	1.10	0.25	Tree Fruit
465	C739897	2410804500	55.23	47.00	Tree Fruit
465	C739897	2411500800	5.02	5.00	Tree Fruit
466	C182228	1082220100	33.00	33.00	Tree Fruit
467	C180836	1280701600	75.62	65.00	Tree Fruit
467	C180836	1281502800	28.00	18.00	Tree Fruit
467	C180836	1281502900	30.00	20.00	Tree Fruit
467	C180836	1281503000	55.00	43.00	Tree Fruit
467	C180836	1281503100	28.00	19.00	Tree Fruit
467	C180836	1282003700	23.85	20.00	Tree Fruit
467	C180836	1282003800	16.06	15.00	Tree Fruit
467	C180836	1282112100	18.03	16.00	Tree Fruit
467	C180836	1282112200	24.62	19.00	Tree Fruit
468	C783513	1083402000	9.92	9.40	Tree Fruit
468	C783513	1083402800	8.80	4.00	Tree Fruit
468	C783513	1083500700	10.50	4.00	Tree Fruit
468	C783513	1083501500	6.00	5.10	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
468	C783513	1083501600	4.60	1.50	Tree Fruit
468	C783513	1083501800	6.40	4.20	Tree Fruit
469	C182264	1851605900	22.50	19.00	Tree Fruit
470	C880024	1310702700	12.58	11.84	Field Grown Nursery or Floral
470	C880024	1310701500	6.10	5.36	Tree Fruit
470	C880024	1322000300	19.24	18.88	Tree Fruit
470	C880024	1322002100	1.67	1.32	Tree Fruit
470	C880024	1322204100	5.70	5.49	Tree Fruit
470	C880024	1322204200	4.11	3.89	Tree Fruit
470	C880024	1322204300	6.74	6.52	Tree Fruit
470	C880024	1330202100	1.33	1.26	Tree Fruit
470	C880024	1330202300	1.04	1.00	Tree Fruit
470	C880024	1330202400	1.02	1.00	Tree Fruit
470	C880024	1330205000	1.23	1.16	Tree Fruit
470	C880024	1330400600	6.55	5.73	Tree Fruit
470	C880024	1330401500	18.53	18.20	Tree Fruit
470	C880024	1330402500	1.98	1.17	Tree Fruit
470	C880024	1330504900	1.40	1.34	Tree Fruit
471	3604864	1280100800	35.00	4.00	Row and Field Crops
471	3604864	1280103500	35.00	14.00	Row and Field Crops
471	3604864	1280202800	40.00	20.00	Row and Field Crops
471	3604864	1280700300	40.00	3.00	Row and Field Crops
471	3604864	1284209100	20.00	10.00	Row and Field Crops
471	3604864	1284200100	80.00	75.00	Tree Fruit
471	3604864	1284200500	40.00	18.00	Tree Fruit
472	C180697	1231202900	1.00	1.00	Tree Fruit
472	C180697	1231203000	5.00	5.00	Tree Fruit
472	C180697	1231203100	5.00	5.00	Tree Fruit
472	C180697	1231203200	1.00	1.00	Tree Fruit
473	C182262	1274207400	4.00	4.00	Tree Fruit
474	5912327	1220200200	40.00	40.00	Field Grown Nursery or Floral
474	5912327	1220200400	16.00	16.00	Field Grown Nursery or Floral
474	5912327	1220200500	4.20	4.20	Field Grown Nursery or Floral
474	5912327	1220200600	10.00	10.00	Field Grown Nursery or Floral
474	5912327	1220202800	10.00	10.00	Field Grown Nursery or Floral
474	5912327	1220204900	10.00	10.00	Field Grown Nursery or Floral
474	5912327	1220308000	74.00	70.00	Field Grown Nursery or Floral
474	5912327	1220902100	15.00	15.00	Field Grown Nursery or Floral
474	5912327	1220904100	12.50	12.50	Field Grown Nursery or Floral
474	5912327	2110222100	53.80	53.80	Field Grown Nursery or Floral
474	5912327	2110231100	45.60	45.60	Field Grown Nursery or Floral
474	5912327	2110231200	12.07	10.87	Field Grown Nursery or Floral
474	5912327	1220905600	21.00	21.00	Field Grown Nursery or Floral
474	5912327	1220905500	1.00	0.00	Other
474	5912327	1211501300	65.00	65.00	Tree Fruit
475	W252009	2771205900	8.00	4.00	Tree Fruit
476	C772636	1274801200	5.00	4.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
477	C648698	1275510700	4.00	3.00	Field Grown Nursery or Floral
477	C648698	1275510900	8.00	7.00	Field Grown Nursery or Floral
477	C648698	1275511000	6.50	6.00	Field Grown Nursery or Floral
478	C292059	1111304900	12.00	11.00	Tree Fruit
478	C292059	1332600200	7.00	7.00	Tree Fruit
478	C292059	1851134700	65.00	40.00	Tree Fruit
479	0576771	1891702800	13.62	5.00	Row and Field Crops
479	0576771	1891703100	20.14	12.00	Tree Fruit
479	0576771	1891703300	43.24	30.00	Tree Fruit
479	0576771	1891700800	24.20	8.00	Tree Fruit
480	C181865	1284800300	2.55	2.00	Tree Fruit
480	C181865	1284800600	10.06	6.00	Tree Fruit
481	C534994	1861006700	34.00	2.00	Tree Fruit
482	C182270	2651702300	3.26	0.92	Tree Fruit
483	C899517	2651500700	3.04	3.00	Tree Fruit
483	C899517	2651500800	3.37	2.75	Tree Fruit
483	C899517	2651500600	15.65	6.75	Tree Fruit
484	C905668	1072205000	6.00	3.00	Tree Fruit
485	C292283	1281603100	2.50	2.00	Field Grown Nursery or Floral
485	C292283	1252320700	10.50	6.00	Tree Fruit
486	C787051	1281704800	20.40	2.00	Tree Fruit
487	c182245	1270723800	10.00	10.00	Tree Fruit
487	c182245	1270724000	10.00	10.00	Tree Fruit
487	c182245	1270724100	5.00	5.00	Tree Fruit
487	c182245	1270724600	8.50	8.50	Tree Fruit
488	C786357	1093520500	5.00	5.00	Field Grown Nursery or Floral
488	C786357	1093521000	20.00	10.00	Field Grown Nursery or Floral
489	C787051	1281704700	8.25	5.00	Tree Fruit
490	C182413	2221431000	1.00	1.00	Container Nursery
492	C567961	2411800200	16.00	10.00	Tree Fruit
492	C567961	2411801700	2.00	2.00	Tree Fruit
493	C420023	1292120600	6.30	5.00	Tree Fruit
494	C937489	2410403200	4.89	3.89	Tree Fruit
495	C182665	3953110100	3.20	0.50	Container Nursery
496	C553297	1821408200	17.00	17.00	Tree Fruit
497	C784062	2601821500	1.00	0.50	Container Nursery
497	C784062	2601821600	1.00	0.50	Container Nursery
497	C784062	7601704600	5.00	3.00	Container Nursery
498	C725766	1263403100	2.50	1.00	Tree Fruit
499	9308700	1852601500	10.00	10.00	Tree Fruit
500	C990327	1080206300	5.20	4.00	Tree Fruit
500	C990327	1080206400	4.50	3.50	Tree Fruit
500	C990327	1080206500	8.50	7.00	Tree Fruit
500	C990327	1080206600	8.00	6.00	Tree Fruit
500	C990327	1242004100	2.20	2.00	Tree Fruit
500	C990327	1242033100	2.50	1.50	Tree Fruit
500	C990327	1242033200	2.30	2.00	Tree Fruit
500	C990327	1242033300	3.30	3.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
500	C990327	1242033400	4.00	4.00	Tree Fruit
500	C990327	1242033500	42.00	38.00	Tree Fruit
500	C990327	1242033800	4.00	4.00	Tree Fruit
500	C990327	1242033900	4.50	4.00	Tree Fruit
500	C990327	1242034000	4.70	4.50	Tree Fruit
500	C990327	1080206700	33.00	18.00	Tree Fruit
500	C990327	1881012800	17.00	15.00	Tree Fruit
501	C182338	1013705800	6.30	2.00	Field Grown Nursery or Floral
502	C814537	1054922900	4.00	3.00	Tree Fruit
503	C462423	1781803400	12.00	12.00	Tree Fruit
504	C866920	1851606600	9.30	8.00	Tree Fruit
505	C772694	1211212100	3.50	2.20	Tree Fruit
506	C899505	1330502200	37.00	4.00	Tree Fruit
507	C753404	1850110400	2.40	1.80	Field Grown Nursery or Floral
508	C182305	1024704100	4.00	3.00	Tree Fruit
509	C182597	2721322200	120.00	100.00	Container Nursery
510	C223135	1720215700	2.00	1.00	Tree Fruit
510	C223135	1720215800	3.40	2.00	Tree Fruit
511	C181977	2470102000	3.00	3.00	Grapes, Berries, and Vine Fruit
512	C182633	1100401300	78.50	60.35	Tree Fruit
512	C182633	1101200100	6.01	4.55	Tree Fruit
512	C182633	1101200700	3.06	2.99	Tree Fruit
512	C182633	1101200900	6.00	5.90	Tree Fruit
512	C182633	1251001000	27.21	8.82	Tree Fruit
512	C182633	1311400900	142.83	37.86	Tree Fruit
512	C182633	1311700900	4.59	2.41	Tree Fruit
513	C182633	1101200800	5.99	4.13	Tree Fruit
513	C182633	1101202300	2.99	3.02	Tree Fruit
513	C182633	1250630900	62.47	15.70	Tree Fruit
513	C182633	1311100600	599.17	0.22	Tree Fruit
513	C182633	1311700800	49.94	37.86	Tree Fruit
513	C182633	1311701000	4.63	1.82	Tree Fruit
513	C182633	1311800600	650.23	1.04	Tree Fruit
513	C182633	1311801900	257.52	118.12	Tree Fruit
514	C182506	1851813100	6.00	3.00	Tree Fruit
515	C182404	1320204200	8.00	7.00	Tree Fruit
516	0008139	1027001700	3.50	3.50	Tree Fruit
516	0008139	1027001800	3.50	3.50	Tree Fruit
516	0008139	1073301200	2.00	2.00	Tree Fruit
516	0008139	1073301300	6.00	6.00	Tree Fruit
516	0008139	1080310900	4.00	4.00	Tree Fruit
516	0008139	1080311400	3.50	3.50	Tree Fruit
516	0008139	1083011500	3.50	3.50	Tree Fruit
516	0008139	1093200300	12.00	10.00	Tree Fruit
517	C182480	1851020400	40.00	3.00	Tree Fruit
518	C182480	1851605100	5.00	3.00	Tree Fruit
519	C484170	1320810800	23.00	21.00	Tree Fruit
519	C484170	1333012400	4.50	4.00	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
519	C484170	1333012500	3.50	2.00	Tree Fruit
519	C484170	1333012600	2.20	1.00	Tree Fruit
519	C484170	1333012900	3.00	2.00	Tree Fruit
519	C484170	1333013000	3.30	2.00	Tree Fruit
520	C637107	2401111000	16.50	9.00	Tree Fruit
521	C402768	1300401700	13.00	6.50	Tree Fruit
522	C665300	1272107400	2.00	1.80	Tree Fruit
522	C665300	1272107500	2.00	1.80	Tree Fruit
523	3364450	1052910600	3.90	1.50	Tree Fruit
523	3364450	1052910700	2.00	2.00	Tree Fruit
523	3364450	1052910800	2.00	2.00	Tree Fruit
524	C568595	1055203400	3.75	2.00	Tree Fruit
525	C182366	2391605000	2.00	1.00	Tree Fruit
526	C899506	1100900200	40.00	3.00	Tree Fruit
527	1141312	1300802700	5.00	3.00	Grapes, Berries, and Vine Fruit
527	1141312	1300802800	5.00	2.00	Grapes, Berries, and Vine Fruit
527	1141312	1310602200	9.00	9.00	Tree Fruit
527	1141312	1882714900	54.00	44.00	Tree Fruit
527	1141312	1883212300	8.00	6.00	Tree Fruit
527	1141312	1883212400	2.00	2.00	Tree Fruit
527	1141312	1883212500	3.00	2.00	Tree Fruit
527	1141312	1883220300	7.00	3.00	Tree Fruit
527	1141312	1883220400	10.00	6.00	Tree Fruit
527	1141312	1300805000	20.00	20.00	Tree Fruit
527	1141312	1880820100	14.00	12.00	Tree Fruit
527	1141312	1882715000	14.00	12.00	Tree Fruit
528	H019432	1293004100	19.00	11.00	Tree Fruit
528	H019432	1293004300	18.00	14.00	Tree Fruit
528	H019432	1293004500	19.00	12.00	Tree Fruit
529	5572634	1733502300	2.50	1.25	Greenhouse Crops
529	5572634	1261804500	8.50	7.50	Tree Fruit
530	C888040	2344202600	1.00	1.00	Tree Fruit
531	C781015	5961903200	10.00	4.00	Tree Fruit
531	C781015	5970903100	5.00	4.00	Tree Fruit
531	C781015	5970904900	21.00	19.00	Tree Fruit
531	C781015	5970904600	4.00	1.00	Tree Fruit
532	C784066	1274001200	3.80	2.50	Tree Fruit
533	C182590	1111901900	5.25	4.00	Tree Fruit
534	C990125	1851805000	3.50	3.50	Tree Fruit
535	ME96913	1081004600	6.00	6.00	Tree Fruit
536	C664814	1057611500	2.00	2.00	Tree Fruit
537	C665065	1020840800	8.00	6.00	Tree Fruit
538	C899476	1070300700	1.75	1.40	Tree Fruit
538	C899476	1072502800	2.00	0.70	Tree Fruit
538	C899476	1072502900	2.50	0.50	Tree Fruit
539	C182317	2770304700	13.00	10.00	Tree Fruit
540	C180684	1275221200	5.50	5.00	Field Grown Nursery or Floral
540	C180684	1275221400	4.70	4.00	Field Grown Nursery or Floral

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
540	C180684	1275721300	6.80	5.00	Field Grown Nursery or Floral
540	C180684	1294202200	20.00	6.00	Field Grown Nursery or Floral
542	C805063	1021806300	13.00	9.00	Tree Fruit
542	C805063	1021808400	1.00	0.50	Tree Fruit
543	C846476	1291003000	15.70	12.50	Tree Fruit
543	C846476	1291006600	9.95	8.50	Tree Fruit
543	C846476	1291006700	5.99	3.00	Tree Fruit
543	C846476	1292910700	4.50	4.00	Tree Fruit
543	C846476	1330502900	4.50	4.50	Tree Fruit
543	C846476	1330503000	10.00	9.50	Tree Fruit
544	C182359	1830121900	2.25	1.00	Greenhouse Crops
544	C182359	1830122200	2.00	1.00	Greenhouse Crops
545	C182484	1320606000	6.00	3.50	Tree Fruit
546	C443473	1051122400	1.00	0.70	Tree Fruit
547	C180637	1280910700	13.00	13.00	Tree Fruit
548	C182375	2220305300	50.00	20.00	Tree Fruit
548	C182375	2220305400	60.00	30.00	Tree Fruit
549	C182547	2783510400	2.50	0.50	Grapes, Berries, and Vine Fruit
549	C182547	2783513700	2.30	1.50	Grapes, Berries, and Vine Fruit
550	0011708	1251330100	28.50	12.00	Tree Fruit
551	C550637	1811804300	1.00	0.50	Field Grown Nursery or Floral
551	C550637	1811808200	15.00	3.50	Field Grown Nursery or Floral
551	C550637	1811808300	2.00	1.00	Field Grown Nursery or Floral
552	W251788	2652602000	9.35	4.20	Tree Fruit
553	C805006	1282402400	9.52	8.50	Tree Fruit
554	0017628	1282401200	11.20	10.00	Tree Fruit
555	C182369	2221022200	2.30	1.00	Other
555	C182369	2221022600	2.58	2.00	Tree Fruit
555	C182369	2221022700	4.65	4.00	Tree Fruit
556	C291979	5180104400	7.90	1.00	Container Nursery
557	C420018	2651401500	1.50	1.50	Tree Fruit
558	C182341	2760231600	12.80	8.00	Tree Fruit
559	C888190	2650800900	3.39	1.75	Tree Fruit
560	C278483	1211902900	26.00	26.00	Tree Fruit
561	C278483	1211903000	52.00	47.00	Tree Fruit
561	C278483	1220302700	40.00	20.00	Tree Fruit
561	C278483	1220302800	80.00	52.00	Tree Fruit
561	C278483	1220308400	40.00	40.00	Tree Fruit
562	C278483	1211731000	2.30	2.30	Tree Fruit
562	C278483	1211731100	2.30	2.30	Tree Fruit
562	C278483	1211731200	2.30	2.30	Tree Fruit
562	C278483	1211731300	2.30	2.30	Tree Fruit
562	C278483	1211731400	2.30	2.30	Tree Fruit
562	C278483	1211731500	2.30	2.30	Tree Fruit
562	C278483	1211731600	2.30	2.30	Tree Fruit
562	C278483	1211731700	2.30	2.30	Tree Fruit
562	C278483	1211731800	2.30	2.30	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
562	C278483	1211731900	2.30	2.30	Tree Fruit
562	C278483	1211732000	2.30	2.30	Tree Fruit
562	C278483	1211732100	2.30	2.30	Tree Fruit
562	C278483	1211732200	2.30	2.30	Tree Fruit
562	C278483	1220308500	40.00	20.00	Tree Fruit
563	C182275	2651020900	8.75	8.75	Tree Fruit
564	C739427	1300103800	37.00	37.00	Tree Fruit
564	C739427	1300103900	18.00	15.00	Tree Fruit
564	C739427	1300104000	33.00	33.00	Tree Fruit
564	C739427	1300104100	12.00	10.00	Tree Fruit
564	C739427	1333803200	4.00	3.00	Tree Fruit
564	C739427	1900801800	70.00	20.00	Tree Fruit
564	C739427	1900802000	120.00	15.00	Tree Fruit
564	C739427	2401400200	40.00	37.00	Tree Fruit
565	C893019	1281600500	45.00	35.00	Field Grown Nursery or Floral
565	C893019	1252324600	5.50	5.50	Tree Fruit
565	C893019	1252324800	7.00	5.00	Tree Fruit
566	C664810	1014600200	7.14	3.75	Tree Fruit
567	C545811	1292702800	11.14	10.25	Tree Fruit
567	C545811	1292702900	7.41	5.75	Tree Fruit
568	C180664	2640313000	5.38	4.53	Tree Fruit
568	C180664	2640313100	4.93	4.03	Tree Fruit
569	C182348	1274902500	6.71	4.90	Tree Fruit
570	C182271	2663404000	2.96	2.00	Tree Fruit
571	C725811	1741122500	2.00	1.25	Container Nursery
571	C725811	1741120400	2.50	1.12	Container Nursery
571	C725811	1741120700	2.00	1.25	Container Nursery
573	0030633	2412930100	1.00	0	Other
573	0030633	2420205600	3.00	0	Other
573	0030633	2412930300	20.00	13	Tree Fruit
573	0030633	2420204800	17.00	4	Tree Fruit
574	ME89455	1274000400	3.06	2	Tree Fruit
575	C182685	1271510200	4.00	3	Tree Fruit
576	C805035	1722200500	19.66	9	Tree Fruit
576	C805035	1866010900	23.83	16	Tree Fruit
578	C182571	1280710500	26.44	21	Tree Fruit
578	C182571	1283301700	19.72	16	Tree Fruit
579	C182548	1853800100	7.00	6	Tree Fruit
580	C846042	1274400900	2.85	1.75	Tree Fruit
581	C750064	2802003300	7.00	5	Tree Fruit
582	C939869	1300500100	2.59	0.00	Container Nursery
582	C939869	1300501500	42.05	39.00	Container Nursery
582	C939869	1300501700	49.77	45.00	Container Nursery
582	C939869	1300504200	4.42	4.42	Container Nursery
582	C939869	1300504300	4.34	3.50	Container Nursery
582	C939869	1300504400	4.80	4.00	Container Nursery
582	C939869	1300504500	5.07	5.00	Container Nursery
582	C939869	1300601300	100.97	95.00	Container Nursery

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
582	C939869	1300601600	126.63	120.00	Container Nursery
582	C939869	1300800500	10.00	9.00	Container Nursery
582	C939869	1300803000	88.52	85.00	Container Nursery
582	C939869	1320902300	105.43	90.00	Container Nursery
582	C939869	1320902500	1.00	0.00	Container Nursery
582	C939869	1320902700	10.92	10.00	Container Nursery
582	C939869	1330205300	2.33	2.33	Container Nursery
582	C939869	1330205400	1.00	1	Container Nursery
582	C939869	1330205500	9.40	8.00	Container Nursery
582	C939869	1330401000	3.75	3.50	Container Nursery
582	C939869	1330401200	3.75	3.50	Container Nursery
582	C939869	1330401400	7.73	7.50	Container Nursery
582	C939869	1330401600	6.97	6.50	Container Nursery
582	C939869	1332600800	7.18	7.00	Container Nursery
582	C939869	1870416100	103.72	78	Container Nursery
582	C939869	1870420600	10.53	2.00	Container Nursery
582	C939869	8420710900	1.00	1	Container Nursery
582	C939869	8420711600	1.00	1	Container Nursery
582	C939869	8420810800	1.00	1	Container Nursery
582	C939869	8420810900	1.00	1	Container Nursery
582	C939869	8420812500	1.00	1	Container Nursery
583	C182667	1300102600	25.00	25	Field Grown Nursery or Floral
583	C182667	1300102800	49.00	35	Field Grown Nursery or Floral
583	C182667	1300103300	18.00	0	Field Grown Nursery or Floral
584	w254460	4815000800	0.50	0	Greenhouse Crops
585	C880187	1873705700	0.70	0.6	Tree Fruit
585	C880187	2241002700	9.80	9	Tree Fruit
585	C880187	2241003400	5.50	5	Tree Fruit
585	C880187	2241007700	2.30	2	Tree Fruit
585	C880187	2241007800	10.70	10	Tree Fruit
585	C880187	2241007900	4.50	2.5	Tree Fruit
585	C880187	2241008000	2.80	2.2	Tree Fruit
585	C880187	2274302000	22.50	17	Tree Fruit
585	C880187	2274302100	1.40	0.5	Tree Fruit
586	C182238	1851812700	3.50	2	Tree Fruit
587	C867300	1311000100	6.99	6	Tree Fruit
587	C867300	1311000200	10.20	9.2	Tree Fruit
588	C181179	1013605000	28.39	1	Other
588	C181179	1013605100	38.52	7.75	Tree Fruit
588	C181179	1013605200	35.23	1	Tree Fruit
588	C181179	1013613400	3.02	3.02	Tree Fruit
588	C181179	1013615700	3.72	3.72	Tree Fruit
588	C181179	1016615600	5.04	5.04	Tree Fruit
589	C664829	2920101500	10.00	10	Tree Fruit
590	C899507	1571007200	227.00	132.5	Row and Field Crops
595	C899507	1220904700	1.50	1.5	Row and Field Crops
596	C181846	2411400900	2.17	1.83	Tree Fruit
596	C181846	2411401000	1.50	0.4	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
597	ME95253	1283801200	12.53	12.53	Tree Fruit
597	ME95253	1283801300	6.24	6.24	Tree Fruit
597	ME95253	1283902700	30.22	30.22	Tree Fruit
598	C182477	1881611500	3.00	1	Container Nursery
599	C665138	1782221400	20.00	6	Container Nursery
599	C665138	1821404500	7.00	4	Container Nursery
600	C182474	1290401000	21.00	17	Tree Fruit
601	C180837	1280701800	8.81	8.31	Tree Fruit
601	C180837	1280702500	105.95	80	Tree Fruit
601	C180837	1281610100	75.52	65	Tree Fruit
601	C180837	1281610200	35.70	35.69	Tree Fruit
601	C180837	1281610300	16.30	14	Tree Fruit
601	C180837	1281710100	13.87	0	Tree Fruit
601	C180837	1281710200	50.71	50	Tree Fruit
602	C059972	1281804000	16.00	16	Tree Fruit
602	C059972	1281804400	1.00	1	Tree Fruit
602	C059972	1282111600	17.82	17	Tree Fruit
602	C059972	2250406800	2.24	1.5	Tree Fruit
602	C059972	2250406900	1.00	0.5	Tree Fruit
602	C059972	2250409500	0.00	0	Tree Fruit
602	C059972	2250410200	0.84	0	Tree Fruit
602	C059972	2250410400	3.02	2	Tree Fruit
602	C059972	2250410600	1.00	0.5	Tree Fruit
602	C059972	2250410700	1.00	0.5	Tree Fruit
602	C059972	2250410900	60.50	40	Tree Fruit
602	C059972	2283131300	25.00	20	Tree Fruit
602	C059972	2320130100	32.64	28	Tree Fruit
602	C059972	2371505200	1.90	0.5	Tree Fruit
602	C059972	2371505300	1.03	1	Tree Fruit
602	C059972	7601708800	105.50	55	Tree Fruit
603	C739428	1900620300	30.57	0	Other
603	C739428	1900620400	10.37	0	Other
603	C739428	1901500800	1.10	0	Other
603	C739428	1901500900	33.83	0	Other
603	C739428	1900620500	41.53	9	Tree Fruit
604	C665363	1281020600	3.00	1	Tree Fruit
604	C665363	1281020605	4.00	3	Tree Fruit
604	C665363	1291620400	10.00	2	Tree Fruit
604	C665363	1291620500	10.00	2	Tree Fruit
606	C182229	1293201100	62.00	25	Tree Fruit
607	C442464	1294210700	62.01	0	Field Grown Nursery or Floral
607	C442464	1294201400	20.68	0	Other
607	C442464	1332203900	22.98	0	Other
607	C442464	1252323300	21.45	20	Tree Fruit
607	C442464	1281501500	41.53	40	Tree Fruit
607	C442464	1281501600	41.63	40	Tree Fruit
607	C442464	1281602200	90.37	70	Tree Fruit
607	C442464	1281602500	7.64	7	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
607	C442464	1281602600	51.56	50	Tree Fruit
607	C442464	1281603900	1.00	1	Tree Fruit
607	C442464	1281604000	26.30	25	Tree Fruit
607	C442464	1283900700	45.08	40	Tree Fruit
607	C442464	1294201500	20.60	0	Tree Fruit
607	C442464	1294210900	72.08	0	Tree Fruit
607	C442464	1294212000	15.46	0	Tree Fruit
607	C442464	1300801600	13.21	12	Tree Fruit
607	C442464	1300900600	4.29	4	Tree Fruit
607	C442464	1301000100	78.55	75	Tree Fruit
607	C442464	1310101300	4.95	4.95	Tree Fruit
607	C442464	1311000300	20.64	20	Tree Fruit
607	C442464	1311000400	1.00	1	Tree Fruit
607	C442464	1311001200	5.00	5	Tree Fruit
607	C442464	1311001400	6.22	6	Tree Fruit
607	C442464	1311001700	3.88	3	Tree Fruit
607	C442464	1311500200	20.00	20	Tree Fruit
607	C442464	1311501000	40.30	40	Tree Fruit
607	C442464	1311602000	10.73	10	Tree Fruit
607	C442464	1311602100	10.00	10	Tree Fruit
607	C442464	1311602900	2.13	2	Tree Fruit
607	C442464	1321503300	49.14	45	Tree Fruit
607	C442464	1321503400	44.77	42	Tree Fruit
607	C442464	1321503500	41.64	40	Tree Fruit
607	C442464	1321601500	41.20	40	Tree Fruit
607	C442464	1321601700	40.00	40	Tree Fruit
607	C442464	1321601900	40.08	40	Tree Fruit
607	C442464	1321602000	21.11	40	Tree Fruit
607	C442464	1321602100	4.63	4	Tree Fruit
607	C442464	1321602700	27.52	25	Tree Fruit
607	C442464	1321602800	24.10	22	Tree Fruit
607	C442464	1321602900	13.62	12	Tree Fruit
607	C442464	1321603200	39.90	38	Tree Fruit
607	C442464	1321900900	6.38	6	Tree Fruit
607	C442464	1321901900	5.44	5	Tree Fruit
607	C442464	1321902000	1.77	1	Tree Fruit
607	C442464	1322201600	1.91	1	Tree Fruit
607	C442464	1322201700	10.28	10	Tree Fruit
607	C442464	1322201900	25.00	25	Tree Fruit
607	C442464	1322203500	10.26	10	Tree Fruit
607	C442464	1322203600	10.87	10	Tree Fruit
607	C442464	1322203700	9.70	9	Tree Fruit
607	C442464	1322203900	10.11	10	Tree Fruit
607	C442464	1324400700	8.34	8	Tree Fruit
607	C442464	1324400900	5.20	5	Tree Fruit
607	C442464	1324401000	3.06	3	Tree Fruit
607	C442464	1324401300	4.86	4	Tree Fruit
607	C442464	1330205200	2.66	2	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
607	C442464	1330600600	21.58	20	Tree Fruit
607	C442464	1332012500	43.03	0	Tree Fruit
607	C442464	1332012600	43.03	0	Tree Fruit
607	C442464	2342604200	2.11	2	Tree Fruit
607	C442464	2342604300	2.05	2	Tree Fruit
607	C442464	2410402300	4.34	4	Tree Fruit
607	C442464	2410402500	4.13	4	Tree Fruit
607	C442464	2411210300	3.31	3	Tree Fruit
607	C442464	2411300900	3.82	3	Tree Fruit
607	C442464	2411301000	2.79	2	Tree Fruit
607	C442464	2411301100	1.32	1	Tree Fruit
607	C442464	2411302000	3.02	3	Tree Fruit
607	C442464	2411400100	5.32	5	Tree Fruit
607	C442464	2412402400	1.00	1	Tree Fruit
607	C442464	1332203800	19.89	0	Tree Fruit
607	C442464	1332204000	43.51	0	Tree Fruit
608	C764427	1275210800	10.00	6	Tree Fruit
608	C764427	1275210900	10.00	10	Tree Fruit
609	C781017	2401412600	183.00	0	Other
609	C781017	2401410300	63.00	6	Tree Fruit
610	C182448	1083001900	5.00	2	Tree Fruit
611	C182632	1275220800	30.00	26	Tree Fruit
612	ME72564	1224500800	3.00	3	Tree Fruit
613	C888187	1083601100	9.00	9	Tree Fruit
614	C182449	1284605800	4.00	4	Tree Fruit
615	C180768	1241720300	4.00	3.5	Tree Fruit
616	C406666	1330301000	1.00	1	Tree Fruit
616	C406666	1330301200	1.00	1	Tree Fruit
616	C406666	1331903900	2.00	2	Tree Fruit
616	C406666	1331904000	0.30	0.3	Tree Fruit
616	C406666	1332600600	6.00	5	Tree Fruit
616	C406666	1324401400	5.00	4	Tree Fruit
616	C406666	1330301300	2.00	1	Tree Fruit
617	C182370	1057600200	3.00	3	Tree Fruit
618	C487567	1310900800	6.50	5	Tree Fruit
619	C182315	1083206400	12.00	12	Tree Fruit
619	C182315	1083206500	12.00	12	Tree Fruit
619	C182315	1083206600	12.00	12	Tree Fruit
620	C182470	1100212400	45.00	29	Tree Fruit
621	C182372	1027711300	2.80	2.8	Tree Fruit
621	C182372	1027711400	2.00	2	Tree Fruit
622	C182727	1057600500	2.50	2	Tree Fruit
623	C182615	1072405300	2.65	2	Tree Fruit
624	C182353	1026806200	4.00	2	Tree Fruit
625	C777777	1211006000	6.50	2	Tree Fruit
627	C361611	2791311600	11.68	6.5	Tree Fruit
628	C546595	1251130100	19.90	8	Tree Fruit
629	C182297	1700510200	1.00	1	Container Nursery

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
630	C182397	1082711500	11.50	11.5	Tree Fruit
630	C182397	1282711600	9.80	9.8	Tree Fruit
631	C182513	1291006200	12.00	10	Tree Fruit
631	C182513	1291007800	9.30	6	Tree Fruit
632	C182367	1014205000	3.80	3	Tree Fruit
633	C777787	1512001900	0.50	0.5	Container Nursery
633	C777787	1512002000	1.50	1.5	Container Nursery
633	C777787	1512005300	2.00	2	Container Nursery
634	C717755	2411003100	34.00	24	Tree Fruit
635	C789181	1022804300	10.60	10	Tree Fruit
636	C419895	1320608200	2.00	2	Tree Fruit
636	C419895	1320608300	16.00	15	Tree Fruit
637	C182423	1021053300	4.60	3	Tree Fruit
638	C182395	1873500800	9.73	0	Other
638	C182395	1873500900	5.00	0	Other
638	C182395	1873501000	3.07	0	Other
638	C182395	1873501100	10.29	0	Other
638	C182395	1873501200	19.54	0	Other
638	C182395	1873501700	40.25	0	Other
638	C182395	1873510100	33.77	33	Tree Fruit
638	C182395	1873510200	2.36	1	Tree Fruit
638	C182395	1873510300	2.27	2.27	Tree Fruit
638	C182395	1873510400	1.99	1	Tree Fruit
638	C182395	1873510500	0.83	0.83	Tree Fruit
638	C182395	1873510600	7.15	7.15	Tree Fruit
638	C182395	1876232800	32.65	30	Tree Fruit
638	C182395	2241001100	9.21	8.5	Tree Fruit
638	C182395	2241003300	3.00	1	Tree Fruit
638	C182395	2241004000	8.38	8.38	Tree Fruit
638	C182395	2241004300	5.38	5.38	Tree Fruit
638	C182395	2241004500	3.01	1.5	Tree Fruit
638	C182395	2241004600	8.73	8	Tree Fruit
638	C182395	2241004700	4.13	4.13	Tree Fruit
638	C182395	2250102900	14.33	13	Tree Fruit
638	C182395	2250103010	2.11	2	Tree Fruit
638	C182395	2250103100	0.22	0.22	Tree Fruit
638	C182395	2250103200	3.56	3	Tree Fruit
638	C182395	2250103600	25.26	24	Tree Fruit
639	C571709	1101200200	4.00	4	Tree Fruit
639	C571709	1101200300	6.50	6.5	Tree Fruit
640	C182699	2241804600	0.25	0.25	Tree Fruit
640	C182699	2336220900	0.50	0.25	Tree Fruit
640	C182699	2336221000	1.00	0.5	Tree Fruit
640	C182699	2336231400	0.50	0.5	Tree Fruit
640	C182699	2341805400	0.75	0.5	Tree Fruit
641	C182467	1100601600	7.50	7	Tree Fruit
642	C665342	1850111800	2.10	2	Field Grown Nursery or Floral
642	C665342	1850112800	2.30	1.5	Field Grown Nursery or Floral

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
642	C665342	1850112900	3.60	3.1	Field Grown Nursery or Floral
643	C546597	2761401700	40.00	3	Grapes, Berries, and Vine Fruit
644	C182545	2870311200	9.03	1	Grapes, Berries, and Vine Fruit
645	C182726	1821801300	8.00	7	Tree Fruit
646	C519775	1271105800	18.91	18	Tree Fruit
647	C900426	2760302800	3.55	2.5	Tree Fruit
648	C182634	4850424100	2.50	1.5	Tree Fruit
649	2955900	1100600100	39.93	11	Tree Fruit
649	2955900	1100600200	39.70	15	Tree Fruit
649	2955900	1100600600	37.19	8.82	Tree Fruit
649	2955900	1100601700	6.18	6.18	Tree Fruit
649	2955900	1310500200	24.00	24	Tree Fruit
649	2955900	1310500300	24.00	24	Tree Fruit
649	2955900	1310500400	23.00	23	Tree Fruit
649	2955900	1310500500	1.00	0.5	Tree Fruit
649	2955900	1310802200	8.50	8	Tree Fruit
649	2955900	1310802300	7.50	7.5	Tree Fruit
649	2955900	1310802400	20.00	20	Tree Fruit
649	2955900	1310802500	32.00	32	Tree Fruit
650	4358325	5031322600	0.56	0.42	Container Nursery
650	4358325	5031323000	0.61	0.3	Container Nursery
650	4358325	5031323100	0.14	0.11	Container Nursery
650	4358325	5032421500	0.73	0.2	Container Nursery
650	4358325	5032421900	0.44	0.22	Container Nursery
650	4358325	5032422000	0.34	0.16	Container Nursery
650	4358325	5032422100	0.30	0.2	Container Nursery
650	4358325	5032513800	0.27	0.22	Container Nursery
650	4358325	5032514900	0.57	0.46	Container Nursery
651	C182563	1070802600	4.00	3	Tree Fruit
651	C182563	1070803200	1.10	1	Tree Fruit
652	C182532	1702103600	12.06	12	Tree Fruit
652	C182532	1861425500	20.00	15	Tree Fruit
653	C182556	1292922700	2.50	0.5	Tree Fruit
653	C182556	1292922800	2.50	1	Tree Fruit
654	C805057	1342400300	56.00	33	Tree Fruit
655	C777769	1012102200	4.84	3	Tree Fruit
655	C777769	1012102300	17.46	15	Tree Fruit
656	C762671	1574121400	18.92	16	Row and Field Crops
657	C568223	1333612000	2.50	1	Field Grown Nursery or Floral
659	C867563	2640421000	5.00	5	Container Nursery
660	C182364	1102800100	12.00	10	Tree Fruit
661	C657582	2401008400	17.00	13	Tree Fruit
662	C180743	1852604900	31.00	2	Field Grown Nursery or Floral
662	C180743	1852605000	57.00	10	Field Grown Nursery or Floral
663	C182429	1320811900	12.00	8	Tree Fruit
664	C182301	1333012000	5.00	3	Tree Fruit
665	C777773	1211902700	3.30	2.75	Tree Fruit
665	C777773	1211902800	2.50	1.5	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
665	C777773	1211902600	2.75	2.4	Tree Fruit
666	C182304	1281012600	3.00	3	Tree Fruit
666	C182304	1310602300	7.77	7.77	Tree Fruit
666	C182304	1310602400	7.69	7.69	Tree Fruit
666	C182304	1320812000	18.00	18	Tree Fruit
666	C182304	1322903000	41.00	27	Tree Fruit
666	C182304	1340900600	18.00	16	Tree Fruit
666	C182304	1340902900	25.00	20	Tree Fruit
667	C182456	2224400900	6.08	3.5	Tree Fruit
667	C182456	2224401600	7.35	4	Tree Fruit
668	C624018	1283302400	5.00	0	Tree Fruit
668	C624018	1283302500	5.00	1	Tree Fruit
669	C292447	1073003600	6.34	3.75	Field Grown Nursery or Floral
669	C292447	1073003700	5.02	3.6	Field Grown Nursery or Floral
669	C292447	1073003800	5.61	4.75	Field Grown Nursery or Floral
669	C292447	1073003900	5.05	4.5	Field Grown Nursery or Floral
669	C292447	1082910800	3.00	0.7	Field Grown Nursery or Floral
670	C207492	1901200600	115.00	35	Tree Fruit
671	C990253	1301001000	46.86	31.9	Tree Fruit
671	C990253	1301001100	24.41	16.6	Tree Fruit
671	C990253	1311600600	20.00	20	Tree Fruit
671	C990253	1311601200	40.00	33	Tree Fruit
671	C990253	1311601300	23.60	20	Tree Fruit
671	C990253	1320900200	32.58	12.5	Tree Fruit
672	1886827	1323511100	2.50	1.25	Field Grown Nursery or Floral
672	1886827	1851231200	2.00	1.25	Field Grown Nursery or Floral
672	1886827	1851231000	2.00	1.75	Greenhouse Crops
672	1886827	1881404500	3.80	2.5	Greenhouse Crops
673	C733665	1062801000	53.00	10.3	Tree Fruit
674	8609362	1281905200	23.00	12	Tree Fruit
675	C182592	2841103100	10.00	1	Grapes, Berries, and Vine Fruit
676	A030564	1281220300	1.25	1	Tree Fruit
677	C777785	1129091500	3.00	2.5	Tree Fruit
678	C182525	1282924100	2.70	1.5	Tree Fruit
679	C182579	1260805500	2.70	2	Tree Fruit
680	C181594	1294002300	5.00	4	Tree Fruit
681	C182712	5992002800	10.00	1	Grapes, Berries, and Vine Fruit
684	C888069	1211721500	14.00	13	Container Nursery
684	C888069	1220801300	3.50	3	Container Nursery
684	C888069	1220801700	4.00	3.5	Container Nursery
684	C888069	1220905800	10.00	9	Container Nursery
684	C888069	1070910100	4.30	3.9	Field Grown Nursery or Floral
684	C888069	1070910300	6.30	5.7	Field Grown Nursery or Floral
684	C888069	1070910400	6.30	5.7	Field Grown Nursery or Floral
685	C180839	2561211700	0.89	0.89	Greenhouse Crops
686	ME96206	1294000700	8.00	6	Tree Fruit
686	ME96206	1850724000	8.00	7	Tree Fruit
686	ME96206	1851123400	2.50	2	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
687	7185700	1281012500	10.00	9	Tree Fruit
687	7185700	1866124500	7.98	7.98	Tree Fruit
687	7185700	1866124600	7.96	7.96	Tree Fruit
687	7185700	1866124700	7.66	7.66	Tree Fruit
687	7185700	1866124800	12.06	9.06	Tree Fruit
688	C786937	2771204600	9.00	7.5	Tree Fruit
688	C786937	2771204700	9.00	7.5	Tree Fruit
689	C783545	1274301000	3.60	1.5	Tree Fruit
691	C888126	1721301700	7.82	7.5	Field Grown Nursery or Floral
691	C888126	1721301800	2.20	1.5	Field Grown Nursery or Floral
691	C888126	1721302000	10.02	9	Field Grown Nursery or Floral
692	ME96921	1024901500	1.95	1.95	Tree Fruit
692	ME96921	1024901000	4.00	4	Tree Fruit
694	C944646	1881404600	3.00	1.5	Greenhouse Crops
694	C944646	1882901400	8.00	2	Greenhouse Crops
694	C944646	2800630400	15.00	7	Greenhouse Crops
695	C182598	2652311140	8.34	2.75	Tree Fruit
695	C182598	2652311300	41.18	32.94	Tree Fruit
695	C182598	2653801000	4.52	4.52	Tree Fruit
695	C182598	2653801100	6.51	6	Tree Fruit
695	C182598	2653801200	11.68	7.1	Tree Fruit
696	C182723	5430331400	1.00	1	Container Nursery
697	C407045	1275221100	5.50	2.5	Tree Fruit
698	C556035	1841810400	5.63	1.16	Greenhouse Crops
699	C506729	1290912400	24.50	5	Tree Fruit
700	C568738	2340404100	2.06	2	Tree Fruit
700	C568738	2410100300	1.19	0.5	Tree Fruit
700	C568738	2410102600	4.74	4	Tree Fruit
700	C568738	2410102900	41.19	38	Tree Fruit
700	C568738	2410103000	1.29	0.3	Tree Fruit
700	C568738	2410103100	3.83	1	Tree Fruit
700	C568738	2410103200	1.44	0.3	Tree Fruit
700	C568738	2410103300	3.68	2	Tree Fruit
700	C568738	2410210200	38.48	6.5	Tree Fruit
700	C568738	2410410400	19.96	15	Tree Fruit
700	C568738	2410102500	2.29	1.66	Tree Fruit
701	C180638	1781801900	20.00	20	Tree Fruit
701	C180638	1781803100	12.50	8	Tree Fruit
702	ME70681	2760805800	5.00	2.5	Grapes, Berries, and Vine Fruit
703	C657608	1210620500	3.91	3.5	Tree Fruit
704	C663573	2760220400	5.00	5	Tree Fruit
704	C663573	2760220500	5.00	4	Tree Fruit
704	C663573	2760220600	5.00	4	Tree Fruit
704	C663573	2760220700	5.00	4	Tree Fruit
705	C182394	1014601800	2.68	2	Tree Fruit
706	W252639	2660530600	4.25	1.5	Tree Fruit
707	C182213	1271110500	2.54	2.54	Tree Fruit
708	C182663	1014700300	2.30	2	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
709	C182529	1292910600	7.80	5	Tree Fruit
710	C181870	2813211700	8.50	3.3	Grapes, Berries, and Vine Fruit
712	C792208	1261803000	5.00	4	Tree Fruit
712	C792208	1260503300	8.00	5	Tree Fruit
712	C792208	1260505100	7.00	3	Tree Fruit
715	W254405	2411800300	6.90	3	Tree Fruit
716	W251716	2544001200	1.80	1	Field Grown Nursery or Floral
717	C182043	1820710500	2.75	2.25	Container Nursery
718	C402802	1274800400	8.90	4	Tree Fruit
719	C182624	3270114000	43.00	3	Grapes, Berries, and Vine Fruit
720	C738098	2770501200	9.50	8.5	Tree Fruit
721	W251891	1080421000	6.00	2	Tree Fruit
722	C420034	1015001100	3.00	1	Tree Fruit
725	C378338	1014601600	2.90	2	Tree Fruit
725	C378338	1014601700	2.70	2.7	Tree Fruit
726	C182253	96400000	10.00	6	Tree Fruit
727	0020972	1870422900	10.00	6	Tree Fruit
728	0020972	1870420300	10.00	10	Field Grown Nursery or Floral
729	0020972	1870423000	10.00	10	Field Grown Nursery or Floral
730	C182292	1054922700	5.20	4.5	Tree Fruit
731	H055317	2840707300	8.90	1.3	Grapes, Berries, and Vine Fruit
732	C571667	1821323200	10.40	8	Grapes, Berries, and Vine Fruit
734	C182276	1024704000	5.00	3	Tree Fruit
734	C182276	1034703100	5.00	3	Tree Fruit
735	C823685	1026305700	10.00	6	Container Nursery
736	C182037	1850421900	5.00	1	Tree Fruit
736	C182037	1850422000	5.70	5	Tree Fruit
737	C641840	1320200700	10.77	0	Tree Fruit
737	C641840	1320201600	32.46	22	Tree Fruit
737	C641840	1320202500	10.50	9.5	Tree Fruit
737	C641840	1320202800	59.30	30	Tree Fruit
737	C641840	1320202900	37.73	30	Tree Fruit
737	C641840	1320203700	10.00	0	Tree Fruit
737	C641840	1320204900	97.74	75	Tree Fruit
737	C641840	1320205000	43.12	40	Tree Fruit
737	C641840	1320205100	62.55	32	Tree Fruit
737	C641840	1320810100	18.84	17	Tree Fruit
737	C641840	1320810200	35.10	20	Tree Fruit
737	C641840	1320813700	8.30	8	Tree Fruit
737	C641840	1320813800	8.30	8	Tree Fruit
737	C641840	1320813900	11.03	9.03	Tree Fruit
737	C641840	1321200700	51.50	0	Tree Fruit
737	C641840	1322503900	8.18	8	Tree Fruit
737	C641840	1322504100	16.07	15	Tree Fruit
738	C765130	3870810900	5.15	3.5	Other
738	C765130	3870840200	2.54	2	Other
738	C765130	3870840300	2.23	1.55	Other
739	C805054	1722104000	5.00	5	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
740	C182274	1271414900	15.75	11	Tree Fruit
741	C442904	1330100500	76.19	18	Grapes, Berries, and Vine Fruit
741	C442904	1110300200	25.32	2.5	Tree Fruit
741	C442904	1330100700	3.38	3.38	Tree Fruit
741	C442904	1330100800	10.00	6.5	Tree Fruit
741	C442904	1330100900	41.31	41.31	Tree Fruit
741	C442904	1331100600	100.00	40	Tree Fruit
741	C442904	1330100600	30.00	7.62	Tree Fruit
742	C926954	2410200900	8.40	8	Tree Fruit
744	C182421	2621900500	2.87	1	Tree Fruit
745	C759416	9227925000	2.90	2.1	Tree Fruit
746	C647618	2420800400	260.00	210	Tree Fruit
747	C182552	2840422200	4.00	1	Grapes, Berries, and Vine Fruit
748	C181888	4100302300	38.00	10	Grapes, Berries, and Vine Fruit
749	C710654	4023003600	3.16	2	Tree Fruit
750	C150240	1866010500	15.00	12	Tree Fruit
751	C180852	1332901800	4.00	4	Tree Fruit
754	C182436	1251332100	5.00	4	Field Grown Nursery or Floral
754	C182436	1251332200	5.00	3	Field Grown Nursery or Floral
754	C182436	1251332300	10.00	7	Field Grown Nursery or Floral
755	C182544	1863220600	2.50	1.5	Tree Fruit
756	C663167	1820761900	3.14	1.24	Greenhouse Crops
757	C736908	2780801700	30.90	12	Tree Fruit
758	C182400	1054911600	3.00	3	Tree Fruit
759	C182029	1213113100	2.00	2	Tree Fruit
759	C182029	1213113200	2.00	1.5	Tree Fruit
759	C182029	1213113300	3.80	2.5	Tree Fruit
760	C182337	1025800700	20.00	18	Tree Fruit
760	C182337	1025800800	10.00	8	Tree Fruit
760	C182337	1025800900	10.00	9	Tree Fruit
761	C182455	1292122000	5.00	2	Tree Fruit
762	C327892	1862905100	4.00	3	Greenhouse Crops
763	C182606	1271420200	8.00	6.6	Tree Fruit
764	C361308	2481001700	84.00	1	Row and Field Crops
764	C361308	2481101000	81.00	1	Row and Field Crops
765	C182287	1221800900	10.00	8	Tree Fruit
765	C182287	1221802700	3.00	3	Tree Fruit
765	C182287	1221802800	3.00	3	Tree Fruit
766	C182439	1290714800	5.00	5	Tree Fruit
768	C182626	1284500100	40.00	0.5	Tree Fruit
769	C182414	1213123100	3.25	2	Tree Fruit
770	C378335	1271511100	10.00	9	Tree Fruit
771	C182240	1220904300	2.50	2	Tree Fruit
771	C182240	1220904400	2.50	2	Tree Fruit
772	C371638	1027710400	6.00	6	Tree Fruit
774	ME96206	1851607300	6.00	5.5	Tree Fruit
775	C292078	2402100600	3.80	1	Tree Fruit
777	C182437	1100710200	11.00	8	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
777	C182437	1100710400	11.00	5	Tree Fruit
777	C182437	1103500300	15.00	12	Tree Fruit
778	C990712	1252201400	2.10	0.07	Tree Fruit
779	C927178	2250103800	7.63	6	Tree Fruit
780	ME95032	1212010500	4.20	2	Tree Fruit
781	C182419	1291006000	4.70	2	Tree Fruit
782	8609300	2341522800	3.14	2	Tree Fruit
783	C182445	2224501700	1.50	1	Tree Fruit
784	C182323	1252313000	8.00	5.5	Tree Fruit
785	C844776	1272211000	9.00	9	Field Grown Nursery or Floral
785	C844776	1275300300	5.00	4	Field Grown Nursery or Floral
785	C844776	1275300200	20.00	10	Tree Fruit
786	C180851	1027410900	7.17	3.5	Container Nursery
786	C180851	1027411100	4.50	0.5	Container Nursery
786	C180851	1027411200	4.40	0.48	Container Nursery
787	C407068	1721404900	9.60	9.6	Tree Fruit
787	C407068	1721405600	7.00	7	Tree Fruit
788	C568236	7601960204	21.00	17	Tree Fruit
788	C568236	7601960205	17.00	17	Tree Fruit
790	C737014	1221003000	2.70	2	Row and Field Crops
790	C737014	1220905000	7.50	7.5	Tree Fruit
790	C737014	1220905100	5.00	3	Tree Fruit
791	C182041	1092702000	21.26	18	Tree Fruit
792	C749971	1270601100	10.00	10	Container Nursery
792	C749971	1270601200	10.00	10	Container Nursery
792	C749971	1270607900	20.00	20	Container Nursery
792	C749971	1270605200	17.00	17	Field Grown Nursery or Floral
792	C749971	1272212600	13.00	10	Field Grown Nursery or Floral
792	C749971	1272212700	10.00	10	Field Grown Nursery or Floral
792	C749971	1272908800	15.00	15	Field Grown Nursery or Floral
793	C182246	1283302900	2.57	1	Container Nursery
794	C534341	1260505300	12.00	9	Tree Fruit
795	C893027	2563143500	1.00	1	Container Nursery
796	C990198	1851124900	10.00	10	Tree Fruit
796	C990198	4523680809	14.00	14	Tree Fruit
796	C990198	8994555989	19.00	19	Tree Fruit
797	C181122	1012710300	5.16	3	Tree Fruit
797	C181122	1012713000	7.94	4	Tree Fruit
798	C724522	1220403000	5.00	4.5	Tree Fruit
798	C724522	1272902500	16.00	13.78	Tree Fruit
799	C182003	2871001600	48.00	3	Grapes, Berries, and Vine Fruit
800	6035000	1054102700	2.20	1	Tree Fruit
801	C772687	1281906800	10.14	8	Tree Fruit
802	C182487	1281804500	1.00	1	Field Grown Nursery or Floral
802	C182487	1281901300	3.50	3	Tree Fruit
802	C182487	1282402800	2.50	1	Tree Fruit
802	C182487	1285101400	4.50	2	Tree Fruit
803	C181871	7601708000	35.00	35	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
804	C717845	1820140004	14.73	12	Row and Field Crops
805	C564076	2640428500	2.00	2	Container Nursery
805	C564076	2602130200	2.00	2	Field Grown Nursery or Floral
805	C564076	2602130700	2.00	2	Field Grown Nursery or Floral
805	C564076	6791001200	18.50	16	Field Grown Nursery or Floral
805	C564076	2640428600	2.50	2.5	Field Grown Nursery or Floral
805	C564076	2164101100	1.00	1	Greenhouse Crops
805	C564076	1260801500	5.00	4	Tree Fruit
806	C181886	1057801300	2.17	2.17	Tree Fruit
806	C181886	1057801400	2.21	2.21	Tree Fruit
806	C181886	1057801500	4.05	3	Tree Fruit
807	C556030	1020714000	8.50	8	Tree Fruit
808	H061987	1274901600	5.50	3	Tree Fruit
809	C919668	1082221500	4.00	3	Tree Fruit
810	C182296	1073008600	3.20	2.25	Tree Fruit
810	C182296	1293104700	3.79	2	Tree Fruit
810	C182296	1293104800	4.04	2	Tree Fruit
810	C182296	1293104900	4.34	4	Tree Fruit
810	C182296	1293105000	4.96	4.5	Tree Fruit
811	C361609	1691301600	2.25	0.5	Greenhouse Crops
812	W251751	2543921400	1.00	0.7	Greenhouse Crops
812	W251751	2543921500	1.00	0.7	Greenhouse Crops
813	C462531	2110102400	110.00	60	Row and Field Crops
814	C182468	1027112800	4.15	3.5	Tree Fruit
815	C805045	1284900400	36.77	35	Tree Fruit
815	C805045	1285000900	21.67	20	Tree Fruit
817	C181112	2831010400	12.25	1.99	Field Grown Nursery or Floral
818	C783533	2543520500	0.50	0.25	Other
819	C783533	2542700700	1.25	0.75	Container Nursery
820	C480794	1850723300	2.50	1.5	Field Grown Nursery or Floral
820	C480794	1851605800	43.00	41	Tree Fruit
821	C182647	1891212200	10.59	2	Grapes, Berries, and Vine Fruit
822	C181140	1941804400	10.00	10	Field Grown Nursery or Floral
823	C182703	1221005500	9.00	3.5	Tree Fruit
824	C182214	ACE1630100	3.00	2	Tree Fruit
825	C182660	1881804600	2.50	1	Tree Fruit
826	C182672	5992302100	5.13	2	Grapes, Berries, and Vine Fruit
827	C783533	2543511900	1.00	0.86	Field Grown Nursery or Floral
827	C783533	2542700800	1.40	1.2	Field Grown Nursery or Floral
827	C783533	2562425800	0.25	0.2	Field Grown Nursery or Floral
827	C783533	2544001000	1.80	1.6	Greenhouse Crops
827	C783533	2562425200	1.00	0.85	Other
828	C182491	1261806000	4.50	3.5	Tree Fruit
829	C182381	1333020800	10.22	3	Tree Fruit
829	C182381	1333021000	2.86	1.5	Tree Fruit
829	C182381	1333021100	2.67	1.5	Tree Fruit
829	C182381	1333021200	2.55	1.5	Tree Fruit
830	C182651	2402500300	78.00	0	Other

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
830	C182651	2401104900	103.89	100	Tree Fruit
830	C182651	2401115100	75.83	75	Tree Fruit
830	C182651	2401115700	1.00	1	Tree Fruit
830	C182651	2401115800	9.64	9	Tree Fruit
830	C182651	2401116100	9.78	9	Tree Fruit
830	C182651	2402410600	34.17	34	Tree Fruit
830	C182651	2402410800	28.70	28	Tree Fruit
831	C789203	2583501200	0.50	0.1	Container Nursery
831	C789203	2583504100	0.50	0.4	Container Nursery
832	C182668	1212021200	4.00	2.5	Grapes, Berries, and Vine Fruit
833	C182638	1274400600	4.00	3	Tree Fruit
834	C556018	1782210700	14.00	12	Tree Fruit
835	ME10660	1782210300	12.95	12	Tree Fruit
836	C182599	2791302600	4.65	1.5	Grapes, Berries, and Vine Fruit
837	C182614	1073704300	2.70	1.5	Tree Fruit
838	C568018	1821802200	19.40	14.55	Container Nursery
838	C568018	1821802300	17.58	13.2	Container Nursery
838	C568018	1876301100	17.00	12.75	Field Grown Nursery or Floral
839	C381681	1014900400	1.50	0	Tree Fruit
839	C381681	1014901100	4.00	4	Tree Fruit
839	C381681	1014901200	10.00	6	Tree Fruit
840	C180973	1810221300	0.90	0.5	Field Grown Nursery or Floral
840	C180973	1810221400	1.02	0.5	Field Grown Nursery or Floral
840	C180973	1812010800	8.00	2	Field Grown Nursery or Floral
840	C180973	1025600400	13.50	6	Field Grown Nursery or Floral
840	C180973	1282904000	32.00	10	Field Grown Nursery or Floral
840	C180973	1810221200	6.28	3	Field Grown Nursery or Floral
840	C180973	1812110100	10.00	5	Field Grown Nursery or Floral
840	C180973	1861231200	12.00	8	Field Grown Nursery or Floral
840	C180973	1332304900	5.00	2.5	Greenhouse Crops
841	1720050	1700510300	7.00	7	Tree Fruit
842	C182247	1082920300	27.80	14	Tree Fruit
843	C952990	1293901800	17.00	6	Tree Fruit
844	C443151	navy000000	40.00	40	Row and Field Crops
844	C443151	navy000000	18.00	18	Row and Field Crops
844	C443151	navy000000	10.00	10	Row and Field Crops
844	C443151	7601078600	2.50	1.5	Tree Fruit
844	C443151	7601079200	3.00	1.5	Tree Fruit
844	C443151	7601078700	6.33	3	Tree Fruit
846	C180842	1027201500	10.18	10.18	Container Nursery
846	C180842	1027201600	16.46	10	Container Nursery
846	C180842	1027210100	5.75	4	Container Nursery
846	C180842	1027210200	2.22	2	Container Nursery
846	C180842	1027210300	1.04	1	Container Nursery
846	C180842	1027210400	1.21	1	Container Nursery
846	C180842	1027210500	5.48	4	Container Nursery
846	C180842	1027200900	119.48	100	Container Nursery
846	C180842	1027201400	3.72	3.72	Field Grown Nursery or Floral

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
847	C182623	1083204400	7.00	6	Tree Fruit
848	C871122	1252312300	2.50	1.5	Field Grown Nursery or Floral
848	C871122	1252312400	4.00	3.5	Tree Fruit
848	C871122	1252312200	3.50	2.5	Tree Fruit
849	C657672	1051900400	20.00	17	Tree Fruit
849	C657672	1051902700	10.00	8	Tree Fruit
849	C657672	1881605300	6.50	3.5	Tree Fruit
849	C657672	1881605400	17.00	16.5	Tree Fruit
850	C777753	2770414200	7.80	6	Tree Fruit
850	C777753	2770420700	15.26	12	Tree Fruit
851	C182495	1071511100	4.00	2.8	Tree Fruit
851	C182495	1281804700	17.20	16	Tree Fruit
851	C182495	1281804800	12.70	12	Tree Fruit
851	C182495	1281804900	4.10	3.8	Tree Fruit
851	C182495	1282121900	8.40	5	Tree Fruit
851	C182495	1282122000	9.20	5	Tree Fruit
851	C182495	1282122100	10.30	5	Tree Fruit
851	C182495	1282122200	16.60	9	Tree Fruit
851	C182495	1282710400	48.00	19	Tree Fruit
851	C182495	1282710500	58.00	23	Tree Fruit
851	C182495	1282711000	1.50	1	Tree Fruit
851	C182495	1282711100	1.30	1	Tree Fruit
851	C182495	1282711700	0.87	0.4	Tree Fruit
851	C182495	1282711800	5.00	3	Tree Fruit
851	C182495	1282713100	84.00	45	Tree Fruit
851	C182495	1282713200	0.61	0.3	Tree Fruit
851	C182495	1284600300	2.00	1	Tree Fruit
851	C182495	1285000500	18.00	17	Tree Fruit
851	C182495	1285000600	27.40	26	Tree Fruit
851	C182495	1293906600	5.00	4.2	Tree Fruit
851	C182495	1323200800	22.00	8	Tree Fruit
851	C182495	1850412700	2.00	1.7	Tree Fruit
851	C182495	2411202000	13.00	9	Tree Fruit
851	C182495	2411202100	13.00	9	Tree Fruit
851	C182495	2411202200	24.80	16	Tree Fruit
851	C182495	2411202300	12.40	8	Tree Fruit
851	C182495	2411202600	10.60	7	Tree Fruit
851	C182495	2411202700	12.50	8	Tree Fruit
851	C182495	2411202800	7.80	5	Tree Fruit
851	C182495	2411202900	9.00	6	Tree Fruit
852	C182441	1281220600	6.70	6.7	Tree Fruit
853	C846483	1851011500	9.83	0	Other
853	C846483	1851010200	39.90	30	Tree Fruit
853	C846483	1851010300	13.80	10	Tree Fruit
853	C846483	1851010400	18.06	15	Tree Fruit
853	C846483	1851010500	8.20	8	Tree Fruit
853	C846483	1851011200	12.04	12	Tree Fruit
854	C695947	1280710300	20.74	16.5	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
854	C695947	1280711600	20.94	20.94	Tree Fruit
854	C695947	1281220200	11.00	10	Tree Fruit
854	C695947	1281701400	30.00	26	Tree Fruit
854	C695947	1281701500	30.00	29	Tree Fruit
854	C695947	1283303700	40.00	33	Tree Fruit
855	C182503	1891700900	0.98	0.25	Container Nursery
856	C182713	6560600800	279.00	10	Grapes, Berries, and Vine Fruit
857	C181876	1013613500	6.00	4	Tree Fruit
857	C181876	1013613600	10.00	10	Tree Fruit
857	C181876	1013614800	10.00	6	Tree Fruit
858	0002489	1283800600	25.00	20	Tree Fruit
858	0002489	1283800700	9.00	7	Tree Fruit
859	C182237	1271110300	5.00	2	Tree Fruit
860	2821370	1870415300	9.50	4	Tree Fruit
861	C182676	1292122600	5.00	1.5	Tree Fruit
862	w254450	4815000900	0.55	0.5	Other
863	C328049	1333511500	2.50	2	Container Nursery
863	C328049	1880901100	4.00	3.5	Container Nursery
863	C328049	1883321800	2.50	2	Container Nursery
863	C328049	1890401800	6.00	5	Container Nursery
864	C182640	1057600100	2.50	1	Tree Fruit
865	C402701	1015510700	15.99	10	Tree Fruit
866	C745615	1081007500	41.00	41	Tree Fruit
866	C745615	1083201400	19.12	41	Tree Fruit
866	C745615	1083202600	7.63	41	Tree Fruit
866	C745615	1083205300	18.90	41	Tree Fruit
867	C182673	1073600300	4.00	0.5	Greenhouse Crops
869	C534022	1270713300	21.00	11	Tree Fruit
869	C534022	1272711500	4.70	4	Tree Fruit
870	C182492	1291624700	4.03	4.03	Tree Fruit
870	C182492	1291624800	4.00	2	Tree Fruit
870	C182492	1291624900	5.00	5	Tree Fruit
870	C182492	1291625000	5.86	2.75	Tree Fruit
870	C182492	1291625100	8.50	0	Tree Fruit
871	C772964	1591703200	8.00	5	Greenhouse Crops
871	C772964	1591801900	5.00	3.5	Greenhouse Crops
872	C182233	2660920700	2.10	0.4	Tree Fruit
873	C118369	1092331200	14.90	5	Tree Fruit
874	C182646	5180105200	1.00	1	Grapes, Berries, and Vine Fruit
875	C182304	1281703100	3.00	13	Tree Fruit
876	C182536	1054810400	3.78	2.78	Tree Fruit
877	C181187	1283304000	5.22	3.5	Tree Fruit
877	C181187	1283403300	5.11	4.5	Tree Fruit
877	C181187	1283403400	5.17	4	Tree Fruit
878	C846007	1322802200	3.31	3	Tree Fruit
879	C846007	1322801500	31.97	8	Tree Fruit
880	C905704	1890210900	45.00	20	Tree Fruit
880	C905704	1891300200	40.00	20	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
882	C182679	1057600300	2.50	1.25	Tree Fruit
883	C772741	2502710500	8.00	1	Grapes, Berries, and Vine Fruit
883	C772741	2502708800	9.00	3	Tree Fruit
883	C772741	2502710900	8.00	2	Tree Fruit
884	C749899	1030103600	10.00	6.5	Tree Fruit
884	C749899	1030106400	5.00	4	Tree Fruit
884	C749899	1030106500	5.00	4.5	Tree Fruit
885	C182654	2500105800	7.33	1	Tree Fruit
886	C749971	1221802000	4.90	4.9	Tree Fruit
887	8609300	1333010900	20.00	15	Tree Fruit
888	C657877	2543510500	3.00	0.75	Field Grown Nursery or Floral
888	C657877	2543510300	1.50	0.25	Field Grown Nursery or Floral
889	C990389	1092600900	8.00	1	Field Grown Nursery or Floral
890	W254587	1330600300	8.00	6	Tree Fruit
891	C990389	1092601100	90.00	8	Field Grown Nursery or Floral
891	C990389	1092601300	7.00	1.5	Field Grown Nursery or Floral
891	C990389	1092601400	86.00	38	Field Grown Nursery or Floral
891	C990389	1093520100	106.00	28	Field Grown Nursery or Floral
892	C436532	1271512000	4.75	4	Tree Fruit
894	C180641	1292703400	2.50	2.5	Tree Fruit
894	C180641	1292703500	2.50	1.5	Tree Fruit
894	C180641	1292706900	8.00	3	Tree Fruit
894	C180641	1292707000	8.00	1.5	Tree Fruit
895	C182737	2760221300	2.78	1	Grapes, Berries, and Vine Fruit
896	C182312	2241904000	3.50	2.5	Tree Fruit
898	1527125	1052205700	1.58	1.5	Tree Fruit
898	1527125	1052205800	1.17	1	Tree Fruit
898	1527125	1052205900	1.22	1	Tree Fruit
898	1527125	1052206000	1.28	1	Tree Fruit
898	1527125	1052206100	1.83	1	Tree Fruit
898	1527125	1052206200	1.01	1	Tree Fruit
898	1527125	1052206300	1.14	1	Tree Fruit
898	1527125	1052206400	1.27	1	Tree Fruit
898	1527125	1052206500	1.00	1	Tree Fruit
898	1527125	1052206600	2.02	1.41	Tree Fruit
898	1527125	1052206700	2.02	2	Tree Fruit
898	1527125	1052206800	1.15	1.06	Tree Fruit
898	1527125	1052207000	2.18	20.3	Tree Fruit
899	C546595	1252325200	32.80	32.8	Tree Fruit
899	C546595	1270611400	2.50	2	Tree Fruit
899	C546595	1270724300	3.11	2.5	Tree Fruit
899	C546595	1270724400	3.11	2.5	Tree Fruit
899	C546595	1270724500	3.11	2.5	Tree Fruit
900	C182655	1290801200	21.20	20	Tree Fruit
900	C182655	1851606500	9.20	9	Tree Fruit
901	C182677	1322800600	11.72	9	Tree Fruit
902	C741193	3623900000	5.00	4	Tree Fruit
903	C546424	1691400600	3.34	1	Greenhouse Crops

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
903	C546424	1691401200	6.32	1	Greenhouse Crops
904	C182428	1270607800	3.00	2	Tree Fruit
905	C180686	3960411900	4.00	3.5	Container Nursery
905	C180686	3960412200	3.00	2.5	Container Nursery
906	6035000	1027112900	2.00	1.5	Tree Fruit
907	3306500	1333701100	5.40	2	Tree Fruit
908	4374663	1290801300	10.00	9	Tree Fruit
908	4374663	1301802100	10.50	9	Tree Fruit
908	4374663	1333123800	2.19	2.19	Tree Fruit
908	4374663	1333123900	2.35	2.35	Tree Fruit
908	4374663	1333124000	4.30	3.85	Tree Fruit
908	4374663	1333124100	3.88	3.5	Tree Fruit
908	4374663	1880822400	10.75	9.5	Tree Fruit
908	4374663	1880824600	10.65	10	Tree Fruit
908	4374663	1881300400	19.00	15	Tree Fruit
909	C328003	1025202900	20.10	6	Tree Fruit
909	C328003	1025210100	5.00	3	Tree Fruit
909	C328003	1026104900	6.96	3	Tree Fruit
910	C182451	1851602400	1.50	1	Tree Fruit
910	C182451	1851606700	10.00	10	Tree Fruit
910	C182451	1851607500	5.00	4.5	Tree Fruit
911	C820391	1061300400	16.47	16	Tree Fruit
911	C820391	1212301000	4.09	4	Tree Fruit
911	C820391	1220307100	7.01	6	Tree Fruit
911	C820391	1220307200	7.05	6	Tree Fruit
912	9824200	1722106300	4.00	3.8	Tree Fruit
913	C182704	1111205200	1.00	0	Other
913	C182704	1111201300	5.00	5	Tree Fruit
913	C182704	1111205100	10.00	10	Tree Fruit
913	C182704	1321902100	7.64	7.64	Tree Fruit
913	C182704	1321902200	7.50	7.5	Tree Fruit
913	C182704	1330503200	23.00	21	Tree Fruit
913	C182704	1333612500	2.50	1	Tree Fruit
913	C182704	1333612600	7.50	7	Tree Fruit
914	C292602	1082230600	4.70	4.7	Tree Fruit
914	C292602	1082230700	13.00	13	Tree Fruit
915	C645645	2371001700	11.00	9	Tree Fruit
916	C777812	1743003100	3.00	1	Greenhouse Crops
917	C182662	1820607300	5.00	4	Container Nursery
917	C182662	1820607400	5.00	4	Container Nursery
917	C182662	1822800100	21.00	12	Container Nursery
917	C182662	1780808700	4.00	1.5	Tree Fruit
918	C182519	1282120700	11.00	7	Tree Fruit
919	C777710	7601284700	49.00	7.4	Field Grown Nursery or Floral
919	C777710	5020400500	116.00	0	Other
920	C739429	1083202300	19.27	18.5	Tree Fruit
920	C739429	1251001700	64.81	64.81	Tree Fruit
920	C739429	1251001900	30.83	30.83	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
920	C739429	1272004200	9.93	7.25	Tree Fruit
920	C739429	1272712300	11.69	8	Tree Fruit
920	C739429	1292707100	2.81	2.81	Tree Fruit
920	C739429	1292707200	2.35	2.35	Tree Fruit
920	C739429	1292707300	2.22	2.22	Tree Fruit
920	C739429	1881200900	28.33	28.33	Tree Fruit
920	C739429	1881201000	39.85	29.67	Tree Fruit
920	C739429	1881201200	10.87	10.87	Tree Fruit
920	C739429	1881702300	8.31	8.31	Tree Fruit
920	C739429	1881702400	7.03	7.03	Tree Fruit
922	C663634	1281220400	8.00	8	Tree Fruit
922	C663634	1284103000	20.00	18	Tree Fruit
922	C663634	1284103100	10.00	9	Tree Fruit
922	C663634	1285210600	16.00	12.75	Tree Fruit
923	C990362	1271420100	8.00	6	Container Nursery
923	C990362	1103200600	30.00	20	Tree Fruit
923	C990362	1260303800	2.58	2	Tree Fruit
923	C990362	1260303900	2.76	2	Tree Fruit
923	C990362	1260304000	4.58	4.5	Tree Fruit
923	C990362	1262102400	8.90	5	Tree Fruit
923	C990362	1271421800	12.60	8	Tree Fruit
923	C990362	1271421900	12.49	8	Tree Fruit
923	C990362	1271422000	8.87	5	Tree Fruit
923	C990362	1271422100	6.79	5	Tree Fruit
923	C990362	1272002100	7.64	5	Tree Fruit
923	C990362	1272002200	7.88	5	Tree Fruit
923	C990362	1272222600	14.96	10	Tree Fruit
923	C990362	1292110200	25.92	20	Tree Fruit
924	9824200	1291006100	9.00	8	Tree Fruit
925	C544991	1081611900	3.11	1	Tree Fruit
926	C846847	1260800500	8.02	6.81	Tree Fruit
926	C846847	1260800600	15.58	13.24	Tree Fruit
926	C846847	1260806300	14.28	12.13	Tree Fruit
926	C846847	1270714000	7.22	3.61	Tree Fruit
926	C846847	1272900500	38.90	36.23	Tree Fruit
926	C846847	1272903400	3.44	2.06	Tree Fruit
926	C846847	1272903500	2.50	1.25	Tree Fruit
926	C846847	1272903600	2.96	1.77	Tree Fruit
926	C846847	1272907300	9.81	9.5	Tree Fruit
926	C846847	1272907400	9.81	9.5	Tree Fruit
926	C846847	1272907500	19.62	18.45	Tree Fruit
926	C846847	1272907600	4.78	4.06	Tree Fruit
926	C846847	1272907900	8.99	8.09	Tree Fruit
926	C846847	1272908300	2.34	1.17	Tree Fruit
926	C846847	1272908400	3.19	3.19	Tree Fruit
926	C846847	1272908500	2.18	2.18	Tree Fruit
926	C846847	1272908600	2.11	2.11	Tree Fruit
926	C846847	1272908700	2.74	2.74	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
926	C846847	1273400900	9.96	7.9	Tree Fruit
926	C846847	1273500600	13.00	10.4	Tree Fruit
926	C846847	1291110400	2.98	2.83	Tree Fruit
926	C846847	1291114000	27.09	25.73	Tree Fruit
926	C846847	1293003100	4.06	3.65	Tree Fruit
926	C846847	1293003200	2.98	2.68	Tree Fruit
926	C846847	1293003300	2.64	2.37	Tree Fruit
926	C846847	1293003400	11.51	10.93	Tree Fruit
926	C846847	1272712800	54.30	46.15	Tree Fruit
926	C846847	1290105700	25.94	20.75	Tree Fruit
926	C846847	1290106100	43.12	38.8	Tree Fruit
926	C846847	1293003500	20.01	16.4	Tree Fruit
927	C531874	1211512800	3.00	3	Row and Field Crops
927	C531874	1211513200	10.00	7	Row and Field Crops
928	C182522	2760810900	8.50	2	Tree Fruit
929	C181620	1021501000	5.00	5	Tree Fruit
929	C181620	1021501300	19.42	10	Tree Fruit
930	C846477	1221800300	7.00	6.5	Tree Fruit
930	C846477	1221801100	4.00	3	Tree Fruit
930	C846477	1222801500	3.80	3	Tree Fruit
930	C846477	1222801700	2.60	2	Tree Fruit
930	C846477	1222801800	2.50	1	Tree Fruit
930	C846477	1222802000	2.50	2.2	Tree Fruit
930	C846477	1222802500	2.50	1.8	Tree Fruit
931	C733674	1282000800	40.00	8	Tree Fruit
931	C733674	1282003400	8.33	8.33	Tree Fruit
931	C733674	1282003500	8.71	7.5	Tree Fruit
931	C733674	1282010600	46.53	41	Tree Fruit
931	C733674	1283503000	36.51	31	Tree Fruit
931	C733674	1282010100	12.51	12	Tree Fruit
931	C733674	1282001000	80.00	26	Tree Fruit
931	C733674	1282003600	129.99	120	Tree Fruit
931	C733674	1282003300	12.57	9.67	Tree Fruit
932	C932756	1270601600	6.00	6	Container Nursery
932	C932756	1270713800	50.00	50	Container Nursery
932	C932756	1272901200	8.00	8	Container Nursery
932	C932756	1701615100	9.00	7	Container Nursery
932	C932756	1701615200	2.60	2.6	Container Nursery
932	C932756	2190410400	3.00	2	Container Nursery
932	C932756	2190423100	5.00	5	Container Nursery
932	C932756	2210214300	7.00	5	Container Nursery
932	C932756	2210215200	25.00	15	Container Nursery
933	C737018	1023610500	8.00	2	Field Grown Nursery or Floral
933	C737018	1093104500	9.00	2	Field Grown Nursery or Floral
935	C544906	2760911900	10.00	8	Tree Fruit
935	C544906	2760912600	8.36	6	Tree Fruit
936	C645663	1083902900	45.00	45	Tree Fruit
936	C645663	1111901109	7.50	7.5	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
936	C645663	1251000600	80.00	80	Tree Fruit
936	C645663	1251000800	33.67	33.67	Tree Fruit
936	C645663	1251000900	4.81	4.81	Tree Fruit
936	C645663	1252320200	19.33	19.33	Tree Fruit
936	C645663	1252322000	38.69	38.69	Tree Fruit
936	C645663	1252323400	16.97	16.97	Tree Fruit
936	C645663	1275123300	8.00	8	Tree Fruit
936	C645663	1280700600	68.37	68.37	Tree Fruit
936	C645663	1281502000	15.00	15	Tree Fruit
936	C645663	1281510500	12.00	12	Tree Fruit
936	C645663	1281603300	16.00	16	Tree Fruit
936	C645663	1282110200	10.00	10	Tree Fruit
936	C645663	1282110300	8.00	8	Tree Fruit
936	C645663	1282110500	8.00	8	Tree Fruit
936	C645663	1282112300	8.00	8	Tree Fruit
936	C645663	1282122600	5.00	5	Tree Fruit
936	C645663	1282713400	6.36	6	Tree Fruit
936	C645663	1282714500	4.31	4.31	Tree Fruit
936	C645663	1282714600	2.01	2	Tree Fruit
936	C645663	1294210800	51.68	50	Tree Fruit
936	C645663	1311500500	32.20	32.2	Tree Fruit
936	C645663	1311500600	40.00	40	Tree Fruit
936	C645663	1311500700	7.00	7	Tree Fruit
936	C645663	1311500800	10.00	10	Tree Fruit
936	C645663	1311501100	37.10	25	Tree Fruit
936	C645663	1311502300	10.00	10	Tree Fruit
936	C645663	1311502400	10.00	10	Tree Fruit
936	C645663	1311502500	10.00	10	Tree Fruit
936	C645663	1311600700	20.00	20	Tree Fruit
936	C645663	1311600800	20.00	20	Tree Fruit
936	C645663	1311602300	20.00	20	Tree Fruit
936	C645663	1311602600	11.95	11.95	Tree Fruit
936	C645663	1321500330	49.14	49	Tree Fruit
936	C645663	1321503100	46.00	46	Tree Fruit
936	C645663	1321503200	48.76	48.76	Tree Fruit
936	C645663	1321603000	40.61	40	Tree Fruit
936	C645663	1323201500	10.00	10	Tree Fruit
936	C645663	1330204200	12.00	11	Tree Fruit
936	C645663	1330204400	12.00	11	Tree Fruit
936	C645663	1661402700	25.34	25.34	Tree Fruit
936	C645663	2410402400	0.50	0.5	Tree Fruit
938	C182580	1281610700	14.80	14.8	Tree Fruit
938	C182580	1281610800	2.41	2.41	Tree Fruit
938	C182580	1281610900	16.13	16.13	Tree Fruit
938	C182580	1281611000	0.40	0.4	Tree Fruit
938	C182580	1281611100	14.78	14.78	Tree Fruit
938	C182580	1281611200	1.93	1.93	Tree Fruit
938	C182580	1281611300	1.63	1.63	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
938	C182580	1281611400	7.37	0	Tree Fruit
938	C182580	1281611500	0.89	0.89	Tree Fruit
938	C182580	1281801100	19.97	19.97	Tree Fruit
938	C182580	1281803100	4.81	0	Tree Fruit
938	C182580	1281803900	3.44	0	Tree Fruit
938	C182580	1281805000	15.99	15.99	Tree Fruit
938	C182580	1900800800	2.44	1	Tree Fruit
938	C182580	1900801100	43.14	38	Tree Fruit
938	C182580	1900802700	34.65	21	Tree Fruit
939	W251899	6461001700	10.00	3	Row and Field Crops
939	W251899	6461001800	10.00	9	Row and Field Crops
939	W251899	6461002000	19.50	15	Row and Field Crops
940	C182531	2770415600	19.50	13	Tree Fruit
941	C182559	6511201800	10.00	7	Row and Field Crops
941	C182559	6540111100	12.00	4	Row and Field Crops
941	C182559	6540112700	8.00	4	Row and Field Crops
942	C182675	1292912400	1.00	1	Tree Fruit
943	C756938	3981401500	118.89	90	Tree Fruit
943	C756938	3981700700	25.63	10	Tree Fruit
943	C756938	4010400500	430.04	370	Tree Fruit
944	C182340	1294002500	5.00	4.5	Tree Fruit
945	C292051	1057711000	3.50	3.5	Tree Fruit
946	C571677	1851606900	16.00	5	Tree Fruit
947	C204649	1281704100	3.00	3	Tree Fruit
948	C180825	1285000800	66.00	45	Tree Fruit
949	C292501	1280710600	14.43	14.43	Tree Fruit
949	C292501	1280710700	20.57	20.57	Tree Fruit
949	C292501	1280710800	5.09	5.09	Tree Fruit
949	C292501	1281111300	8.03	8.03	Tree Fruit
950	C719651	1111901100	5.00	5	Tree Fruit
950	C719651	1310201700	4.00	4	Tree Fruit
950	C719651	1310400200	5.00	5	Tree Fruit
950	C719651	9011001100	3.50	3.5	Tree Fruit
951	C645627	1074002300	10.00	8	Tree Fruit
952	5199950	1290410700	7.00	5	Tree Fruit
953	C182613	1282121100	82.15	49	Tree Fruit
954	C661850	1264800300	4.00	3	Tree Fruit
955	C943903	1026006600	5.75	5	Tree Fruit
956	W251455	1073802400	13.70	12	Tree Fruit
956	W251455	1073802500	7.00	6	Tree Fruit
957	C880124	1021011700	31.00	31	Field Grown Nursery or Floral
957	C880124	1021011800	20.00	5	Field Grown Nursery or Floral
957	C880124	1021011900	20.00	1	Field Grown Nursery or Floral
957	C880124	1057800100	4.50	1	Field Grown Nursery or Floral
958	C545884	1850105200	10.00	9	Tree Fruit
959	C182573	1220403800	2.50	1.75	Tree Fruit
960	W252827	2670511100	1.00	1	Grapes, Berries, and Vine Fruit
961	C733974	1320607100	2.00	1.5	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
962	C181170	2401423900	25.31	3.5	Tree Fruit
963	C182461	1102204300	12.20	6	Tree Fruit
964	C823399	1251504400	30.00	5	Field Grown Nursery or Floral
965	C182769	1301701800	186.00	144	Tree Fruit
966	W255419	1851604300	7.00	3.5	Tree Fruit
967	C745630	1252323800	5.00	5	Tree Fruit
967	C745630	1252323900	25.00	17	Tree Fruit
967	C745630	6791400500	19.33	19	Tree Fruit
968	W255276	9293200024	5.00	4	Grapes, Berries, and Vine Fruit
969	C657687	0000004A01	190.00	190	Field Grown Nursery or Floral
970	C182745	1063122200	1.24	0.62	Tree Fruit
970	C182745	1063122300	1.24	0.62	Tree Fruit
971	c182793	1321504500	4.65	2.5	Tree Fruit
972	A064282	9313000101	10.00	8.5	Tree Fruit
973	C631319	9291600047	6.30	4	Grapes, Berries, and Vine Fruit
974	C182591	2410403100	3.20	2	Tree Fruit
975	c182766	2783612300	2.50	1	Grapes, Berries, and Vine Fruit
976	C637114	1070201100	1.10	0.5	Tree Fruit
976	C637114	1070206600	10.30	8.5	Tree Fruit
977	C182827	2171400400	1.50	1	Tree Fruit
978	W250504	2761211000	8.00	3	Grapes, Berries, and Vine Fruit
979	W254569	1333012700	1.10	0.5	Tree Fruit
979	W254569	1333012800	3.84	1.5	Tree Fruit
980	c182831	1042722100	1.20	1	Tree Fruit
980	c182831	1042722200	1.20	1	Tree Fruit
981	C645456	1290604300	17.50	15	Tree Fruit
981	C645456	1290608000	47.50	13	Tree Fruit
982	C182611	2811831300	4.80	2	Tree Fruit
983	C717806	1261701300	40.00	5	Greenhouse Crops
983	C717806	1220307500	24.22	24.22	Row and Field Crops
983	C717806	1220307600	4.73	4.73	Row and Field Crops
983	C717806	1221004700	52.54	46	Row and Field Crops
983	C717806	1221300300	49.17	32	Row and Field Crops
983	C717806	1221300400	1.07	1.07	Row and Field Crops
983	C717806	1221301000	25.87	25.87	Row and Field Crops
983	C717806	1221301200	16.81	16.81	Row and Field Crops
983	C717806	1221302200	39.02	39.02	Row and Field Crops
983	C717806	1221302300	181.47	181.47	Row and Field Crops
983	C717806	1221302400	17.54	17.54	Row and Field Crops
983	C717806	1221302700	20.10	20.1	Row and Field Crops
983	C717806	1221303100	92.39	55.13	Row and Field Crops
983	C717806	1223100500	38.33	38.33	Row and Field Crops
983	C717806	1241503200	637.87	49	Row and Field Crops
983	C717806	1251314800	328.63	30	Row and Field Crops
983	C717806	1251314900	35.65	9.5	Row and Field Crops
983	C717806	1261707900	53.17	26	Row and Field Crops
983	C717806	1263201200	76.24	29	Row and Field Crops
983	C717806	1272305900	117.50	10	Row and Field Crops

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
983	C717806	1272710200	36.41	36.41	Row and Field Crops
983	C717806	1571506000	23.51	13	Row and Field Crops
983	C717806	7601851200	9.20	9.2	Row and Field Crops
983	C717806	7601851500	77.58	69.8	Row and Field Crops
983	C717806	7602112100	52.54	50	Row and Field Crops
983	C717806	7602112200	320.00	216	Row and Field Crops
984	C733670	1851606000	29.00	24	Tree Fruit
985	C182786	1290802500	20.00	10	Tree Fruit
986	C182225	2224500500	6.00	6	Tree Fruit
987	C182744	1021052900	8.00	5	Tree Fruit
988	c182749	1861405800	3.00	2	Tree Fruit
989	A032354	1291113900	5.60	2.5	Tree Fruit
990	c755068	1213222100	4.87	1	Greenhouse Crops
991	C180814	1866014600	3.04	2	Tree Fruit
992	W255345	9313000112	9.74	6	Tree Fruit
993	C725856	1062721400	1.24	1.07	Container Nursery
993	C725856	1062721500	1.06	0.92	Container Nursery
993	C725856	1062721600	1.06	0.92	Container Nursery
993	C725856	1062721700	1.05	0.91	Container Nursery
993	C725856	1062721800	1.00	0.87	Container Nursery
993	C725856	1062721900	1.11	0.96	Container Nursery
993	C725856	1062722000	1.22	1.06	Container Nursery
993	C725856	1062722100	1.40	1.21	Container Nursery
993	C725856	1062722200	1.12	0.97	Container Nursery
993	C725856	1062722300	1.11	0.96	Container Nursery
993	C725856	1062722400	1.21	1.05	Container Nursery
993	C725856	1062722500	1.13	0.98	Container Nursery
993	C725856	1062800300	6.49	3.5	Container Nursery
994	JB0000	1882407200	5.20	2	Tree Fruit
995	C773086	2591302900	2.50	1	Greenhouse Crops
996	C182776	2771005200	12.40	11	Tree Fruit
997	W254576	1015100600	4.00	2	Tree Fruit
998	W255262	1862106100	5.00	4	Tree Fruit
999	H042042	1850109500	5.76	2.5	Tree Fruit
1001	C182682	1861405000	5.00	1	Tree Fruit
1002	c182771	1264801400	2.78	1.75	Tree Fruit
1003	C568453	1014601500	5.01	3	Tree Fruit
1004	C646194	1820740900	4.40	2.5	Greenhouse Crops
1004	C646194	1820741100	9.60	6	Greenhouse Crops
1005	C182816	1026801600	6.60	4.5	Tree Fruit
1006	C181850	1294101000	4.00	1	Row and Field Crops
1007	C182409	2221010300	19.62	8	Tree Fruit
1007	C182409	2221010500	18.74	8	Tree Fruit
1007	C182409	2320130400	16.45	10	Tree Fruit
1007	C182409	2325000500	10.86	6	Tree Fruit
1007	C182409	2325000900	23.00	12	Tree Fruit
1007	C182409	2325001100	0.91	0	Tree Fruit
1008	C223149	2771103100	8.26	2	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1009	C182322	2401105000	26.51	26	Tree Fruit
1009	C182322	2401105100	22.85	22	Tree Fruit
1009	C182322	2401115300	12.80	12.5	Tree Fruit
1010	C182693	2770421700	8.00	3	Tree Fruit
1011	W254487	1051807100	9.70	5	Field Grown Nursery or Floral
1012	W255346	9313000079	10.00	6	Tree Fruit
1013	W255145	1333022000	13.90	5	Tree Fruit
1014	C182627	2830315900	2.00	1	Grapes, Berries, and Vine Fruit
1014	C182627	2830316000	2.00	1	Tree Fruit
1014	C182627	2830315200	2.00	2	Tree Fruit
1015	ME89524	1690902500	4.00	2	Field Grown Nursery or Floral
1016	C182823	2224401000	1.50	1	Tree Fruit
1017	C182426	1012905600	5.00	5	Tree Fruit
1017	C182426	1012905700	4.66	4	Tree Fruit
1017	C182426	9330600247	20.00	18	Tree Fruit
1018	0552621	1292912100	37.05	37.05	Tree Fruit
1020	C182824	1292910300	8.00	7	Tree Fruit
1021	C181202	1875403500	30.00	26	Tree Fruit
1022	C733944	1131400300	196.70	40	Row and Field Crops
1023	C182830	1280911000	3.30	3	Tree Fruit
1024	C182805	1292703300	11.13	5.3	Tree Fruit
1025	C182804	1853512100	2.50	1	Tree Fruit
1026	C181827	8217201400	4.88	2.1	Grapes, Berries, and Vine Fruit
1027	C182652	2703501200	1.00	1	Tree Fruit
1027	C182652	2703501400	1.25	1	Tree Fruit
1029	C182837	1866020400	5.82	3	Tree Fruit
1030	0020962	1291007500	58.00	45	Tree Fruit
1030	0020962	1291007600	45.00	20	Tree Fruit
1030	0020962	1291007700	20.00	5	Tree Fruit
1031	C182767	1281120300	2.59	2	Tree Fruit
1032	C182767	1284300300	10.70	8	Tree Fruit
1033	C182767	1281120400	28.48	23	Tree Fruit
1034	C182767	1284300400	16.07	10	Tree Fruit
1035	C182767	1284302400	15.50	10	Tree Fruit
1036	C182767	1285001800	32.29	24	Tree Fruit
1037	C182639	2761003700	6.00	6	Tree Fruit
1037	C182639	2761003500	6.00	6	Tree Fruit
1038	C182836	1743002700	10.00	9	Tree Fruit
1039	C182308	1274102000	5.33	5	Tree Fruit
1040	C665685	1561106700	1.00	1	Container Nursery
1040	C665685	2561711900	1.00	1	Container Nursery
1041	0399700	1290402900	14.08	8	Tree Fruit
1041	0399700	1290410900	22.17	10	Tree Fruit
1042	C182724	1870421400	7.00	4	Tree Fruit
1043	C182574	2642401800	4.30	1.5	Tree Fruit
1044	C181978	1284603200	4.86	4	Tree Fruit
1045	C180755	1024202100	5.00	4	Container Nursery
1048	C182256	1241830200	7.80	3.5	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1049	C182521	2771012000	8.69	4.5	Tree Fruit
1050	C182796	1890320500	5.50	1	Tree Fruit
1051	C182748	1881501000	19.11	8	Tree Fruit
1052	C181193	1851507600	2.96	1	Tree Fruit
1053	C777784	2370705100	2.00	2	Tree Fruit
1054	C364847	1272906000	3.59	2	Tree Fruit
1055	C182434	2830410400	1.00	1	Container Nursery
1057	C182517	1293107100	5.60	3	Tree Fruit
1058	C182608	1274903600	4.00	3	Tree Fruit
1059	C180938	1263311600	2.00	2	Tree Fruit
1059	C180938	1263311700	4.00	4	Tree Fruit
1059	C180938	1702301300	1.89	1	Tree Fruit
1059	C180938	1702303600	3.00	3	Tree Fruit
1059	C180938	1702303900	2.00	2	Tree Fruit
1060	C182825	2241905500	3.23	2.23	Tree Fruit
1062	w253963	2870310700	8.00	8	Grapes, Berries, and Vine Fruit
1063	C182584	1292706400	2.50	1.5	Tree Fruit
1064	C182514	1851810900	4.40	3.5	Field Grown Nursery or Floral
1064	C182514	1851810500	4.10	3.5	Tree Fruit
1066	C182766-02	1294301700	2.00	1	Tree Fruit
1067	C182488	1274301100	3.84	1.5	Tree Fruit
1068	C182385	1110801200	5.78	5	Tree Fruit
1068	C182385	1110801300	12.60	12	Tree Fruit
1069	C182680	2224501600	2.00	1	Tree Fruit
1070	6616975	1892712200	15.00	7.5	Tree Fruit
1071	C182278	2651701100	9.00	4	Tree Fruit
1071	C182278	2652600500	4.00	2.5	Tree Fruit
1072	W255156	1290411000	14.00	14	Tree Fruit
1073	N250759	1292707500	6.00	5	Row and Field Crops
1073	N250759	1292707600	4.00	2	Row and Field Crops
1074	C545318	1027601800	9.00	8	Tree Fruit
1074	C545318	1027801700	3.00	1	Tree Fruit
1074	C545318	1272509300	6.00	5	Tree Fruit
1074	C545318	1272509400	6.00	6	Tree Fruit
1075	C182478	1020830600	12.00	9	Tree Fruit
1076	w255403	1221700800	8.00	6.5	Tree Fruit
1077	C182410	1284301900	5.00	3.5	Tree Fruit
1079	C190403	1251504200	38.40	14	Other
1079	C190403	1251614500	1921.40	41	Other
1079	C190403	1251502900	383.80	16.8	Tree Fruit
1079	C190403	1251503000	459.80	52.5	Tree Fruit
1079	C190403	1251615500	223.70	9.6	Tree Fruit
1079	C190403	1251616500	123.20	4.9	Tree Fruit
1079	C190403	1251616600	21.80	6	Tree Fruit
1079	C190403	1251621500	249.90	31.8	Tree Fruit
1079	C190403	1251624700	148.00	18.1	Tree Fruit
1079	C190403	1251718200	203.00	19	Tree Fruit
1079	C190403	1251719000	292.40	67	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1079	C190403	1251730600	24.30	1.8	Tree Fruit
1079	C190403	1251730700	191.60	85	Tree Fruit
1080	C883201	1211502000	50.00	50	Tree Fruit
1080	C883201	1220308100	10.00	4	Tree Fruit
1080	C883201	1220308200	10.00	4	Tree Fruit
1080	C883201	1220308300	10.00	4	Tree Fruit
1086	C888030	1281703400	10.00	5	Tree Fruit
1086	C888030	1281703500	15.00	13	Tree Fruit
1087	6563200	1243512100	4.00	3	Tree Fruit
1087	6563200	1243518300	6.00	6	Tree Fruit
1087	6563200	1243518400	6.00	5	Tree Fruit
1087	6563200	1243518500	4.00	4	Tree Fruit
1088	C792224	1021803500	19.56	7	Tree Fruit
1089	C182670	1073402700	1.37	0	Tree Fruit
1089	C182670	1073402800	3.50	3.17	Tree Fruit
1090	C180653	2380630600	2.50	1	Tree Fruit
1090	C180653	2380630700	1.00	1	Tree Fruit
1090	C180653	2380630800	1.50	1	Tree Fruit
1090	C180653	2380630900	1.00	1	Tree Fruit
1090	C180653	2380631000	1.50	1	Tree Fruit
1091	C182227	1271505100	20.00	15	Tree Fruit
1093	C677635	1282404200	19.00	5	Tree Fruit
1094	C182331	1070803900	3.78	2.5	Tree Fruit
1094	C182331	1073307700	4.00	2.5	Tree Fruit
1094	C182331	1073307800	4.00	4	Tree Fruit
1095	C182822	2760304600	9.88	5.5	Tree Fruit
1096	C182049	1015511100	4.65	3.25	Tree Fruit
1097	C327931	2760804600	15.00	3	Tree Fruit
1098	C880150	1021808687	45.00	35	Tree Fruit
1099	C880150	2780703536	35.00	20	Tree Fruit
1100	C53402	1290803100	12.00	12	Tree Fruit
1100	C53402	1290803200	20.00	20	Tree Fruit
1100	C53402	1290804800	10.50	10.5	Tree Fruit
1100	C53402	1900310300	24.80	0	Tree Fruit
1100	C53402	1900310400	40.00	0	Tree Fruit
1101	W255156	1290601300	14.00	14	Tree Fruit
1102	c118370	2461400700	34.50	0.5	Grapes, Berries, and Vine Fruit
1103	C180653	1212901100	4.40	4.4	Tree Fruit
1103	C180653	1212901200	3.00	3	Tree Fruit
1103	C180653	2072300100	2.00	2	Tree Fruit
1104	C182562	2671480700	2.50	2	Tree Fruit
1104	C182562	2671480800	2.50	1	Tree Fruit
1105	W251857	2650610900	4.00	1	Tree Fruit
1106	C182324	1073003100	10.30	7	Tree Fruit
1107	C725895	1710910100	5.00	1.5	Greenhouse Crops
1107	C725895	1812703400	2.50	1	Greenhouse Crops
1108	C182457	1072902600	2.50	2.5	Tree Fruit
1109	1720050	1722101700	6.70	6	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1110	3746247	1301002100	1.00	1	Tree Fruit
1110	3746247	1301002200	1.00	1	Tree Fruit
1110	3746247	1301002300	1.00	1	Tree Fruit
1110	3746247	1301002400	1.00	1	Tree Fruit
1112	C182407	1012802500	39.05	38	Tree Fruit
1112	C182407	1012802700	10.32	9.09	Tree Fruit
1112	C182407	1012802800	10.16	10.14	Tree Fruit
1112	C182407	1012802900	10.05	10.02	Tree Fruit
1112	C182407	1012803011	10.02	9.76	Tree Fruit
1112	C182407	1280204200	9.38	9.02	Tree Fruit
1112	C182407	1280204300	10.85	10	Tree Fruit
1112	C182407	1280204400	8.02	8	Tree Fruit
1112	C182407	1280204500	7.45	7.25	Tree Fruit
1112	C182407	1280204600	4.40	4.11	Tree Fruit
1112	C182407	1280204700	9.06	8.89	Tree Fruit
1112	C182407	1282710100	39.70	38.02	Tree Fruit
1112	C182407	1282711300	6.97	6.5	Tree Fruit
1112	C182407	1282711400	11.57	11.5	Tree Fruit
1113	C783660	1290701100	31.15	27.8	Tree Fruit
1113	C783660	1290701700	21.49	10.53	Tree Fruit
1114	C182738	1292911100	2.82	2.5	Tree Fruit
1115	C968836	2771113900	8.00	1.8	Grapes, Berries, and Vine Fruit
1116	C119276	1290605900	14.50	7	Tree Fruit
1116	C119276	1290607800	9.50	7	Tree Fruit
1117	W251772	2653316200	1.30	0.6	Tree Fruit
1118	W255365	1021806900	10.00	9	Tree Fruit
1119	C182412	1082520900	3.38	3.38	Tree Fruit
1119	C182412	1082521000	2.41	2.41	Tree Fruit
1120	W254591	2371602600	2.00	1.5	Tree Fruit
1121	C182746	2770905000	10.00	10	Tree Fruit
1121	C182746	2770905600	10.00	2	Tree Fruit
1122	C182806	1221701100	2.40	1.5	Tree Fruit
1123	C867240	6531110800	20.00	12	Other
1124	W255026	2801102000	1.20	0.75	Tree Fruit
1125	C182634	1850424100	2.50	1.5	Tree Fruit
1126	C182605	2830614200	10.00	2	Field Grown Nursery or Floral
1127	C657845	1251331700	2.50	2	Tree Fruit
1128	C182217	1220307300	12.00	12	Tree Fruit
1128	C182217	1220307400	13.00	13	Tree Fruit
1129	C182377	2381511000	2.90	2	Tree Fruit
1129	C182377	2381511100	1.80	1.8	Tree Fruit
1130	C753575	1882401200	10.00	5	Container Nursery
1130	C753575	1882402400	2.00	1	Container Nursery
1131	6515558	1281120500	5.00	1.5	Tree Fruit
1131	6515558	1281130160	19.90	8	Tree Fruit
1132	c182809	1282122500	8.00	2.5	Tree Fruit
1133	W255060	1211902000	8.50	6.5	Tree Fruit
1134	C888060	1025801400	8.00	8	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1135	C182810	1333013300	9.00	4	Tree Fruit
1136	C571696	1282900900	20.00	13	Tree Fruit
1137	C182302	1020710900	3.00	3	Tree Fruit
1138	C182422	1332500200	4.26	0.5	Tree Fruit
1138	C182422	1332500300	15.60	5.5	Tree Fruit
1138	C182422	1332500400	7.80	7	Tree Fruit
1141	C182628	1211720600	2.50	2	Tree Fruit
1142	C182267	1293107000	3.60	2.5	Tree Fruit
1143	C749104	1781301500	5.00	1	Container Nursery
1144	C462465	1251331600	2.50	2	Tree Fruit
1145	C182661	1293105200	2.30	1	Tree Fruit
1146	C182283	1072406900	4.00	4	Tree Fruit
1146	C182283	2224401200	4.50	4.5	Tree Fruit
1147	C182263	2671202300	28.00	1	Tree Fruit
1148	C725848	1333013700	5.30	2	Tree Fruit
1149	C182336	1281210500	17.00	17	Tree Fruit
1150	A002915	1050203500	5.30	2.5	Tree Fruit
1151	C181574	1333901000	1.00	1	Container Nursery
1152	C733719	1020830900	39.00	39	Tree Fruit
1153	C182773	1865801300	1.50	1.5	Tree Fruit
1154	C180631	1322001900	6.00	6	Field Grown Nursery or Floral
1154	C180631	1322002000	6.00	6	Field Grown Nursery or Floral
1154	C180631	1322302400	6.00	6	Field Grown Nursery or Floral
1154	C180631	1401101900	40.00	40	Field Grown Nursery or Floral
1154	C180631	1401102000	40.00	40	Field Grown Nursery or Floral
1154	C180631	1401102400	40.00	40	Field Grown Nursery or Floral
1154	C180631	1402900400	86.00	0	Field Grown Nursery or Floral
1154	C180631	1402900500	90.00	90	Field Grown Nursery or Floral
1154	C180631	1402900800	86.00	86	Field Grown Nursery or Floral
1155	C771082	1281012200	3.00	3	Tree Fruit
1155	C771082	1281012300	3.00	3	Tree Fruit
1156	C927183	1260303600	5.82	3	Tree Fruit
1157	C182335	1333120600	2.95	1.25	Tree Fruit
1158	w253680	1264800700	5.61	4.5	Tree Fruit
1159	C181232	1821802900	8.50	7.5	Tree Fruit
1160	5791610	1072403600	2.00	0.5	Tree Fruit
1161	C738107	7601707100	70.00	35	Grapes, Berries, and Vine Fruit
1162	C182686	1882260200	7.25	3	Tree Fruit
1163	C182787	1020811000	20.00	20	Tree Fruit
1163	C182787	1320203800	8.00	8	Tree Fruit
1163	C182787	1320203900	8.00	8	Tree Fruit
1163	C182787	1320204000	9.91	9.91	Tree Fruit
1163	C182787	1320204100	8.00	8	Tree Fruit
1163	C182787	9353500204	2.85	2.85	Tree Fruit
1163	C182787	9353500215	2.85	2.85	Tree Fruit
1163	C182787	9353500226	2.85	2.85	Tree Fruit
1163	C182787	9353500237	2.85	2.85	Tree Fruit
1163	C182787	9353500248	2.85	2.85	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1163	C182787	9353500259	2.85	2.85	Tree Fruit
1163	C182787	9353500260	2.90	2.9	Tree Fruit
1164	C182447	1220302900	120.00	98	Grapes, Berries, and Vine Fruit
1165	C182447	1220304300	80.00	40	Grapes, Berries, and Vine Fruit
1166	c846822	1220805800	5.00	3	Grapes, Berries, and Vine Fruit
1166	c846822	1220307700	5.00	4	Tree Fruit
1167	C182666	2771011900	9.00	3	Tree Fruit
1168	C567671	1027310100	6.00	3	Tree Fruit
1169	C545325	1210321200	2.20	0.8	Tree Fruit
1170	C182403	2481800800	10.00	4	Tree Fruit
1170	C182403	2502720700	9.50	9	Tree Fruit
1170	C182403	2481800900	18.30	10	Tree Fruit
1178	5912327	1220201400	10.00	10	Field Grown Nursery or Floral
1178	5912327	1220201500	5.00	5	Field Grown Nursery or Floral
1178	5912327	1220201600	14.46	14.46	Field Grown Nursery or Floral
1179	5912327	1220305500	20.00	20	Field Grown Nursery or Floral
1179	5912327	1222801400	5.87	5.87	Field Grown Nursery or Floral
1180	5912327	1220305300	15.65	10	Field Grown Nursery or Floral
1181	5912327	1220904600	2.50	2	Field Grown Nursery or Floral
1182	5912327	2111310200	2.94	2.94	Field Grown Nursery or Floral
1182	5912327	2111310300	2.50	2.5	Field Grown Nursery or Floral
1182	5912327	2111310400	2.42	2.42	Field Grown Nursery or Floral
1182	5912327	2111310500	5.46	5.46	Field Grown Nursery or Floral
1182	5912327	2111310700	2.84	2.84	Field Grown Nursery or Floral
1182	5912327	2111311000	3.01	3.01	Field Grown Nursery or Floral
1184	C182794	4324911400	0.50	0.3	Tree Fruit
1187	C182756	1850906800	4.80	0	Tree Fruit
1187	C182756	1850907400	4.00	1	Tree Fruit
1187	C182756	1850907500	4.00	0	Tree Fruit
1187	C182756	1850908000	59.00	1	Tree Fruit
1188	C181120	1781700200	24.00	14	Greenhouse Crops
1189	C182739	2802100300	4.00	1	Grapes, Berries, and Vine Fruit
1191	C182618	1292121000	2.50	2	Tree Fruit
1191	C182618	1292121100	2.50	1.5	Tree Fruit
1193	C781057	1272712600	4.89	3	Tree Fruit
1194	C899520	1210210300	2.03	2.03	Container Nursery
1194	C899520	1210212200	2.00	2	Container Nursery
1194	C899520	7601960215	44.47	26.9	Container Nursery
1194	C899520	7601960216	65.57	48.2	Container Nursery
1194	C899520	7601962600	4.90	4.9	Container Nursery
1195	C119177	1282121300	97.00	50	Grapes, Berries, and Vine Fruit
1195	C119177	1282121200	3.00	0	Other
1195	C119177	1301600500	296.00	200	Tree Fruit
1196	C954133	6341005900	5.00	3	Container Nursery
1196	C954133	6341007800	6.50	4	Container Nursery
1196	C954133	6341006000	3.50	1	Row and Field Crops
1196	C954133	6341006200	10.00	0	Row and Field Crops
1196	C954133	6360206800	4.00	2	Row and Field Crops

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1197	C657613	1250304100	2.00	1	Tree Fruit
1198	c739917	1012711400	5.08	0	Other
1198	c739917	1012711500	5.11	0	Other
1198	c739917	1012712800	45.00	0	Other
1198	c739917	1027311000	17.81	0	Other
1198	c739917	1284603900	2.52	0	Other
1198	c739917	1310200500	1.70	0	Other
1198	c739917	1103500200	5.15	4	Tree Fruit
1198	c739917	1281400100	40.00	10	Tree Fruit
1198	c739917	1281400200	80.00	45	Tree Fruit
1198	c739917	1282001900	10.16	5	Tree Fruit
1198	c739917	1282002300	190.91	100	Tree Fruit
1198	c739917	1282002400	29.09	10	Tree Fruit
1198	c739917	1282003900	162.28	110	Tree Fruit
1198	c739917	1282111100	4.73	2	Tree Fruit
1198	c739917	1282111200	37.58	19	Tree Fruit
1198	c739917	1282111400	14.20	8	Tree Fruit
1198	c739917	1283800300	82.18	30	Tree Fruit
1198	c739917	1283801000	10.00	6	Tree Fruit
1198	c739917	1283900400	23.28	15	Tree Fruit
1198	c739917	1283900600	45.36	27	Tree Fruit
1198	c739917	1283901600	18.28	15	Tree Fruit
1198	c739917	1283901700	5.00	3	Tree Fruit
1198	c739917	1290802800	73.11	18.5	Tree Fruit
1198	c739917	1290804100	12.22	4.5	Tree Fruit
1198	c739917	1290804500	12.93	1.5	Tree Fruit
1198	c739917	1290804600	8.53	1.5	Tree Fruit
1198	c739917	1290804700	10.11	6	Tree Fruit
1198	c739917	1332600100	8.95	7	Tree Fruit
1198	c739917	1342400100	10.47	6	Tree Fruit
1198	c739917	1342400200	43.41	31	Tree Fruit
1199	C182669	1701623900	3.85	3.85	Tree Fruit
1200	C781007	1273302000	2.50	2	Tree Fruit
1201	C182259	2650503200	3.60	1	Tree Fruit
1202	C181642	1057800300	2.00	1.75	Tree Fruit
1203	C182447	1211501700	40.00	20	Grapes, Berries, and Vine Fruit
1203	C182447	1211501800	40.00	20	Grapes, Berries, and Vine Fruit
1203	C182447	1211501900	40.00	20	Grapes, Berries, and Vine Fruit
1203	C182447	1220307000	40.00	20	Grapes, Berries, and Vine Fruit
1204	C182447	1220402500	80.00	40	Grapes, Berries, and Vine Fruit
1205	c930844	1212531600	1.40	1	Container Nursery
1205	c930844	1212531800	1.20	1	Container Nursery
1206	C622217	1701701000	42.50	22.5	Tree Fruit
1206	C622217	1701702700	42.50	22.5	Tree Fruit
1206	C622217	1701703400	42.50	22.5	Tree Fruit
1206	C622217	1701703500	42.50	22.5	Tree Fruit
1206	C622217	1701710100	42.50	22.5	Tree Fruit
1206	C622217	1710800800	42.50	22.5	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1207	5440383	2402302800	2.02	2	Tree Fruit
1207	5440383	2402302900	2.53	2	Tree Fruit
1207	5440383	2402303000	8.37	2	Tree Fruit
1207	5440383	2402303100	7.54	0	Tree Fruit
1208	c182792	1013611900	20.71	20.71	Tree Fruit
1208	c182792	1013612300	2.98	2.98	Tree Fruit
1208	c182792	1013611800	11.82	11.82	Tree Fruit
1208	c182792	1013612700	2.53	2.53	Tree Fruit
1209	C182795	2760912700	9.00	8	Tree Fruit
1209	C182795	2761500300	10.00	10	Tree Fruit
1209	C182795	2761500400	10.00	10	Tree Fruit
1210	C567912	1014801400	10.00	0	Other
1210	C567912	1014302900	21.00	13	Tree Fruit
1210	C567912	1014303000	19.00	9	Tree Fruit
1210	C567912	1015000100	19.00	13	Tree Fruit
1211	W254974	1211005700	5.50	3	Field Grown Nursery or Floral
1212	W252023	1141204700	20.00	4	Grapes, Berries, and Vine Fruit
1213	C182794	1084400700	5.37	4	Tree Fruit
1213	C182794	4304911400	0.50	0.3	Tree Fruit
1214	C182017	1282905400	4.90	3	Tree Fruit
1214	C182017	1282905500	5.00	3	Tree Fruit
1214	C182017	1282905600	5.00	3	Tree Fruit
1214	C182017	1282905700	5.20	3	Tree Fruit
1214	C182017	1282905800	8.72	1.25	Tree Fruit
1214	C182017	1282905900	5.47	1.25	Tree Fruit
1214	C182017	1282906000	3.23	1.25	Tree Fruit
1214	C182017	1282906100	3.18	1.25	Tree Fruit
1214	C182017	1284400200	10.63	5	Tree Fruit
1214	C182017	1284400300	16.00	10	Tree Fruit
1214	C182017	1290106800	23.37	18	Tree Fruit
1214	C182017	1290106900	12.40	10	Tree Fruit
1214	C182017	1290107000	4.48	2	Tree Fruit
1214	C182017	1290107100	4.91	3	Tree Fruit
1214	C182017	1290107200	22.14	20	Tree Fruit
1214	C182017	1822802700	5.00	5	Tree Fruit
1215	C568109	1020831300	40.00	38	Tree Fruit
1215	C568109	1020831400	40.00	38	Tree Fruit
1215	C568109	1020831600	40.00	36	Tree Fruit
1215	C568109	1020831700	40.00	36	Tree Fruit
1215	C568109	1020831800	40.00	38	Tree Fruit
1215	C568109	1023004300	4.00	3	Tree Fruit
1215	C568109	1023004400	4.00	3	Tree Fruit
1215	C568109	1111301100	6.00	5	Tree Fruit
1215	C568109	1111301300	4.00	2	Tree Fruit
1215	C568109	1111301400	6.00	6	Tree Fruit
1215	C568109	1111305400	10.00	4	Tree Fruit
1215	C568109	1111305500	16.00	5	Tree Fruit
1215	C568109	1111305600	8.00	7	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1215	C568109	1111700300	4.00	1	Tree Fruit
1215	C568109	1284604500	42.00	38	Tree Fruit
1215	C568109	1290105800	24.00	15	Tree Fruit
1215	C568109	1293001600	20.00	10	Tree Fruit
1215	C568109	1293004600	20.00	15	Tree Fruit
1215	C568109	1293004800	20.00	10	Tree Fruit
1215	C568109	1293005000	20.00	20	Tree Fruit
1215	C568109	1294200200	83.00	24	Tree Fruit
1215	C568109	1311001000	8.00	6	Tree Fruit
1215	C568109	1311001500	30.00	20	Tree Fruit
1215	C568109	1311100300	20.00	20	Tree Fruit
1215	C568109	1333014200	22.00	18	Tree Fruit
1215	C568109	1334201000	20.00	20	Tree Fruit
1215	C568109	1334201700	16.00	16	Tree Fruit
1215	C568109	1334201800	14.00	14	Tree Fruit
1215	C568109	1781000600	40.00	2	Tree Fruit
1215	C568109	1851120200	7.00	6	Tree Fruit
1215	C568109	2410100700	12.00	9	Tree Fruit
1215	C568109	2410101600	9.00	7	Tree Fruit
1215	C568109	2411600100	40.00	30	Tree Fruit
1216	C574447	1012401200	11.20	0	Tree Fruit
1216	C574447	1012711800	33.90	9	Tree Fruit
1216	C574447	1012712900	73.10	30	Tree Fruit
1216	C574447	1015711900	4.00	2	Tree Fruit
1216	C574447	1015712000	4.00	2	Tree Fruit
1216	C574447	1015712100	14.30	5	Tree Fruit
1217	C182807	1781902000	8.30	6	Tree Fruit
1218	C182617	1015630100	11.00	4	Tree Fruit
1219	C182293	1273204500	1.10	1.1	Grapes, Berries, and Vine Fruit
1220	C182320	2641305100	5.00	4	Field Grown Nursery or Floral
1221	C182803	1293201700	44.00	30	Tree Fruit
1222	C182811	1111700500	1.90	1	Tree Fruit
1223	c182774	1851122400	10.50	7	Tree Fruit
1223	c182774	1851124000	2.50	1	Tree Fruit
1224	C181579	2502720300	10.00	6	Tree Fruit
1225	w255363	1850720100	5.90	0.5	Tree Fruit
1226	c182813	2770420500	16.00	2	Tree Fruit
1227	C181245	2410201000	23.50	23.5	Tree Fruit
1228	C182768	1860212200	2.50	1	Tree Fruit
1229	C182387	1821904800	3.74	2	Greenhouse Crops
1230	C578817	2840201400	1.52	0.75	Tree Fruit
1231	C739884	1870502900	1.00	0.37	Container Nursery
1231	C739884	1870503000	0.60	0.37	Container Nursery
1232	C553237	1021050200	10.00	5	Tree Fruit
1233	C777711	1871407500	9.00	5	Container Nursery
1234	182790	1091201200	35.00	1	Tree Fruit
1235	C182486	1853901700	3.00	1	Tree Fruit
1236	C182775	1821907400	12.00	4.5	Grapes, Berries, and Vine Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1237	C182498	1866012500	2.53	1.75	Tree Fruit
1238	C291910	1263401900	3.00	0.5	Tree Fruit
1239	C182741	1022805700	6.50	5.5	Tree Fruit
1240	c182833	1333013100	5.00	1	Tree Fruit
1241	C777720	1293003900	76.00	76	Tree Fruit
1241	C777720	1720800800	130.00	101	Tree Fruit
1241	C777720	1852503000	50.00	50	Tree Fruit
1241	C777720	1881003500	120.00	120	Tree Fruit
1242	C182621	2861300400	9.30	1.5	Grapes, Berries, and Vine Fruit
1243	C182763	1221704400	2.73	2	Tree Fruit
1244	C739453	1026002000	4.83	3.5	Tree Fruit
1244	C739453	1057302000	6.10	5	Tree Fruit
1244	C739453	1057712600	1.70	0.2	Tree Fruit
1244	C739453	7601962300	5.00	5	Tree Fruit
1245	C572093	2770402800	10.00	2	Tree Fruit
1246	6015746	1562200200	3.00	3	Container Nursery
1246	6015746	1563510300	3.00	3	Container Nursery
1246	6015746	1563510700	2.00	2	Container Nursery
1246	6015746	1563510800	0.50	0.5	Container Nursery
1247	C182835	1111801900	2.05	1	Tree Fruit
1248	C846708	1082520600	4.40	1.5	Tree Fruit
1249	C182500	1021050300	4.35	2.75	Tree Fruit
1250	1321294	1822700900	46.68	46.68	Tree Fruit
1250	1321294	1822701200	54.74	54.74	Tree Fruit
1250	1321294	1822701300	16.58	16.58	Tree Fruit
1250	1321294	1822701400	13.06	13.06	Tree Fruit
1251	C182418	2840705700	10.00	10	Tree Fruit
1253	C182657	1881612100	3.98	2.75	Tree Fruit
1254	C683888	9311800123	19.39	9.5	Tree Fruit
1255	C182762	1323205900	2.66	1	Tree Fruit
1256	C182783	1221704300	3.20	2	Tree Fruit
1257	C182546	1720212300	8.90	7.5	Tree Fruit
1257	C182546	1720212700	9.50	8	Tree Fruit
1258	C182473	1333013600	1.50	1.5	Tree Fruit
1259	C181174	1024405500	4.12	3.5	Tree Fruit
1260	W253935	6531200100	25.00	2	Tree Fruit
1261	C905651	1720212400	5.26	4	Tree Fruit
1261	C905651	1720215400	14.19	11	Tree Fruit
1261	C905651	1720215500	8.28	7	Tree Fruit
1261	C905651	1720215600	8.39	7	Tree Fruit
1262	6732853	1081205200	11.00	2	Tree Fruit
1262	6732853	1081205300	13.00	5	Tree Fruit
1262	6732853	1081205400	43.00	35	Tree Fruit
1262	6732853	1081211500	27.00	20	Tree Fruit
1262	6732853	1081220300	22.00	17	Tree Fruit
1262	6732853	1081220800	30.00	10	Tree Fruit
1262	6732853	1081220900	31.00	25	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1262	6732853	1081221100	110.00	15	Tree Fruit
1262	6732853	1081221300	57.00	25	Tree Fruit
1262	6732853	1081221400	12.00	10	Tree Fruit
1262	6732853	1081221700	1.00	1	Tree Fruit
1262	6732853	1081221900	78.00	55	Tree Fruit
1262	6732853	1250610400	39.00	10	Tree Fruit
1262	6732853	1250610700	8.00	2	Tree Fruit
1262	6732853	1250610900	97.00	12	Tree Fruit
1262	6732853	1250620600	1.00	0	Tree Fruit
1262	6732853	1250620800	131.00	35	Tree Fruit
1262	6732853	1280103600	58.00	5	Tree Fruit
1262	6732853	1280103700	39.00	0	Tree Fruit
1263	C182318	1280711200	40.00	40	Tree Fruit
1263	C182318	1281700400	26.00	26	Tree Fruit
1263	C182318	1281702400	10.00	10	Tree Fruit
1263	C182318	1281702800	10.00	10	Tree Fruit
1263	C182318	1281702900	10.00	10	Tree Fruit
1263	C182318	1281703600	40.00	40	Tree Fruit
1263	C182318	1281704900	10.00	10	Tree Fruit
1263	C182318	1285000200	10.00	10	Tree Fruit
1263	C182318	1285001700	60.00	60	Tree Fruit
1264	ME52347	1270610500	8.00	8	Tree Fruit
1265	C182039	3723060000	1.50	1.5	Tree Fruit
1266	C182643	1057711900	4.00	2	Tree Fruit
1267	C846855	1273202200	6.50	2	Tree Fruit
1268	C556098	1292111900	3.00	2	Field Grown Nursery or Floral
1268	C556098	1292112100	10.00	5	Field Grown Nursery or Floral
1269	C181975	1324705700	3.75	3.75	Tree Fruit
1269	C181975	1324705800	3.25	2.25	Tree Fruit
1270	C758250	1852603500	17.00	10	Tree Fruit
1271	C820552	1333013400	5.02	5.02	Tree Fruit
1271	C820552	1333013500	5.54	5.54	Tree Fruit
1272	C182589	1102003000	8.00	7	Tree Fruit
1273	H053721	1281510200	60.00	40	Tree Fruit
1274	C641801	1290308100	31.00	24	Tree Fruit
1274	C641801	1292703700	5.00	3.5	Tree Fruit
1275	C908270	1260200800	10.00	8	Tree Fruit
1276	C182772	2620323700	0.70	0.2	Container Nursery
1277	C402581	1081911900	2.00	1	Field Grown Nursery or Floral
1279	C182750	1061710500	2.50	2.5	Tree Fruit
1280	C182025	1851130400	20.00	2	Container Nursery
1281	W255104	1221703000	4.50	4	Tree Fruit
1281	W255104	1221703900	2.50	2	Tree Fruit
1282	C564070	1026305800	1.63	1	Field Grown Nursery or Floral
1283	C990276	1025602400	15.39	12.25	Field Grown Nursery or Floral
1283	C990276	1083002100	2.79	1	Field Grown Nursery or Floral
1283	C990276	1083002200	6.29	4.75	Field Grown Nursery or Floral
1283	C990276	1083002300	8.05	5.5	Field Grown Nursery or Floral

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1283	C990276	1083002400	35.58	21.25	Field Grown Nursery or Floral
1283	C990276	1083206900	4.00	2	Field Grown Nursery or Floral
1283	C990276	1083400500	50.21	38	Field Grown Nursery or Floral
1283	C990276	1083401700	10.36	7.25	Field Grown Nursery or Floral
1283	C990276	1083402100	14.14	12	Field Grown Nursery or Floral
1283	C990276	1083402200	18.72	14	Field Grown Nursery or Floral
1283	C990276	1083402300	11.44	9.75	Field Grown Nursery or Floral
1283	C990276	1083402400	11.02	8.25	Field Grown Nursery or Floral
1283	C990276	1084201800	10.72	5.25	Field Grown Nursery or Floral
1283	C990276	1083204100	21.43	14	Field Grown Nursery or Floral
1283	C990276	1083205200	22.21	17.75	Field Grown Nursery or Floral
1283	C990276	1083205900	8.43	5	Field Grown Nursery or Floral
1283	C990276	1083206000	8.17	6.5	Field Grown Nursery or Floral
1283	C990276	1083206100	8.06	4.75	Field Grown Nursery or Floral
1283	C990276	1083206200	5.23	1	Field Grown Nursery or Floral
1283	C990276	1083206300	3.20	2.75	Field Grown Nursery or Floral
1283	C990276	1083502500	19.24	16.5	Field Grown Nursery or Floral
1283	C990276	1083902800	62.00	50	Field Grown Nursery or Floral
1283	C990276	1083001800	5.95	4.25	Tree Fruit
1283	C990276	1083203400	8.75	7.5	Tree Fruit
1283	C990276	1083401500	53.79	45.75	Tree Fruit
1283	C990276	1083402500	9.71	8.25	Tree Fruit
1283	C990276	1083402600	20.00	17	Tree Fruit
1283	C990276	1083402700	10.91	9.25	Tree Fruit
1283	C990276	1083206700	10.00	5	Tree Fruit
1283	C990276	1083206800	20.00	14	Tree Fruit
1283	C990276	1250801800	14.00	10	Tree Fruit
1284	C182659	1322800500	13.70	10	Tree Fruit
1285	C207447	1042710400	19.80	6.5	Tree Fruit
1285	C207447	1042722500	5.00	4	Tree Fruit
1285	C207447	1080110300	9.90	7.5	Tree Fruit
1285	C207447	1080203200	36.00	15	Tree Fruit
1286	C182764	1865801900	4.11	3.8	Tree Fruit
1286	C182764	1865802100	5.25	5.25	Tree Fruit
1286	C182764	1865802200	17.00	14.5	Tree Fruit
1286	C182764	1865802300	9.00	7.5	Tree Fruit
1286	C182764	1865802400	2.44	2	Tree Fruit
1287	W251657	1221004200	3.00	3	Tree Fruit
1288	C181625	1234501500	1.00	1	Tree Fruit
1289	C182255	1272904500	3.00	3	Tree Fruit
1290	C182471	2861812000	4.00	4	Tree Fruit
1291	C182789	1221703300	2.90	1.5	Tree Fruit
1292	c182791	1875304400	115.20	60	Tree Fruit
1292	c182791	1875304500	61.91	5	Tree Fruit
1292	c182791	1875500100	10.00	10	Tree Fruit
1293	0030029	2770930300	13.50	13	Tree Fruit
1293	0030029	2770930400	27.50	18	Tree Fruit
1293	0030029	2770933900	8.50	8	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1293	0030029	2770934300	4.15	4	Tree Fruit
1293	0030029	2780704000	46.00	45	Tree Fruit
1293	0030029	2791510500	20.00	19	Tree Fruit
1293	0030029	2791510600	20.00	19	Tree Fruit
1294	C182834	1333422900	2.00	1	Tree Fruit
1295	C182012	1283800900	42.00	25	Tree Fruit
1296	C182645	1273901800	2.60	1	Tree Fruit
1297	C182399	1013605400	6.00	3	Tree Fruit
1297	C182399	1013605500	4.00	3	Tree Fruit
1298	C207289	1100211000	80.00	14	Tree Fruit
1298	C207289	1100900100	183.00	34	Tree Fruit
1299	C182234	2651102600	2.85	2.5	Tree Fruit
1300	c182832	1792503100	1.17	1.17	Container Nursery
1301	C182797	1320813600	4.30	2	Tree Fruit
1302	C180725	2410404600	4.00	2	Tree Fruit
1303	w254895	1221700400	4.20	3	Tree Fruit
1304	C534225	1890810300	20.00	17	Field Grown Nursery or Floral
1304	C534225	1890814300	10.00	4	Field Grown Nursery or Floral
1304	C534225	1890814400	10.00	9	Field Grown Nursery or Floral
1305	C181649	1333125700	2.20	2	Tree Fruit
1306	C182755	1220802000	10.00	10	Row and Field Crops
1306	C182755	1713500700	5.00	5	Row and Field Crops
1307	C182802	1221701300	4.20	3	Tree Fruit
1308	c663141	1103610500	9.75	2	Tree Fruit
1308	c663141	1103611800	46.28	25	Tree Fruit
1309	C182386	4793502700	0.50	0.3	Greenhouse Crops
1310	C181973	1221301400	1.00	0	Other
1311	C205080	2410411000	20.00	1	Row and Field Crops
1311	C205080	2410410900	20.00	5	Tree Fruit
1313	C888183	1701705400	7.20	7	Field Grown Nursery or Floral
1314	C888183	1540406800	2.80	2.8	Container Nursery
1315	C182641	1057600900	2.50	1.5	Tree Fruit
1316	C182782	2652708300	0.50	0.5	Container Nursery
1322	C182784	1882716000	2.20	1.5	Tree Fruit
1323	A069031	1874605500	2.63	1.5	Tree Fruit
1324	C920976	2870702200	8.00	6	Tree Fruit
1325	A008072	2563300700	4.50	4.5	Container Nursery
1326	C118331	1221800100	3.50	3	Tree Fruit
1326	C118331	1221801300	5.50	5.5	Tree Fruit
1331	c820549	1851607900	10.00	8	Tree Fruit
1332	C648091	1220900300	5.00	5	Field Grown Nursery or Floral
1332	C648091	1220900500	5.00	5	Field Grown Nursery or Floral
1332	C648091	1220901800	10.00	10	Field Grown Nursery or Floral
1333	C665382	2160530700	3.20	1.4	Greenhouse Crops
1335	ME96288	1027502600	4.75	4.75	Tree Fruit
1336	C783640-37	1070700400	20.70	16.4	Tree Fruit
1336	C783640-37	1070701200	36.80	29	Tree Fruit
1336	C783640-37	1070701800	13.20	10.4	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1336	C783640-37	1073201500	6.90	5.5	Tree Fruit
1336	C783640-37	1073201600	23.70	18.7	Tree Fruit
1336	C783640-37	1073202000	3.00	2	Tree Fruit
1340	C888069	6491110100	5.66	5.1	Container Nursery
1340	C888069	6491110200	0.51	0.5	Container Nursery
1340	C888069	6491110300	0.35	0.3	Container Nursery
1340	C888069	6491110600	1.37	1.3	Container Nursery
1340	C888069	6492810100	2.62	2.4	Container Nursery
1340	C888069	6491110400	0.01	0	Other
1341	C665426	1015710300	42.00	20	Field Grown Nursery or Floral
1341	C665426	1021304200	73.00	25	Tree Fruit
1342	C190941	1275211000	44.00	35	Tree Fruit
1343	C182044	9342000093	10.00	3	Tree Fruit
1344	C182678	1271105700	5.40	4	Tree Fruit
1345	w255356	1292112300	7.33	1.15	Field Grown Nursery or Floral
1346	C181974	1280921700	8.00	5	Tree Fruit
1346	C181974	1280921800	5.00	4	Tree Fruit
1346	C181974	1281110100	10.00	5	Tree Fruit
1347	c182829	1220900200	3.50	3.5	Field Grown Nursery or Floral
1347	c182829	2221311100	44.50	30	Field Grown Nursery or Floral
1347	c182829	1220900400	4.64	4	Tree Fruit
1348	C182311	1282001400	30.00	27	Tree Fruit
1349	C713377	1291008400	2.00	2	Tree Fruit
1352	5481450	1082912500	15.50	2	Tree Fruit
1352	5481450	1082912600	5.28	3	Tree Fruit
1352	5481450	1082920400	52.16	35	Tree Fruit
1352	5481450	1083500500	6.60	2.5	Tree Fruit
1352	5481450	1083701100	0.85	0	Tree Fruit
1352	5481450	1083704500	36.00	25	Tree Fruit
1352	5481450	1083704800	22.90	0.5	Tree Fruit
1352	5481450	1083705200	3.40	0.5	Tree Fruit
1352	5481450	1083705300	2.20	1.5	Tree Fruit
1352	5481450	1083710100	11.40	0.5	Tree Fruit
1352	5481450	1083710700	22.78	7	Tree Fruit
1353	C182594	1213122000	1.50	1.5	Tree Fruit
1354	c182814	1057600600	2.50	2	Tree Fruit
1356	C182443	2400104000	2.00	2	Field Grown Nursery or Floral
1356	C182443	1320203100	5.00	5	Tree Fruit
1356	C182443	1320203300	5.00	5	Tree Fruit
1356	C182443	1875404000	20.00	20	Tree Fruit
1357	C180666	1275002400	8.89	7	Tree Fruit
1358	C353624	1282010200	21.36	10	Tree Fruit
1359	C182460	2642501200	3.32	3	Tree Fruit
1360	C182690	1880821600	30.00	10	Container Nursery
1361	C545716	1072900800	3.00	2	Tree Fruit
1362	C182630	1273902300	2.50	2.5	Tree Fruit
1363	C760146	1581505800	45.00	20	Tree Fruit
1363	C760146	1881514700	20.00	1	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1364	ME10643	1270610400	4.50	4	Field Grown Nursery or Floral
1364	ME10643	1270611300	20.00	12	Field Grown Nursery or Floral
1365	C181258	1275210400	41.50	28	Field Grown Nursery or Floral
1365	C181258	1292120200	7.50	7	Field Grown Nursery or Floral
1365	C181258	1292123200	8.50	8	Field Grown Nursery or Floral
1365	C181258	2192412900	8.00	5	Field Grown Nursery or Floral
1365	C181258	2190301200	2.00	0	Other
1369	ME10668	1292921900	10.00	3	Row and Field Crops
1369	ME10668	1293500100	20.00	18	Row and Field Crops
1370	C777817	1280931600	2.68	2	Tree Fruit
1370	C777817	1280931700	2.83	2.4	Tree Fruit
1370	C777817	1280932300	11.58	10	Tree Fruit
1371	C628004	1713100900	14.44	10	Tree Fruit
1371	C628004	1740300100	17.32	12	Tree Fruit
1373	C182330	1290410300	16.00	0	Tree Fruit
1373	C182330	1290410400	2.87	2	Tree Fruit
1373	C182330	1881500900	19.60	3	Tree Fruit
1376	C716031	1860621200	4.00	3	Tree Fruit
1376	C716031	1860621300	6.00	3	Tree Fruit
1376	C716031	1860622500	30.00	20	Tree Fruit
1376	C716031	1860622600	30.00	28	Tree Fruit
1376	C716031	1860622700	30.00	18	Tree Fruit
1377	C182333	1721406000	32.00	8	Tree Fruit
1378	C180674	1250707800	6.00	3	Field Grown Nursery or Floral
1378	C180674	1250707900	26.50	18	Field Grown Nursery or Floral
1379	C182812	1013706100	40.00	10	Tree Fruit
1380	C242165	1220806900	2.50	2.5	Container Nursery
1380	C242165	1220807000	12.82	9	Field Grown Nursery or Floral
1381	0028689	1092703500	11.85	11.85	Tree Fruit
1381	0028689	1093200500	2.54	1.5	Tree Fruit
1381	0028689	1093200600	2.23	2	Tree Fruit
1381	0028689	1093400100	84.18	65.6	Tree Fruit
1382	c568779	1111800400	4.77	3.77	Tree Fruit
1384	C657712	2173814000	12.00	9	Other
1385	C657712	1820821100	4.25	3.5	Other
1386	C182452	1282110100	28.59	28.59	Tree Fruit
1386	C182452	1282110600	14.21	14.21	Tree Fruit
1386	C182452	1282120100	51.47	51.47	Tree Fruit
1386	C182452	1282120200	8.78	8.78	Tree Fruit
1387	C182808	1282120800	8.11	8.11	Tree Fruit
1388	C182252	1274401500	8.00	7	Tree Fruit
1390	C893047	1281703800	10.00	10	Tree Fruit
1391	A021121	1283402000	17.00	12	Tree Fruit
1392	C899484	1071511900	6.90	6	Tree Fruit
1393	C182582	1022804400	15.00	14	Tree Fruit
1395	C423019	1081007100	27.00	22	Tree Fruit
1395	C423019	1210223200	12.50	6	Tree Fruit
1396	C182752	1222801300	9.10	9	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1397	C182006	1290304200	12.00	5	Field Grown Nursery or Floral
1399	C182539	1053012200	9.00	7	Tree Fruit
1399	C182539	1053013100	2.00	1.5	Tree Fruit
1400	C772933	1082510100	5.00	5	Tree Fruit
1400	C772933	1082521100	5.00	5	Tree Fruit
1401	C534965	2502720600	10.00	0	Tree Fruit
1401	C534965	2502720500	10.00	2	Tree Fruit
1401	C534965	2502720800	10.00	1	Tree Fruit
1402	C900468	1290803800	1.00	0	Other
1402	C900468	1290805000	40.00	20	Tree Fruit
1402	C900468	1291807300	4.49	4.49	Tree Fruit
1402	C900468	1291807400	3.15	3.15	Tree Fruit
1403	C279241	3930102900	37.45	30	Tree Fruit
1403	C279241	3930103900	13.52	13.52	Tree Fruit
1403	C279241	3930104500	3.78	3.78	Tree Fruit
1406	C846049	1026102500	5.00	0	Tree Fruit
1406	C846049	1026102600	5.00	2	Tree Fruit
1406	C846049	1026104800	5.00	3.5	Tree Fruit
1406	C846049	1243515100	2.50	2.5	Tree Fruit
1406	C846049	1243515200	2.50	2.5	Tree Fruit
1406	C846049	1243517400	7.00	7	Tree Fruit
1406	C846049	1243517500	2.50	2.5	Tree Fruit
1407	C753559	2410401800	6.00	3	Tree Fruit
1408	C624050	1021010200	10.93	7	Field Grown Nursery or Floral
1408	C624050	1021010300	8.11	5	Field Grown Nursery or Floral
1408	C624050	1021010500	8.80	5	Field Grown Nursery or Floral
1409	C867708	2420700800	2.81	1	Grapes, Berries, and Vine Fruit
1409	C867708	2420701500	46.30	40.4	Tree Fruit
1409	C867708	2430200300	44.94	22	Tree Fruit
1409	C867708	2420700700	41.00	7.5	Tree Fruit
1410	0382200	2650620900	3.00	1.2	Tree Fruit
1410	0382200	2651100200	4.50	2.2	Tree Fruit
1410	0382200	2670202100	2.50	1.25	Tree Fruit
1410	0382200	2670202400	4.00	1.5	Tree Fruit
1411	C182524	1821407600	12.12	3.4	Other
1412	C825610	1300104200	8.00	8	Tree Fruit
1412	C825610	1300104500	8.00	8	Tree Fruit
1412	C825610	1310103100	8.00	8	Tree Fruit
1412	C825610	1310104300	13.00	13	Tree Fruit
1412	C825610	1310104400	8.00	8	Tree Fruit
1415	C545820	1290802600	22.00	14	Tree Fruit
1415	C545820	1290802700	18.00	13	Tree Fruit
1417	C182383	1850627100	46.22	5	Greenhouse Crops
1418	C182493	1274500400	5.00	2.5	Tree Fruit
1420	C182730	1013615500	6.50	3.2	Tree Fruit
1422	C181215	1140910600	10.00	4	Grapes, Berries, and Vine Fruit
1423	C888004	2911310600	5.00	2.5	Tree Fruit
1423	C888004	2911310700	5.00	2	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1424	C182273	1080206100	8.00	3	Tree Fruit
1425	C735738	2602121800	10.00	8.5	Container Nursery
1425	C735738	2602222000	4.83	4.2	Container Nursery
1426	C204333	6522200200	264.00	20	Other
1427	C181823	1055603700	5.24	1.25	Tree Fruit
1428	C749186	1292921700	3.69	3	Tree Fruit
1429	C182417	1270903600	3.00	3	Tree Fruit
1430	C120578	2682300800	6.00	4	Tree Fruit
1431	W252949	6753311900	5.00	4	Tree Fruit
1431	W252949	6753312000	5.00	4	Tree Fruit
1432	C867685	1782000100	32.00	25	Tree Fruit
1432	C867685	1782002300	8.00	3	Tree Fruit
1433	C182561	1881512900	3.19	2.5	Field Grown Nursery or Floral
1434	C182561	1291904800	7.62	5.5	Tree Fruit
1436	0382200	2642912800	1.50	0.75	Other
1436	0382200	1883312900	3.00	1.5	Tree Fruit
1436	0382200	2260920500	2.00	1.1	Tree Fruit
1436	0382200	2621900700	3.00	2.25	Tree Fruit
1436	0382200	2640903600	2.50	1.25	Tree Fruit
1436	0382200	2641513300	2.00	0.75	Tree Fruit
1436	0382200	2642233100	2.50	1.5	Tree Fruit
1436	0382200	2642403500	1.50	0.75	Tree Fruit
1436	0382200	2642412100	4.00	2	Tree Fruit
1436	0382200	2642412300	3.00	2	Tree Fruit
1436	0382200	2642501100	2.50	2	Tree Fruit
1436	0382200	2643911000	1.50	0.75	Tree Fruit
1436	0382200	2644510900	2.50	1.5	Tree Fruit
1436	0382200	2650502800	2.50	1	Tree Fruit
1436	0382200	2650630600	2.00	1.42	Tree Fruit
1436	0382200	2650632000	2.00	1	Tree Fruit
1436	0382200	2650802600	3.00	2	Tree Fruit
1436	0382200	2651103100	2.00	1.5	Tree Fruit
1436	0382200	2651400700	1.50	1.5	Tree Fruit
1436	0382200	2651402000	2.00	1	Tree Fruit
1436	0382200	2651402200	2.50	0.75	Tree Fruit
1436	0382200	2651602700	4.00	0.4	Tree Fruit
1436	0382200	2651701200	10.00	6.5	Tree Fruit
1436	0382200	2652014300	2.00	1.5	Tree Fruit
1436	0382200	2652014500	2.50	1.5	Tree Fruit
1436	0382200	2652202200	2.00	1.5	Tree Fruit
1436	0382200	2652202600	3.50	1.75	Tree Fruit
1436	0382200	2653316300	1.50	0.8	Tree Fruit
1436	0382200	2653316600	1.00	0.3	Tree Fruit
1436	0382200	2653316800	1.50	0.75	Tree Fruit
1436	0382200	2653702100	1.00	0.5	Tree Fruit
1436	0382200	2654120600	3.00	1.75	Tree Fruit
1436	0382200	2654210100	2.00	1.25	Tree Fruit
1436	0382200	2654511200	2.00	0.75	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1436	0382200	2654802400	2.00	1.25	Tree Fruit
1436	0382200	2660203000	3.00	2	Tree Fruit
1436	0382200	2660204300	8.00	6.5	Tree Fruit
1436	0382200	2660302300	2.50	1.5	Tree Fruit
1436	0382200	2660402400	1.50	0.75	Tree Fruit
1436	0382200	2660412000	2.00	1.2	Tree Fruit
1436	0382200	2660530800	4.00	3	Tree Fruit
1436	0382200	2660714300	2.00	1	Tree Fruit
1436	0382200	2660714500	1.50	0.5	Tree Fruit
1436	0382200	2660911700	4.50	3.3	Tree Fruit
1436	0382200	2660919300	2.50	1.75	Tree Fruit
1436	0382200	2660921800	2.00	0.54	Tree Fruit
1436	0382200	2661101300	2.00	1	Tree Fruit
1436	0382200	2661202600	1.50	0.75	Tree Fruit
1436	0382200	2661402000	2.50	1	Tree Fruit
1436	0382200	2661510200	3.00	1.5	Tree Fruit
1436	0382200	2661910400	2.50	1.5	Tree Fruit
1436	0382200	2662000300	3.00	1.5	Tree Fruit
1436	0382200	2662002500	1.50	0.75	Tree Fruit
1436	0382200	2662002700	1.50	0.75	Tree Fruit
1436	0382200	2662203200	2.00	0.5	Tree Fruit
1436	0382200	2663104900	4.00	1	Tree Fruit
1436	0382200	2663205000	3.50	0.5	Tree Fruit
1436	0382200	2663600300	2.50	1.5	Tree Fruit
1436	0382200	2663600700	2.00	1.25	Tree Fruit
1436	0382200	2663602900	1.50	0.35	Tree Fruit
1436	0382200	2670100100	3.00	1.5	Tree Fruit
1436	0382200	2670101600	2.00	1.25	Tree Fruit
1436	0382200	2670200700	3.00	1	Tree Fruit
1436	0382200	2670200800	3.00	2	Tree Fruit
1436	0382200	2670302400	3.00	2	Tree Fruit
1436	0382200	2670302700	3.00	2	Tree Fruit
1436	0382200	2670701700	3.00	1.5	Tree Fruit
1436	0382200	2670801500	3.50	2.3	Tree Fruit
1436	0382200	2670900300	4.50	3.5	Tree Fruit
1436	0382200	2671002500	4.00	4	Tree Fruit
1436	0382200	2671201400	2.50	1.5	Tree Fruit
1436	0382200	2671203100	2.00	1.2	Tree Fruit
1436	0382200	2671203400	3.00	2	Tree Fruit
1436	0382200	2671203500	2.50	1.5	Tree Fruit
1436	0382200	2671630400	1.25	0.5	Tree Fruit
1436	0382200	2671710800	3.00	1.6	Tree Fruit
1436	0382200	2680100700	2.00	0.75	Tree Fruit
1436	0382200	2680902500	3.50	2.75	Tree Fruit
1436	0382200	2682500200	3.00	2.25	Tree Fruit
1436	0382200	2690200900	1.00	0.4	Tree Fruit
1436	0382200	2691935800	4.00	2	Tree Fruit
1436	0382200	2981901100	3.00	2	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1436	0382200	8778112100	2.00	1	Tree Fruit
1437	0382200	2654120300	4.00	3	Tree Fruit
1438	C905680	1281210200	2.00	2	Tree Fruit
1438	C905680	1281210300	10.00	10	Tree Fruit
1439	C182459	1221001200	19.60	2	Container Nursery
1440	C880189	1021604900	8.50	4.5	Tree Fruit
1440	C880189	1080206200	25.00	0	Tree Fruit
1441	C805040	2760232100	12.00	4	Tree Fruit
1442	C181254	1284400500	9.80	1	Grapes, Berries, and Vine Fruit
1442	C181254	1284402200	5.90	3	Grapes, Berries, and Vine Fruit
1442	C181254	1284402300	3.00	1	Grapes, Berries, and Vine Fruit
1443	C825597	2830320200	6.00	6	Grapes, Berries, and Vine Fruit
1444	C665439	1822600600	6.50	5	Greenhouse Crops
1444	C665439	1822600800	14.00	0	Greenhouse Crops
1444	C665439	1822700500	1.00	0	Greenhouse Crops
1445	0382200	2651602900	6.00	4	Tree Fruit
1445	0382200	2651603000	6.00	3	Tree Fruit
1445	0382200	2651701400	3.00	1	Tree Fruit
1445	0382200	2651701500	12.00	10	Tree Fruit
1445	0382200	2651701600	6.00	5	Tree Fruit
1445	0382200	2651701700	6.00	3	Tree Fruit
1445	0382200	2654511100	3.00	1	Tree Fruit
1445	0382200	2660102100	6.50	4.5	Tree Fruit
1445	0382200	2662000500	3.00	1.5	Tree Fruit
1445	0382200	2663710400	3.00	2	Tree Fruit
1446	C182509	2760802000	12.19	5	Tree Fruit
1447	C181854	1110300600	40.00	40	Tree Fruit
1447	C181854	1110301100	30.00	30	Tree Fruit
1447	C181854	1110301200	10.00	0	Tree Fruit
1447	C181854	1110301700	40.00	40	Tree Fruit
1448	C182379	1057611400	2.50	2	Tree Fruit
1449	C182508	1330501900	10.87	10.87	Tree Fruit
1449	C182508	1330502100	17.33	17	Tree Fruit
1450	ME97845	2172802600	1.60	0.5	Container Nursery
1451	C182753	1211411900	2.00	1.2	Tree Fruit
1452	C967892	1261809700	3.50	2.5	Tree Fruit
1453	C182356	1071902000	6.40	0.5	Tree Fruit
1453	C182356	1071903000	3.50	0.5	Tree Fruit
1454	W252884	2650632300	2.00	1	Tree Fruit
1455	C990644	1812600200	1.80	1	Greenhouse Crops
1456	C635803	1860421600	6.00	4	Tree Fruit
1457	W251785	2780801600	40.00	0	Other
1458	C180760	1821408300	4.70	3	Tree Fruit
1459	C182357	1021051700	5.00	4	Tree Fruit
1459	C182357	1021051800	5.00	4	Tree Fruit
1459	C182357	1021051900	4.00	3	Tree Fruit
1460	C182481	1950403600	30.00	2	Field Grown Nursery or Floral

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1463	C182735	0000000001	3.00	3	Tree Fruit
1464	W255374	1292707400	2.50	2	Tree Fruit
1465	C182828	2391506400	1.00	1	Tree Fruit
1466	C778138	1141204800	20.00	3	Grapes, Berries, and Vine Fruit
1467	C180802	1021809000	6.00	2	Tree Fruit
1467	C180802	1024501400	1.00	0	Tree Fruit
1467	C180802	1026900700	80.00	23	Tree Fruit
1468	C182610	1210620700	4.00	1	Container Nursery
1472	C753609	2471802700	11.50	11.5	Tree Fruit
1472	C753609	2471802800	1.00	1	Tree Fruit
1472	C753609	2471802900	5.00	5	Tree Fruit
1473	C180678	1291007300	8.60	7	Tree Fruit
1475	c182817	1071205400	1.00	0.3	Other
1476	C777845	2150700400	5.00	2	Container Nursery
1477	C512979	1102200200	24.00	8	Tree Fruit
1477	C512979	1102200500	3.53	3	Tree Fruit
1477	C512979	1102200600	3.00	3	Tree Fruit
1477	C512979	1102200700	3.25	3	Tree Fruit
1477	C512979	1102200800	3.22	3	Tree Fruit
1477	C512979	1102200900	20.92	10	Tree Fruit
1477	C512979	1102201300	89.00	10	Tree Fruit
1477	C512979	1102202500	20.00	10	Tree Fruit
1479	C181866	2760230400	6.00	3	Tree Fruit
1480	C182432	1111901600	4.21	4	Tree Fruit
1481	7965569	1072900400	2.50	2.25	Tree Fruit
1481	7965569	1072900500	3.00	2.25	Tree Fruit
1482	C825503	2363335000	0.20	0.05	Row and Field Crops
1482	C825503	2341410300	9.00	4.5	Tree Fruit
1482	C825503	2363334400	0.45	0.22	Tree Fruit
1482	C825503	2363334500	4.61	2.3	Tree Fruit
1483	C182431	1252324400	4.00	4	Tree Fruit
1484	C119272	1015100800	1.00	1	Tree Fruit
1490	C542115	1291633400	4.00	2	Field Grown Nursery or Floral
1490	C542115	1882715300	3.00	1	Other
1492	C182583	2860603500	20.00	2.5	Tree Fruit
1493	C182583	2861113300	8.58	1	Other
1496	C182648	1863111200	3.00	3	Tree Fruit
1497	C182398	1057723400	4.50	4.2	Tree Fruit
1498	c899530	1272103300	7.00	3	Tree Fruit
1499	C182321	1021807500	3.90	2	Tree Fruit
1500	W250179	2783520700	4.00	2	Grapes, Berries, and Vine Fruit
1501	C182476	2401906500	14.00	14	Tree Fruit
1502	C791579	1252200200	8.19	8.19	Tree Fruit
1502	C791579	1252200300	5.26	5.26	Tree Fruit
1502	C791579	1252200400	13.63	13.63	Tree Fruit
1504	8862000	1841024700	4.99	0.25	Field Grown Nursery or Floral
1505	c789157	1861404800	5.00	1	Greenhouse Crops
1505	c789157	1861405700	5.00	1	Greenhouse Crops

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1508	w254696	2461311800	17.50	1	Grapes, Berries, and Vine Fruit
1509	C182424	1234005200	0.50	0.5	Container Nursery
1510	C402951	1822404400	5.10	1	Container Nursery
1510	C402951	1822405400	5.10	1	Container Nursery
1511	C442464	1252322400	16.97	16.97	Tree Fruit
1512	C777800	1720921200	1.00	0	Other
1512	C777800	1720920200	14.00	3	Tree Fruit
1513	C750042	1301502800	3.65	0	Other
1513	C750042	1301701300	25.91	25	Other
1513	C750042	1301800900	0.72	0.72	Tree Fruit
1513	C750042	1301802200	19.60	19	Tree Fruit
1513	C750042	1301802300	3.96	3.96	Tree Fruit
1513	C750042	1321502000	17.60	17.6	Tree Fruit
1513	C750042	1321502100	11.92	11.92	Tree Fruit
1513	C750042	1321502200	30.86	30.86	Tree Fruit
1513	C750042	1321504300	109.23	108.5	Tree Fruit
1513	C750042	1322800800	8.58	0	Tree Fruit
1514	C119271	1284800100	7.50	2.7	Tree Fruit
1515	C406507	1292110100	14.00	10	Row and Field Crops
1515	C406507	1293000900	60.00	50	Row and Field Crops
1515	C406507	1293001000	20.00	15	Row and Field Crops
1517	C899528	1073402300	16.00	16	Tree Fruit
1517	C899528	1073402400	17.00	17	Tree Fruit
1518	0032727	1011301100	60.38	26.68	Tree Fruit
1518	0032727	1011501000	159.88	1.24	Tree Fruit
1518	0032727	1011501100	160.24	99	Tree Fruit
1518	0032727	1011501200	159.88	88.03	Tree Fruit
1518	0032727	1012107100	123.13	11.92	Tree Fruit
1518	0032727	1012402800	0.88	0	Tree Fruit
1518	0032727	1012402900	38.00	0	Tree Fruit
1518	0032727	1012403000	2.58	0	Tree Fruit
1518	0032727	1012404100	167.80	151.87	Tree Fruit
1518	0032727	1012404200	39.48	39.48	Tree Fruit
1518	0032727	1012404300	70.50	35.84	Tree Fruit
1518	0032727	1012404400	38.90	13.2	Tree Fruit
1518	0032727	1012404500	39.17	35.23	Tree Fruit
1519	C182351	2224502100	5.00	4	Tree Fruit
1519	C182351	2224502300	6.70	5.5	Tree Fruit
1519	C182351	2224502500	7.10	6	Tree Fruit
1520	C182316	1320204400	8.01	0	Tree Fruit
1520	C182316	1320204500	12.84	11	Tree Fruit
1520	C182316	1320204600	11.11	10	Tree Fruit
1520	C182316	1320204700	8.02	7.5	Tree Fruit
1521	W250512	1100712000	70.00	15	Field Grown Nursery or Floral
1522	C686424	1025301400	12.00	4.5	Container Nursery
1522	C686424	1051809100	20.00	18	Container Nursery
1522	C686424	1070300600	18.00	14	Container Nursery
1522	C686424	1070301200	1.00	1	Container Nursery

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1522	C686424	1072502600	15.00	13	Container Nursery
1523	c182757	1290307900	18.00	12	Tree Fruit
1524	C182535	1275221700	8.60	8	Tree Fruit
1525	C182826	1210806900	4.60	4	Tree Fruit
1526	C888027	1292112200	20.00	19	Tree Fruit
1527	C850099	1323523600	3.00	2	Tree Fruit
1528	8862000	1812605600	0.63	0.15	Container Nursery
1528	8862000	1812605700	0.71	0.15	Container Nursery
1528	8862000	1812605800	2.18	0.1	Container Nursery
1528	8862000	1812606100	2.10	0.1	Field Grown Nursery or Floral
1528	8862000	1812600300	1.60	0.15	Greenhouse Crops
1528	8862000	1812606200	2.31	0.1	Greenhouse Crops
1529	C181622	1080311800	3.75	3.75	Tree Fruit
1530	W252800	1271511700	5.25	4	Tree Fruit
1531	C777844	2770422000	10.00	9	Tree Fruit
1532	C182465	1251330600	12.00	10	Tree Fruit
1533	C919673	1027114000	5.00	5	Tree Fruit
1536	C118092	1102901500	9.00	4.5	Tree Fruit
1537	C118092	1102901200	8.50	5	Field Grown Nursery or Floral
1537	C118092	1102901600	8.00	6	Tree Fruit
1537	C118092	1102901800	14.00	6	Tree Fruit
1538	C182751	1743001300	10.00	5	Tree Fruit
1539	C182405	1026201800	11.70	3.5	Tree Fruit
1541	C182576	1283901500	12.00	4	Field Grown Nursery or Floral
1541	C182576	1291903000	6.00	5	Field Grown Nursery or Floral
1541	C182576	1293800300	5.00	4	Field Grown Nursery or Floral
1543	C725812	1013604800	101.00	30	Field Grown Nursery or Floral
1546	C182362	1280930600	5.87	5.87	Tree Fruit
1546	C182362	1280930700	6.30	6.3	Tree Fruit
1546	C182362	1281210700	2.50	2.5	Tree Fruit
1546	C182362	1281210800	7.11	7.11	Tree Fruit
1546	C182362	1281210900	2.50	2.5	Tree Fruit
1546	C182362	1281211000	4.99	4.99	Tree Fruit
1548	C796917	2760301500	38.00	30	Tree Fruit
1548	C796917	2760800800	30.00	25	Tree Fruit
1548	C796917	2761501600	39.00	30	Tree Fruit
1548	C796917	2761501700	14.00	11	Tree Fruit
1548	C796917	2761501800	10.00	9	Tree Fruit
1548	C796917	2761501900	10.00	9	Tree Fruit
1548	C796917	2761502000	11.00	10	Tree Fruit
1548	C796917	2761502100	18.00	11	Tree Fruit
1549	W254959	1061104400	2.00	1.5	Tree Fruit
1552	C777817	1280930100	11.57	10	Tree Fruit
1553	C181106	2543521100	3.40	2.25	Greenhouse Crops
1554	C182479	5630701700	1.65	1	Field Grown Nursery or Floral
1555	C182479	5640400500	2.00	1.25	Field Grown Nursery or Floral
1555	C182479	5640400800	1.50	1	Field Grown Nursery or Floral
1555	C182479	5640610900	0.50	0.25	Field Grown Nursery or Floral

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1556	4764971	2770300500	5.20	2	Tree Fruit
1556	4764971	2771501700	39.78	35	Tree Fruit
1557	C181111	1220307900	2.53	2	Field Grown Nursery or Floral
1558	5912327	1220205500	14.96	12	Field Grown Nursery or Floral
1559	C182530	1274806300	1.25	1.25	Tree Fruit
1559	C182530	1274806400	1.00	1	Tree Fruit
1559	C182530	1274806600	18.23	18.23	Tree Fruit
1559	C182530	1274807000	86.15	86.15	Tree Fruit
1559	C182530	1274807100	6.85	6.85	Tree Fruit
1559	C182530	1274900800	2.50	2.5	Tree Fruit
1559	C182530	1274904300	4.25	4.25	Tree Fruit
1559	C182530	1274904800	5.69	5.69	Tree Fruit
1559	C182530	1274904900	4.20	4.2	Tree Fruit
1559	C182530	1274905100	4.34	4.34	Tree Fruit
1560	C182479	640610900	0.50	0.25	Field Grown Nursery or Floral
1562	C182777	1212704200	2.00	0.5	Tree Fruit
1563	C182339	1290111500	20.00	20	Field Grown Nursery or Floral
1563	C182339	1711501200	4.54	4	Field Grown Nursery or Floral
1564	C182033	2441204100	50.00	3	Tree Fruit
1564	C182033	2441204500	40.00	7	Tree Fruit
1566	C182327	1220300800	20.00	17	Field Grown Nursery or Floral
1566	C182327	1291111100	20.00	18	Field Grown Nursery or Floral
1566	C182327	1591701000	45.00	4	Field Grown Nursery or Floral
1566	C182327	1820740400	20.00	20	Field Grown Nursery or Floral
1566	C182327	1862461200	20.00	20	Field Grown Nursery or Floral
1567	C783695	1274104100	2.50	1.5	Tree Fruit
1571	C182303	1074202400	2.54	1	Grapes, Berries, and Vine Fruit
1571	C182303	1074202500	8.37	4	Grapes, Berries, and Vine Fruit
1571	C182303	1074205000	4.29	3	Grapes, Berries, and Vine Fruit
1571	C182303	1071202400	14.50	6	Tree Fruit
1573	0382200	2661100400	4.00	2.5	Tree Fruit
1573	0382200	2661201100	6.50	4	Tree Fruit
1574	C182735	2652401200	3.00	3	Tree Fruit
1575	C182596	1100212700	10.00	10	Tree Fruit
1575	C182596	1100214600	5.00	5	Tree Fruit
1575	C182596	1270104300	6.00	6	Tree Fruit
1576	C825504	7601709800	40.00	40	Field Grown Nursery or Floral
1576	C825504	7601701600	25.00	25	Field Grown Nursery or Floral
1578	C210996	1111003900	8.23	7	Tree Fruit
1578	C210996	1111100800	0.99	0.99	Tree Fruit
1578	C210996	1281704500	10.00	10	Tree Fruit
1578	C210996	1300800800	3.00	2	Tree Fruit
1583	C745630	1021603900	10.00	10	Tree Fruit
1583	C745630	1021604200	1.50	1.5	Tree Fruit
1583	C745630	1024401100	7.00	7	Tree Fruit
1583	C745630	1024403200	4.00	4	Tree Fruit
1583	C745630	1024405600	1.00	1	Tree Fruit
1583	C745630	1025210200	6.00	6	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1583	C745630	1025210300	10.00	10	Tree Fruit
1583	C745630	1053632100	4.00	4	Tree Fruit
1583	C745630	1071710600	7.00	7	Tree Fruit
1583	C745630	1082520100	8.00	8	Tree Fruit
1583	C745630	1212020400	5.00	5	Tree Fruit
1583	C745630	1275300600	5.00	5	Tree Fruit
1583	C745630	1293101700	15.00	15	Tree Fruit
1583	C745630	1294101700	10.00	10	Tree Fruit
1584	C571707	1314300200	5.00	4	Tree Fruit
1587	C182595	1275111400	10.00	10	Tree Fruit
1587	C182595	1275111600	15.00	15	Tree Fruit
1588	8331300	2841101100	14.00	0	Other
1588	8331300	2841101600	2.00	0	Other
1588	8331300	2841103500	10.00	0	Other
1588	8331300	2850800200	90.00	0	Other
1588	8331300	2850910500	5.00	0	Other
1588	8331300	2841101500	38.00	6	Tree Fruit
1588	8331300	2841103700	21.00	15	Tree Fruit
1588	8331300	2841103800	8.00	5	Tree Fruit
1588	8331300	2841300900	39.00	15	Tree Fruit
1588	8331300	2841301000	43.00	32	Tree Fruit
1588	8331300	2841501500	26.00	26	Tree Fruit
1588	8331300	2841501600	7.00	7	Tree Fruit
1588	8331300	2850910600	35.00	35	Tree Fruit
1596	0382200	401001362	4.00	1	Tree Fruit
1596	0382200	2670100400	3.00	1	Tree Fruit
1596	0382200	2671411800	4.50	1	Tree Fruit
1708	C550667	1590803000	10.00	5	Field Grown Nursery or Floral
1708	C550667	1820200100	20.00	15	Field Grown Nursery or Floral
1708	C550667	2051120800	1.00	1	Field Grown Nursery or Floral
1708	C550667	2090404400	10.00	3	Field Grown Nursery or Floral
1708	C550667	2090606100	40.00	10	Field Grown Nursery or Floral
1709	C182633	1100901000	120.00	27.48	Container Nursery
1710	C180802	1021809100	15.00	12	Tree Fruit
1711	C182352	1873222200	2.00	1	Tree Fruit
1712	C182328	1882900200	16.00	16	Tree Fruit
1713	C182838	2411300700	3.10	2	Tree Fruit
1714	C567884	1852307400	5.00	5	Field Grown Nursery or Floral
1715	W254966	2870701400	6.05	2	Tree Fruit
1716	C180659	1027711100	5.30	5	Tree Fruit
1717	0030021	1022805400	15.00	7.5	Tree Fruit
1718	C182801	1027310200	4.26	1	Container Nursery
1718	C182801	1020520400	22.04	8	Tree Fruit
1718	C182801	1013120300	80.00	50	Tree Fruit
1719	C893012	1221701200	3.60	3.6	Tree Fruit
1720	W254447	6501900200	42.00	8.5	Tree Fruit
1721	W255839	1026004000	2.74	1.8	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1722	C182779	1013500800	50.00	24	Tree Fruit
1723	C182633	1100901000	120.00	27.48	Field Grown Nursery or Floral
1724	C182841	2224500900	1.81	1	Tree Fruit
1725	C182845	1892712000	5.12	4	Tree Fruit
1725	C182845	1892712100	5.90	5	Tree Fruit
1725	C182845	1892712700	6.29	4	Tree Fruit
1726	C182798	1212000500	5.25	2	Tree Fruit
1727	C436493	1311702300	12.27	12.27	Tree Fruit
1727	C436493	1311800800	2.56	2.56	Tree Fruit
1727	C436493	1334201600	12.80	12.8	Tree Fruit
1728	C182902	2371611300	2.00	1.5	Tree Fruit
1729	C182964	2224401400	6.62	6.62	Tree Fruit
1730	C888066	1280710400	22.50	20.5	Tree Fruit
1730	C888066	1280711500	23.00	21	Tree Fruit
1731	C182923	1054923500	3.88	1.5	Tree Fruit
1732	W257096	1332020600	15.00	1	Field Grown Nursery or Floral
1732	W257096	1281502100	13.96	13	Tree Fruit
1733	C182925	1281020300	17.00	10	Tree Fruit
1733	C182925	1281020400	13.00	10	Tree Fruit
1734	C556005	1851122700	21.00	19	Tree Fruit
1735	C182942	1026400300	21.68	5	Tree Fruit
1735	C182942	9180300056	40.00	5	Tree Fruit
1736	C182561	1291904800	7.62	7.62	Field Grown Nursery or Floral
1737	8609300	1333010900	20.00	18	Tree Fruit
1738	W257159	1742407300	4.00	4	Container Nursery
1738	W257159	1822404700	2.00	2	Container Nursery
1738	W257159	1822404800	1.00	1	Container Nursery
1738	W257159	1822405500	1.50	1.5	Container Nursery
1738	W257159	2171622000	1.00	1	Container Nursery
1738	W257159	2171622100	1.00	1	Container Nursery
1738	W257159	2172010100	1.50	1.5	Container Nursery
1739	C657672	1290921000	5.00	4.5	Tree Fruit
1740	C406666	1330301100	9.00	9	Tree Fruit
1741	C804679	1056802000	5.00	0.44	Container Nursery
1742	C182944	1015510900	3.50	3.5	Tree Fruit
1742	C182944	1015511000	3.00	3	Tree Fruit
1743	C749942	1241902000	10.00	5	Field Grown Nursery or Floral
1743	C749942	1241902100	10.00	5	Field Grown Nursery or Floral
1743	C749942	1241901900	12.00	1	Tree Fruit
1743	C749942	1241901800	180.00	125	Tree Fruit
1744	C182966	1281022700	7.00	6	Tree Fruit
1745	C182945	1283301600	7.00	7	Tree Fruit
1745	C182945	1283301800	7.00	7	Tree Fruit
1745	C182945	1285210500	8.00	8	Tree Fruit
1746	C182866	1292910900	6.70	5	Tree Fruit
1747	C182943	1290402600	26.00	24	Tree Fruit
1748	C182849	1873220400	2.97	1	Tree Fruit
1749	C182905	2250200500	6.68	3	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1750	W257259	1292403000	23.65	12	Tree Fruit
1751	C182903	1023004400	4.00	1	Tree Fruit
1751	C182903	1024004300	2.00	1.5	Tree Fruit
1752	C182962	2760811400	8.82	1.1	Tree Fruit
1752	C182962	2760811500	10.58	1.8	Tree Fruit
1753	C182904	1280920200	6.00	6	Tree Fruit
1754	C725699	1103510700	21.00	19	Tree Fruit
1754	C725699	1103612100	2.00	1	Tree Fruit
1755	C182965	1320814000	32.82	25	Other
1755	C182965	1320814100	5.14	2	Other
1756	C182906	2410400300	3.20	2.5	Tree Fruit
1757	C733669	1851601900	5.00	2.5	Tree Fruit
1757	C733669	1851606000	29.00	25	Tree Fruit
1758	C182867	1882300100	35.13	35.13	Tree Fruit
1758	C182867	1882300600	8.14	8.14	Tree Fruit
1759	W257349	7601709800	20.00	10	Other
1760	C846486	2241433300	5.00	3	Tree Fruit
1000	C182253	96400000	10.00	7	Tree Fruit
1109	1720050	1722101700	6.70	6	Container Nursery
1139	C182434	2830410400	1.00	1	Container Nursery
1182	5912327	2111310200	1.14	1.14	Field Grown Nursery or Floral
1182	5912327	2111310500	3.47	3.47	Field Grown Nursery or Floral
1182	5912327	2111310700	1.85	1.85	Field Grown Nursery or Floral
1214	C182017	1284401700	4.60	1.5	Tree Fruit
1214	C182017	1284401800	2.80	1.5	Tree Fruit
1214	C182017	1284401900	2.17	1.5	Tree Fruit
1214	C182017	1284402000	3.01	1.5	Tree Fruit
1214	C182017	1284402100	4.32	1.5	Tree Fruit
1252	C182259	2650503200	3.00	1	Tree Fruit
1389	C719651	1111901100	7.58	7	Tree Fruit
1398	C182257	2380630600	2.40	1	Tree Fruit
1398	C182257	2380630700	1.20	1.1	Tree Fruit
1398	C182257	2380630800	1.50	1.2	Tree Fruit
1398	C182257	2380630900	1.50	1.2	Tree Fruit
1398	C182257	2380631000	2.40	1	Tree Fruit
1403	C279241	3930103900	26.81	20	Tree Fruit
1405	C645663	1282714600	2.01	0	Other
1405	C645663	1083902900	52.00	50	Tree Fruit
1405	C645663	1281502000	13.90	13	Tree Fruit
1405	C645663	1281510500	12.65	12	Tree Fruit
1405	C645663	1281603300	16.60	16	Tree Fruit
1405	C645663	1282110200	19.08	19	Tree Fruit
1405	C645663	1282110300	8.50	8	Tree Fruit
1405	C645663	1282110500	8.16	8	Tree Fruit
1405	C645663	1282122600	8.00	5	Tree Fruit
1405	C645663	1282714500	4.31	4	Tree Fruit
1405	C645663	1323201500	10.12	10	Tree Fruit
1431	W252949	6753312100	0.10	0.1	Tree Fruit

SDRILG ID	SDRILG Member Number	Parcel Number	Total Acres	Irrigated Acres	Primary Crop Type
1431	W252949	6753312200	0.40	0.4	Tree Fruit
1431	W252949	6753410900	3.00	1.5	Tree Fruit
1431	W252949	6753411000	5.00	4	Tree Fruit
1431	W252949	6753411100	0.40	0.4	Tree Fruit
1449	C182508	1311602900	2.13	2	Tree Fruit
1462	C182584	1292706400	2.50	1.5	Tree Fruit
1505	c789157	1881404500	4.00	1	Greenhouse Crops
1507	C104510	1025602400	2.00	2	Container Nursery
1511	C442464	1252323300	21.45	21	Tree Fruit
1511	C442464	1330205200	2.66	1.5	Tree Fruit
1511	C442464	1330600600	21.00	21	Tree Fruit
1551	C119272	1015100800	1.00	1	Tree Fruit
1552	C777817	1280931600	2.63	2	Tree Fruit
1552	C777817	1280931700	2.85	2	Tree Fruit
1565	C18257	2721322200	120.00	100	Container Nursery
1572	C182327	1822600600	20.00	20	Field Grown Nursery or Floral
1583	C745630	1294101700	3.00	3	Tree Fruit
217	C182361	1311502600	22.04	22.04	Tree Fruit
217	C182361	1311502700	15.00	3.00	Tree Fruit
292	C567839	1710322300	1.50	1.50	Greenhouse Crops
684	C888069	1220902100	1.00	1	Container Nursery
684	C888069	1220904100	12.00	11	Container Nursery
684	C888069	1220905600	1.00	1	Container Nursery
693	ME96206	1294000700	8.00	6	Field Grown Nursery or Floral
693	ME96206	1851123400	2.50	2	Tree Fruit
693	ME96206	1850724000	8.00	7	Tree Fruit
724	C181234	5962510800	8.00	3	Field Grown Nursery or Floral
773	ME96206	1851123400	2.50	5	Tree Fruit
774	ME96206	1294000700	8.00	6	Field Grown Nursery or Floral
774	ME96206	1851123400	2.50	2	Tree Fruit
774	ME96206	1850724000	8.00	7	Tree Fruit
868	C182282	1333013800	5.00	2	Tree Fruit
893	C182301	1333012000	5.00	3	Tree Fruit
897	C182615	1072405300	2.65	1	Tree Fruit
925	C544991	1081612000	2.04	1	Tree Fruit
931	C733674	1281905200	22.81	14.75	Tree Fruit
947	C204649	1281703100	10.00	10	Tree Fruit
	C182780	1081004500	10.00	8	Field Grown Nursery or Floral

APPENDIX B

FIELD MONITORING AND SAMPLING
STANDARD OPERATING PROCEDURES

Marine Pollution Studies Laboratory – Department of Fish and Game (MPSL-DFG) Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in the Surface Water Ambient Monitoring Program (SWAMP)

The SOPs below are for reference and information purposes only, the documents are not required by the Surface Water Ambient Monitoring Program (SWAMP). Please see the SWAMP Quality Assurance Management Plan (http://www.swrcb.ca.gov/swamp/qamp.html) for more information regarding SWAMP QA/QC requirements.

Table of Contents

Field Measurements

Field Data Sheets

Field data sheets are used to record field observations, probe measurements, and water and sediment chemistry sampling. Field data sheets are provided through the Marine Pollution Studies Laboratory website at:
http://mpsl.mlml.calstate.edu/swdwnlds.htm
Click on the *Field Data Sheets* for the most recent versions. There are guidelines provided below to standardize what is recorded on all data sheets and that should be helpful in completing each form. The Beaufort Scale (see at the end of this document) is also used for specifications and equivalent wind speeds for water conditions. The entries discussed below and on the field data sheets are recorded at each sampling site.

Notes to Standardize SWAMP Field Data Sheets (For in the field use)

Upon arrival at a sampling site, record visual observations on the appearance of the water and other information related to water quality and water use.

Key Reminders to identify samples:

1. **Sample Time** is the SAME for all samples (Water, Sediment, & Probe) taken at the sampling event. Use time of FIRST sample as it is important for the chain of custody (COC).
2. **Left Bank/Right Bank**
   Left bank is defined as the bank to the left of the observer when facing downstream, and the *right bank* is to the right of the observer when facing downstream

FIELD OBSERVATIONS: (each one of these observations has a *Comment* field in the database so use comment space on data sheet to add information about an observation if necessary)

1. **DOMINANT SUBSTRATE**: if possible; describe DOMINANT substrate type; use UNK if you cannot see the dominant substrate type
2. **WADEABILITY**: in general, is the water body being sampled wadeable to the average person AT the POINT of SAMPLE
3. **BEAUFORT SCALE**: use scale 0-12; refer to scales listed at the end of this document.
4. **WIND DIRECTION**: records the direction from which the wind is blowing
5. **PICTURES:** Digital photos are taken to help document the actual sampling site. The convention is to take photos facing DOWNSTREAM, overlooking the site. Right bank and left bank are thus defined in this downstream-facing direction. Document any discrepancies from this convention. Only one photo is necessary, if both, left and right

bank, fit into one frame. Record all photos in the field data sheet space to record picture numbers given by camera; be sure to rename accordingly back in the office. All photos should be renamed and saved with the StationCode_yyyy_mm_dd_uniquecode (e.g. 123ABC123_2007_07_01_BBDS).

6. **SITE ODOR**: Note if hydrogen sulfide odor, musty odor, sewage odor, etc. is in the sampling reach
7. **SKY CODE**: Note recent meteorological events that may have impacted water quality
8. **OTHER PRESENCE**: VASCULAR refers to terrestrial plants or submerged aquatic vegetation (SAV) and NONVASCULAR refers to plankton, periphyton etc.
9. **PRECIPITATION**: Note if any precipitation is occurring during sampling
10. **PRECIPITATION LAST 24 HOURS**: Note how much precipitation has occurred within the last 24-h of sampling
11. **WATER ODOR**: Note if the sample water being collected has odor
12. **WATER CLARITY**: this describes the clarity of the water while standing creek side; clear represents water that is clear to the bottom, cloudy may not be clear to bottom but greater than 4” can be seen through the water column.
13. **WATER COLOR**: This is the color of the water from standing creek side
14. **OBSERVED FLOW**: Visual estimates in cubic ft/s.

SAMPLE DETAILS:

1. **EVENT TYPE**: Note the event type based which type of media is being collected
2. **SAMPLE TYPE**: GRAB samples are when bottles are filled from a single depth; INTEGRATED sample are taken from MULTIPLE depths and combined.
   a. GRAB: use 0.1 for subsurface samples; if too shallow to submerge bottle; depth =0
   b. INTEGRATED: -88 in depth sampled, record depths combined in sample comments
3. **SAMPLING CREW**: J. Smith, S. Ride (first person listed is crew leader)
4. **STARTING BANK**: Which side of the stream was accessed first. Bearings are always recorded looking downstream
5. **OCCUPATION METHOD**: What media was used to access the site
6. **TARGET LAT/LONG**: Refers to the existing station location that the sampling crew is trying to achieve; can be filled out prior to sampling
7. **ACTUAL LAT/ LONG**: is the location of the current sample event.
8. **SAMPLE LOCATION**: describes from where IN water body sample was taken: Can be combined; ex: bank/thalweg or midchannel /thalweg
9. **HYDROMODIFICATION:** Describe existing hydromodifications such as a grade control, drainage pipes, bridge, culvert
10. **HYDROMOD LOC**: if there was an IMMEDIATE (with in range potentially effecting sample) hydromodification; was sample taken upstream or downstream of modification; if there is no hydromodification, NA is appropriate
11. **STREAM DEPTH, WIDTH & DISTANCE FROM BANK**: describe in meters at point of sample. Distance from bank should be recorded from the starting bank

Field Data Logbook

A Field Data Logbook or a Field Folder is taken into the field on each sampling trip. The use of bound or loose-leaf notebooks is left up to the entity conducting the monitoring. A good safety precaution against the loss of a bound field data logbook is to photocopy the current pages upon returning from the field. These pages are kept on file at the specific sample collection entity's office. If a loose-leaf notebook is used, take care to remove original field data log sheets from the notebook and file in the office. Copies of the field data log sheets may be left in the notebook for future reference.

Field Data Logbooks (bound or loose leaf sheets) are maintained on file indefinitely in each regional office or contract laboratory office. They are never discarded, since the logbook may be the only written record of field measurements. Field Data Logbooks are reviewed periodically during SWAMP QA site visits. At this point, these field notes are not inclusive of the information that would be collected for biological assessment work, and several other data measurement types.

Flow

Sampling crews should be notified on reconnaissance forms if it is known that there is an operational United States Geological Survey (USGS) gage is located at or nearby a sampling site. If there is a USGS gage nearby, a gage height in feet is recorded and later converted to an instantaneous flow value and recorded in the logbook. The gage height is always to be reported to the USGS for conversion to flow. If a USGS gage is not available, a flow measurement should be taken, if requested. See Instantaneous Flow Measurement information starting on page 13 in this document. In addition, it is recommended that a flow severity value is recorded at each stream or river station that is not tidally influenced. See the Flow Severity section starting on page 13 of this document. Centroid velocity measurements may also be taken as a minimum acceptable rough characterization of the stream flow as requested, although this measurement is not to be recorded as a flow, since it is only a velocity measurement.

Record of Samples Collected for Purposes of Chemical Analysis

The general types of chemical samples to be collected are listed for each site, since this may vary from site-to-site (e.g., metals-in-water, pesticides-in-sediments, routine water quality). Analyses authorization forms are recommended since different authorized laboratories perform different chemical analyses. The method of preservation for each chemical sample is recorded, as appropriate.

Record of Data Submission

The *Logbook* field must indicate in some manner whether data recorded in the logbook has been transcribed onto data forms and submitted to the SWAMP data management staff.

Other Observations

Water Appearance	Note general appearance (e.g., color, unusual amount of suspended matter, debris or foam)
Sediment Appearance	Color, Odor and sediment composition should be noted.
Weather	Note recent meteorological events that may have impacted water quality; (e.g., heavy rains, cold front, very dry, very wet)
Biological Activity	Note excessive macrophyte, phytoplankton or periphyton growth. The observation of water color and excessive algal growth is very important in explaining high chlorophyll a values. Other observations such as presence of fish, birds and spawning fish are noted.
Watershed or Instream Activities	Note instream or drainage basin activities or events that are impacting water quality (e.g., bridge construction, shoreline mowing, livestock watering upstream).
Record of Pertinent Observations Related to Water Quality and Stream Uses	If the water quality conditions are exceptionally poor, note that standards are not met in the observations, (e.g., dissolved oxygen is below minimum criteria). Note uses (e.g., swimming, wading, boating, fishing, irrigation pumps, navigation). Eventually, for setting water quality standards, the level of use will be based on comments related to the level of fishing and swimming activities observed at a station.
Specific Sample Information	Note specific comments about the sample itself that may be useful in interpreting the results of the analysis (e.g., number of sediment grabs, or type and number of fish in a tissue sample). If the sample was collected for a complaint or fish kill, make a note of this in the observation section.
Missing Parameters	If a scheduled parameter or group of parameters is not collected, make some note of this in the comments.

Field Data Measurements

While collecting water samples (see Field Collection Procedures for Water Samples section), record appropriate field measurements. When field measurements are made with a multiparameter instrument, it is preferable to place the sonde in the body of water to be sampled and allow it to equilibrate in the dissolved oxygen (D.O.) mode while water samples are collected. Field measurements are made at the centroid of flow, if the stream visually appears to be completely mixed from shore to shore. *Centroid* is defined as the midpoint of that portion of the stream width which contains 50% of the total flow. For routine field measurements, the date, time and depth are reported as a grab. Measure Quality Objectives (MQO's) for field measurements are listed in appendix C of the SWAMP QAMP.

Recommended Depths for Conducting Field Data Measurements

Water Depth Less than 5 ft (<1.5 m) If the water depth is less than 5 ft (1.5 m), grab samples for water are taken at approximately 0.1 m (4 in.), and multi-probe measurements are taken at approximately 0.2 m (8 in.). This is because all sensors have to be submerged, so 0.1 m would not be deep enough. But taking a grab sample at 0.2 m is not always feasible, as it is difficult to submerge bottles to that depth, and in many cases the bottle will hit the stream bottom.

Water Depth Greater than 5 ft (>1.5 m) If the water depth at the sampling point exceeds 5 ft (1.5 m) in depth, a vertical profile of dissolved oxygen, temperature, pH and specific conductance are made using the multiparameter probe equipment. The depth of the sonde at the time of measurement is most accurately determined from the depth sensor on the multiparameter sonde rather than depth labels on the cable.

Vertical Depth Profiles and Depth-Integrated Sample Collection If depth integration sampling is being conducted, or if vertical profile measurements are requested, multi-probe measurements are made starting at a depth of 0.2 m, and are then conducted at 1.0, 2.0, 3.0, 4.0, and 5.0 m depths after that until 5.0 m depth is reached. Beginning at 5.0 m, measurements are made every 5.0 m through depth profile.

Field data for multiparameter vertical depth profiles are recorded in final form on the SWAMP Field Data Sheets and submitted to the SWAMP data management staff.
Go to http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Water Temperature (^{O}C)

Water temperature data are recorded for each SWAMP visit in final form in a Field Data Logbook and submitted to the SWAMP data management staff.
See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Temperature Sampling Procedures

Temperature is measured in-stream at the depth(s) specified above. Measuring temperature directly from the stream by immersing a multiprobe instrument or thermometer is preferred.

Hand Held Centigrade Thermometer

If an electronic meter is not available, the temperature is measured with a hand-held, centigrade thermometer (Rawson, 1982).

- In wadeable streams, stand so that a shadow is cast upon the site for temperature measurement.

- Hold the thermometer by its top and immerse it in the water. Position the thermometer so that the scale can be read.
- Allow the thermometer to stabilize for at least one minute, then without removing the thermometer from the water, read the temperature to the nearest 0.1^{o} C and record.
- Do not read temperature with the thermometer out of the water. Temperature readings made with modern digital instruments are accurate to within $\pm$ 0.1^{o} C.

Temperature Measurement from a Bucket
When temperature cannot be measured in-stream, it can be measured in a bucket-Nalgene or plastic. Care must be taken to insure a measurement representative of in-stream conditions.

The following conditions must be met when measuring temperature from a bucket:

- The bucket must be large enough to allow full immersion of the probe or thermometer.
- The bucket must be brought to the same temperature as the water before it is filled.
- The probe must be placed in the bucket immediately, before the temperature changes.
- The bucket must be shaded from direct sunlight and strong breezes prior to and during temperature measurement.
- The probe is allowed to equilibrate for at least one minute before temperature is recorded.
- After these measurements are made, this water is discarded and another sample is drawn for water samples which are sent to the laboratory.

pH (standard units)

pH data is recorded for each SWAMP visit in final form on the Field Data Sheets and submitted to the SWAMP data management staff. See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

pH Sampling Equipment
The pH meter should be calibrated according to the recommended procedures for calibration and maintenance of SWAMP field equipment. Calibration directions are listed in the manufactures field equipment operations manual. The pH function is pre and post calibrated every 24 h of use for multiparameter instruments.

pH Sampling Procedures
In-stream Method
Preferably, pH is measured directly in-stream at the depth(s) specified earlier in this document. Allow the pH probe to equilibrate for at least one minute before pH is recorded to the nearest 0.1 pH unit.

pH Measurement from a Bucket
When pH cannot be measured in-stream, it can be measured in a bucket-Nalgene or plastic. The following precautions are outlined above; “Temperature Measurement from a Bucket”.

Potential Problems

< If the pH meter value does not stabilize in several minutes, out gassing of carbon dioxide or hydrogen sulfide, or the settling of charged clay particles may be occurring (Rawson, 1982).

< If out gassing is suspected as the cause of meter drift, collect a fresh sample, immerse the pH probe and read pH at one minute.

< If suspended clay particles are the suspected cause of meter drift, allow the sample to settle for 10 min, then read the pH in the upper layer of sample without agitating the sample.

< With care, pH measurements can be accurately measured to the nearest 0.1 pH unit.

Dissolved Oxygen (mg/L)

Dissolved oxygen (D.O.) data is recorded for each SWAMP visit in final form on a Field Data Sheet and submitted to the SWAMP data management staff.
See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Dissolved Oxygen Sampling Equipment

The dissolved oxygen meter should be calibrated according to the recommended procedures for calibration and maintenance of SWAMP field equipment. Calibration directions are listed in the manufactures field equipment operations manual.

Multiprobe Instrument

Pre and post calibrate the D.O. sensor every 24 h and for elevations greater than 500 ft on the multiprobe instrument. Preferably, D.O. is measured directly in-stream at the depth(s) specified in the Field Measurements section above. The D.O. probe must equilibrate for at least 90 s before D.O. is recorded to the nearest 0.1 % saturation or mg/L. Care must be taken at profile stations to insure that the reading is stable for each depth. Since dissolved oxygen takes the longest to stabilize, record this parameter after temperature, conductivity and pH. If the D.O. probe has an operable, automatic stirrer attached, the D.O. probe does not have to be manually stirred. However, if the probe is not equipped with an automatic stirrer, manual stirring must be provided by raising and lowering the probe at a rate of 1 ft/s (0.3m/s) without agitating the water surface. If the stream velocity at the sampling point exceeds 1 ft/s, the probe membrane can be pointed upstream into the flow and manual stirring can be avoided (Rawson, 1982).

D.O. Measurement from a Bucket

When D.O. cannot be measured in-stream, it can be measured in a bucket-Nalgene or plastic, following precautions outlined in the Temperature Measurement from a Bucket listed above. During equilibration and reading, water should be moved past the membrane surface at a velocity of 1 ft/s (0.3 m/sec), either by automatic stirrer or manual stirring. If stirred manually in a bucket, the water surface is not agitated (Rawson, 1982).

24-Hour Average D.O. (if requested in special study)

Unattended 24-Hour D.O. Data Collection

Why Collect 24-Hour Data

Dissolved oxygen sampling for standards compliance is targeted to water bodies where low instantaneous D.O. levels indicate partial or nonsupport of designated aquatic life uses. Intensive monitoring is conducted with automated equipment that is preset to record and store field measurements hourly over one 24-h period. Four or more dissolved oxygen measurements may also be made manually at 4-6-h intervals over one 24-h period, as long as one is made near sunrise (0500-0900 h) to approximate the daily minimum. However, data collected with automated equipment is preferred.

When to Take Measurements

All 24-h D.O. monitoring events must be spaced over an index period representing warm-weather seasons of the year (approx March 15-October 15), with between one-half to two-thirds of the measurements occurring during the critical period (July 1-September 30). The ***critical period*** of the year is when minimum stream flows, maximum temperatures, and minimum dissolved oxygen concentrations typically occur in area streams. **A flow measurement must be taken at the time of deployment.** In a perennial stream, a 24-h data for standards compliance can not be used if the flow is less than the 7Q2. In perennial streams, the D.O. criterion to do not apply for flows under the 7Q2. A period of about one month must separate each 24-h sampling event. Additional samples may be collected outside the index period to further characterize a water body, but that information is generally not used for assessing standards compliance.

Frequency of Measurements

The measurement interval should be no more than once per 15 min and no less than once per hour.

Where to Take Measurements

For purposes of determining standards compliance with the 24-h average criteria, samples collected near the surface will be considered representative of the mixed surface layer. In deep streams, reservoirs, and tidally influenced water bodies, automated equipment is positioned between 1 foot (from the surface) to one-half the depth of the mixed surface layer. At least 10 24-h monitoring events (using the 24-h criteria and/or absolute minimum criteria) at each site within a 5-year period are recommended to provide adequate data for assessment.

When to Collect Other Routine Samples, if doing 24-hour D.O. measurements

Other routine field measurements and water samples should be collect at either the time of deployment, at the reference check, or when the multiprobe recording 24-h data is retrieved. When ever possible, flow must be measured at the 24-h site.

Priority for Scheduling 24-Hour Sampling Events

< 303d listed waterbodies

< Waterbodies with Concerns for DO problems (too few samples available for full use assessment).

- Occurrence of low D.O. concentrations observed during the day
- Waterbodies with trends indicating declining D.O. concentrations
- Waterbodies which would contribute to an Ecoregion data set

Data Reporting for 24-hour D.O. measurements

Dissolved oxygen values recorded over the 24-h period are summed and divided by the number of measurements to determine the average concentration, which is compared to the 24-h criterion. The lowest D.O. value from each 24-h set is compared to the minimum criterion. There will be occasions when a complete 24-h data set won't be possible. For example, if there are 18 measurements instead of 24, a time weighted diurnal average needs to be calculated. This can be easily done using GW Basic.

Support of assigned aquatic life use is based on 24-h D.O. average and minimum criteria for each monitoring event. Report the 24-h average D.O. value, number of measurements over a 24-h period, and the minimum, and maximum values. Report data as a time composite sample with a beginning and ending date and time, covering the 24-h period measured.

Specific Conductance (µS/cm)

Specific conductance should be recorded for each SWAMP visit in final form on a Field Data Sheet and submitted to the SWAMP data management staff.
See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Specific Conductance Sampling Equipment

The conductivity meter should be calibrated according to the recommended procedures for calibration and maintenance of SWAMP field equipment. Calibration directions are listed in the manufactures field equipment operations manual.

Specific Conductance Sampling Procedure

Preferably, conductivity is measured directly in-stream at the depth(s) specified earlier in this document. Allow the conductivity probe to equilibrate for at least one minute before specific conductance is recorded to three significant figures (if the value exceeds 100). The primary physical problem in using a specific conductance meter is entrapment of air in the conductivity probe chambers. The presence of air in the probe is indicated by unstable specific conductance values fluctuating up to $\pm$100 µS/cm. The entrainment of air can be minimized by slowly, carefully placing the probe into the water; and when the probe is completely submerged, quickly move it through the water to release any air bubbles.

If specific conductance cannot be measured in-stream, it should be measured in the container it can be measured in a bucket-Nalgene or plastic. The following precautions are outlined above; "Temperature Measurement from a Bucket".

Salinity (parts per thousand--ppt, or ‰)

The value for salinity is computed from chloride concentration or specific conductance. The calculation assumes a nearly constant ratio for major ions in an estuary when seawater is diluted by river water. This assumption does not hold for cases where salinity is less than about three parts per thousand. Salinity determinations at such low values are only approximate. In estuarine waters, salinity is a relevant and meaningful parameter. Often the salinity may be low, approaching that of freshwater. Nevertheless, this is useful information. Determine if a station is estuarine from historical records (i.e., experiences cases where salinity is >2.0 ppt) and always report salinity at this station, regardless of the salinity during periods of high flow.

Salinity is measured directly in-stream at the depth(s) specified earlier in this document. Salinity data should be recorded for each SWAMP visit in final form on a Field Data Sheet and submitted to the SWAMP data management staff. See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Values between 2.0 ppt and 1.0 ppt should be reported as <2.0 ppt rather than the actual value and values <1.0 ppt should be reported as <1.0 ppt. The field instruments compute salinity from specific conductance and temperature, and display the value in parts per thousand. Report salinity values above 2.0 ppt to the nearest 0.1 ppt.

Secchi Disc Transparency (meters)--if requested in special study

Secchi disk transparency should be recorded for each SWAMP visit in final form on a Field Data Sheet and submitted to the SWAMP data management staff. See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting.

Secchi Disk Sampling Equipment

- Secchi disk, 20 cm in diameter
- Measuring tape

Secchi Disk Transparency Sampling Procedures

Preferably, Secchi disk transparency is measured directly in-stream wherever conditions allow. The Secchi disk should be clean, weighted and suspended with chain, wire, or Dacron line (the line used to suspend the Secchi disk should not be nylon or cotton; stretching may cause erroneous readings). Another option is to attach the Secchi disk to a metal rod calibrated in metric units.

Average Turbidity

The Secchi disk should be lowered vertically in a location shielded from direct sunlight. Glare from the water's surface will affect the accuracy of the measurement. Don't wear sunglasses.

Slowly lower the disk until it disappears from view. The person viewing the disk should maintain an eye level of less than two meters above the water's surface. Note the depth at which the disk disappears from view.

Slowly raise the disk until it becomes visible. Note the depth at which the disk reappears.

Compute the mathematical average of the two depths noted and record the average value to two significant figures in the field logbook. The recorded average value is the Secchi disk transparency.

High Turbidity (Muddy Water)

In streams with very high turbidity, high velocity, and/or poor access, it may be necessary to measure Secchi disk transparency in a bucket. Fill the bucket from the centroid of flow being careful not to disturb the substrate.

Follow steps above for measuring the Secchi disk depth within 30 s after raising the filled bucket from the water's surface. Or, re-suspend the solids by stirring, then quickly make the measurement.

Record Secchi disk transparency to two significant figures.

Low Turbidity (Clear Water)

Some bodies of water will be so clear and shallow that it will not be possible to lower the Secchi disk until it disappears from view.

Measure and record the depth at the deepest point accessible. Report Secchi disk transparency as greater than the deepest depth measured.

Example (Low Turbidity): South Fork Rocky Creek is a small (<1 ft^3/s) clear stream. The stream in the vicinity of the sampling site was less than 1 m deep and the bottom was clearly visible everywhere. However, a pool was located in the stream next to a bridge. The maximum depth of the pool was 2.6 m at which depth the Secchi disk was still visible. Therefore, Secchi disk transparency for South Fork Rocky Creek was recorded as > 2.6 m.

Importance of Secchi Disk Data

Eutrophication, the natural aging process in reservoirs and lakes is accelerated by human activities which add nutrients to lakes, reservoirs, and the surrounding watersheds. Section 314 of the Clean Water Act (CWA) of 1987 requires all states to classify lakes and reservoirs according to trophic state. Although chlorophyll a is the most direct measure of algal biomass, other indices and programs utilize Secchi disk depth as the primary factor.

Turbidity Measurement with Turbidity Meter

Nephelometric Turbidity can be determined by measuring the amount of scatter when light is passed through a sample using a turbidity meter. The LaMotte 2020 Turbidity meter is a suitable instrument for example.

Meters should be calibrated using a standard close to the expected sample value.

For instructions on how to operate the instruments refer to the manufacturer's manual. Turbidity measurements can be executed together with water sampling. The turbidity sample has to be representative for the sampled water mass. Make sure that no gas bubbles are trapped in the vial for the reading and that the outside of the vial is wiped completely clean (i.e., meaning free of moisture, lint and fingerprints). Take several measurements to assure an accurate reading. Do not record values that vary greatly. If variations are small, record an average. If settling particles are present, record a reading before and one after settling. The meter might have to be recalibrated with a different standard, if the sample water readings are outside of the calibration standard limits.

Days Since Last Significant Precipitation

Significant precipitation is defined as any amount that visibly influences water quality. Water quality in small to medium streams and in the headwaters of many reservoirs is influenced by runoff during and immediately after rainfall events. This influence is site specific and poorly studied. As part of a new initiative to understand and regulate the adverse effects of runoff, SWAMP would like to associate recent rains or melted snow with ambient water quality, using a parameter defined as "days since last significant precipitation". Record the number of days, rounded to the nearest whole number, since a rain has occurred that, in the best professional judgment of monitoring personnel, may have influenced water quality. If it is raining when the sample is collected, or has rained within the last 24-h, report a value of <1. If it has been a long time since a significant rain, record this as greater than that particular value, for example >7 days. If confidence about the recent history of precipitation is low, draw a line through the space on the data form.

Flow Severity -- recommended new parameter

Flow severity should be noted for each SWAMP visit to <u>non-tidally influenced flowing streams</u> and submitted in the comments on the SWAMP Field Data Sheet. It should be recorded even if flow is visible but not measurable on that sampling visit. There are no numerical flow guidelines associated with flow severity. This is an observational measurement that is highly dependent on the knowledge of monitoring personnel. It is a simple but useful piece of information when assessing water quality data. For example, a bacteria value of 10,000 with a flow severity of 1 would represent something entirely different than the same value with a flow severity of 5. The six flow severity values are; 1=No Flow, 2= Low Flow, 3 = Normal Flow, 4 = Flood, 5 = High Flow, and 6 = Dry. The following are detailed descriptions of severity values:

1 **No Flow** When a flow severity of one (1 = no flow) is recorded for a sampling visit, then a flow value of zero ft^3/s should also be recorded for that sampling visit. **A flow severity of one (1) (no flow) describes situations where the stream has water visible in isolated pools.** There should be no obvious shallow subsurface flow in sand or gravel beds between isolated pools. Low flow does not only apply to streams with pools. It also applies to long reaches of bayous and streams that have no detectable flow but may have water from bank to bank.

2 **Low Flow** When stream flow is considered low a flow severity value of two (2) is recorded for the visit and the corresponding flow measurement is also recorded for that visit. In streams too shallow for a flow measurement but with detected water movement, record a value of < 0.10 cfs. Note: Use a stick or other light object to verified the direction of water movement (i.e., movement is downstream and not the affect of wind.) What is low for one stream could be high for another.

3 **Normal Flow** When stream flow is considered normal, a flow severity value of three (3) is recorded for the visit and the corresponding flow measurement is also be recorded for that visit. Normal is highly dependent on the stream. Like low flow, what is normal for one could be high or low for another stream.

4 and 5 **Flood and High Flow** Flow severity values for high and flood flows have long been established by EPA and are not sequential. Flood flow is reported as a flow severity of four (4) and high flows are reported as a flow severity of five (5). High flows would be characterized by flows that leave the normal stream channel but stay within the stream banks. Flood flows are those which leave the confines of the normal stream channel and move out on to the flood plain.

6 **Dry** When the stream is dry a flow severity value of six (6 = dry) is recorded for the sampling visit. In this case the flow is not reported. This will indicate that the stream is completely dry with no visible pools.

Flow information for over 200 USGS sites is available on the Internet. The address is **http://water.usgs.gov/index.html**. This is useful information in determining flow conditions prior to sampling. This information may be included in general observations.

Flow Measurement Method (Reporting)

The method (or instrument) used to measure flow is noted by reporting a method number. The method numbers are:

1- Flow Gage Station (USGS/IBWC)	3- Electric (ex. Marsh-McBirney)
2- Mechanical (ex. Pigmy meter)	4- Weir/Flume
5- Other (orange peel, etc.)	

Flow (ft^3/s)
If requested, flow data should be recorded for each monitoring visit to non-tidal, flowing streams. Flow data should be recorded in final form on a Field Data Sheet and submitted to the SWAMP data management staff. See http://mpsl.mlml.calstate.edu/swdwnlds.htm for detailed information on data reporting. The following are two exceptions to the flow reporting requirement:

No Flow/ Pools If there is no flow at a stream site and accessible, isolated pools remain in the stream bed, collect and report the required field data and laboratory samples from the pools and report instantaneous flow. Under these conditions, flow (ft^3/s) should be reported as zero. The reported flow severity value should be one. Pools may represent natural low-flow conditions in some streams and the chemistry of these pools will reveal natural background conditions.

Dry If the stream bed holds no water, the sampling visit is finished. Report that the stream was "dry" in the observations and record a value of six (meaning "dry") for flow severity. No value is reported for flow since there is no water.

Flow Measurement

If a flow measurement is required at a site, measure and record flow after recording visual observations. The intent of measuring flow first is to delay collection of chemical and biological water samples with limited holding times. Care must be taken not to collect water samples in the area disturbed during flow measurement. There are several acceptable flow measurement methods that can be used.

U.S. Geological Survey (USGS) Gaging Station
Some SWAMP Stations are sampled at sites where the USGS maintains flow gaging equipment. On any type of sampling visit to a site that has a USGS flow gage, observe and record the gage height to the nearest hundredth of a foot in the field logbook. Upon return to the office, contact the USGS office responsible for maintaining the gage. USGS personnel can provide the flow value in cubic feet per second (ft^3/s) that corresponds to the gage height. Although SWAMP personnel may have a rating curve available to them, shifts associated with changes in the stream bed may occur over time. Always call the USGS to determine the shift. At some sites the shift changes frequently. At others, the relation between stream flow and gage height is almost unchanging. If a gage is no longer maintained by USGS, cross out the recorded gage height and be prepared to measure flow by another method on the return visit to that site.

Several factors may influence the accuracy of the USGS rating curves that are used to convert gage height to flow. If there is any doubt about the accuracy of a USGS gage height reading or flow rating curve, sampling personnel should measure the flow if possible.

Gage height may be indicated at a USGS gage by one of three methods:

Staff Gage

Staff gages are enameled steel plates (with the appearance of large measuring tapes) bolted to some stable structure. For example, staff gages may be bolted to concrete bridge abutments, pillars, or docks. The staff gage face is white with black lettering and gradations. The gradations shown are feet, tenths of a foot, and 0.02 of a foot. The point at which the water level crosses the staff gage should be recorded to the nearest hundredth of a foot.

Wire Weight Gage

Wire weight gages are locked, metal boxes with approximate dimensions of 15 in. long x 12 in. tall x 12 in. deep. Wire weight gages are usually affixed to bridge rails near mid-stream. They must be unlocked with a USGS key. The wire weight gages house a weight attached by wire cable to a graduated reel (gradations are tenths and hundredths of feet) with a counter at one end.

When the reel is released the weight can be gradually lowered until the bottom of the weight contacts the water surface. At the point of contact, the weight causes the water surface to ripple slightly. Maintaining the weight in that position, record the counter value to the nearest whole number and the point indicated by the stylus on the graduated reel to the nearest hundredth of a foot. Determine if the gage is the movable type that can be moved to multiple locations on the bridge. This type is common on braided streams. A correction value is stamped on the bridge near each point that the gage can be attached. Record the corrected value as the gage height in feet.

Bubble Gage

Bubble gages are locked in metal sheds that are approximately 4 ft wide x 4 ft deep x 6.5 ft tall. The gage houses are most frequently located on the shore near a bridge but sometimes are attached to bridge pillars near mid-stream or established on the stream bank far from any bridge. The gage house must be unlocked with a USGS key. Bubble gages in gage houses usually indicate the gage height in two or three locations. A counter attached to the manometer system indicates gage height in feet. Some gage houses have stilling wells that can be entered. Often there is a staff gage on the inside wall.

Most bubble gages are also equipped with digital recorders. Digital recorders consist of two white, coded discs, approximately 4 in. in diameter with a punch tape overlapping a portion of each disc. The discs are marked with 100 gradations. As the front of the digital recorder is viewed, the stylus at the disc on the left indicates height in feet. The stylus at the disc on the right indicates gage height in hundredths of feet. The gage height from both discs should be added and the number recorded in the field logbook as gage height to the nearest hundredth of a foot.

Many USGS metal sheds also contain a surface level recorder. This devise can be opened to determine how stable stream flow has been prior to the sampling event. Record observations concerning the flow hydrograph.

Instantaneous Flow Measurement

Water quality monitoring visits to sites where there are no nearby USGS flow gauges will require water quality monitoring personnel to measure flow, when requested by Regional Water Quality Control Boards (Regional Boards).

Flow Measurement Equipment

Flow meter

One of the following or an equivalent:

- Marsh-McBirney Electronic meter
- Montedoro-Whitney Electronic meter
- Price Pigmy meter (with timer and beeper)
- Price meter, Type AA (with Columbus weight)

Additional Equipment

- Top-setting wading rod (preferably measured in tenths of feet)(see Figure 1).
- Tape measure (with gradations every tenth of a foot).

Flow Measurement Procedure (USGS, 1969)

Select a stream reach with the following characteristics:

- Straight reach with laminar flow (threads of velocity parallel to each other) and bank to bank. These conditions are typically found immediately upstream of riffle areas or places where the stream channel is constricted.
- The site should have an even streambed free of large rocks, weeds, and protruding obstructions that create turbulence. The site should not have dead water areas near the banks, and a minimum amount of turbulence or back eddies.

Flat Streambed Profile (cross section)

Stretch the measuring tape across the stream at right angles to the direction of flow. When using an electronic flow meter, the tape does not have to be exactly perpendicular to the bank (direction of flow). When using a propeller or pigmy type meter, however, corrections for deviation from perpendicular must be made.

If necessary and possible, modify the measuring cross section to provide acceptable conditions by building dikes to cut off dead water and shallow flows, remove rocks, weeds, and debris in the reach of stream one or two meters upstream from the measurement cross section. After modifying a streambed, allow the flow to stabilize before starting the flow measurement.

Record the following information on the flow measurement form (see example Flow Measurement Forms at end of this document):

- Station Location and Station ID
- Date
- Time measurement is initiated and ended
- Name of person(s) measuring flow
- Note if measurements are in feet or meters
- Total stream width and width of each measurement section
- For each cross section, record the mid-point, section depth and flow velocity

Measuring the Stream Width

Measure and record the stream width between the points where the tape is stretched (waters edge to waters edge).

Determining the Number of Flow Cross Sections

Determine the spacing and location of flow measurement sections. Some judgment is required depending on the shape of the stream bed. Measurements must be representative of the velocity within the cross-section. If the stream banks are straight and the depth is nearly constant and the bottom is free of large obstructions, fewer measurements are needed, because the flow is homogeneous over a large section. Flow measurement sections do not have to be equal width. However, they should be unless an obstacle or other obstruction prevents an accurate velocity measurement at that point. ***No flow measurement section should have greater than 10% of the total flow.***

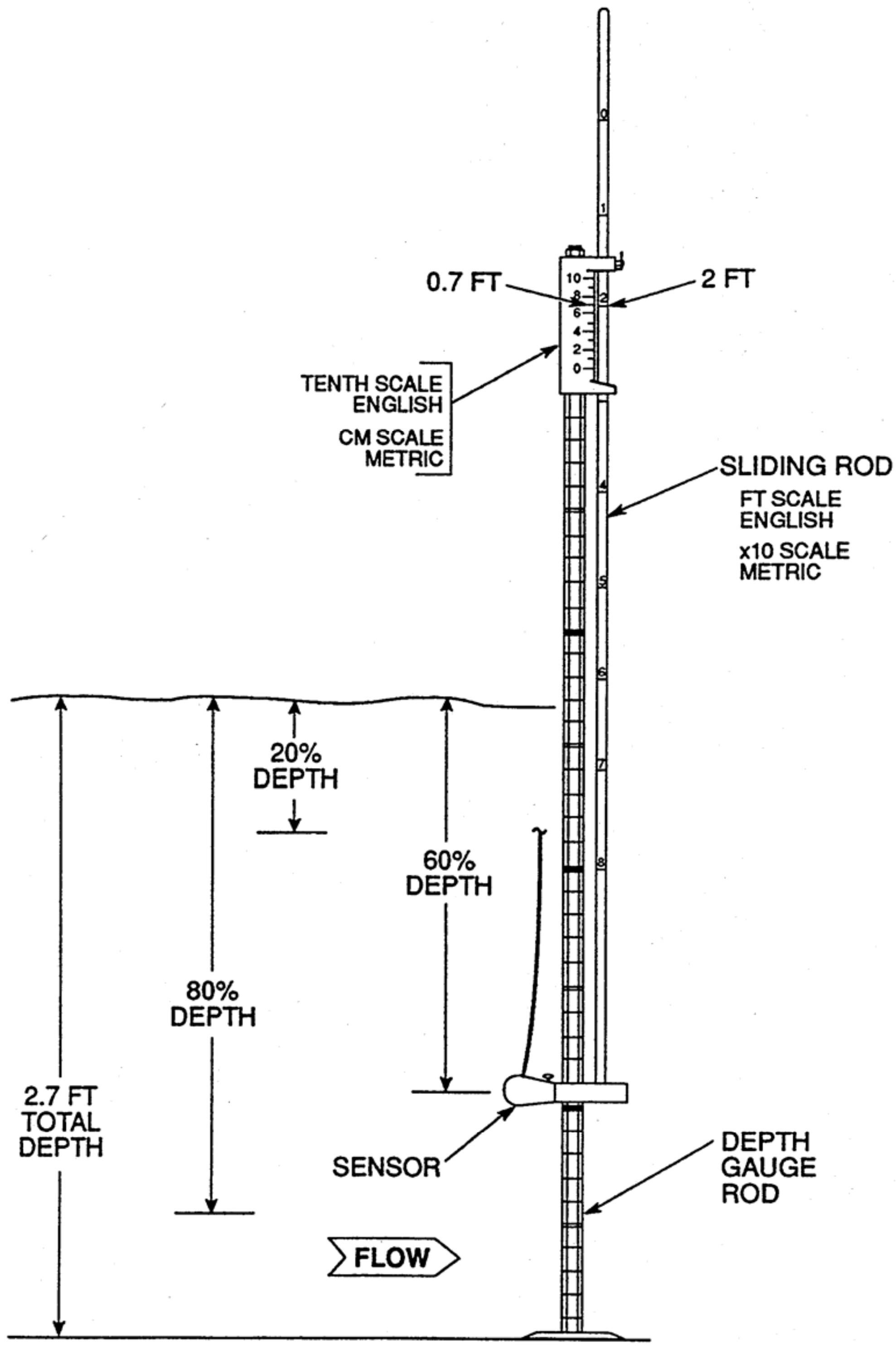
If the *stream width is less than 5 ft*, use flow sections with a width of 0.5 ft (See example 1 on page 23 of this document). If the *stream width is greater than 5 ft*, the minimum number of flow measurements is 10. The preferred number of flow measurement cross sections is 20-30 (See Example 2 on page 24 on this document). The total stream width is 26 ft with 20 measurements, section widths will be 1.3 ft (26/20 = 1.3).

Determining the Mid-Point of the Cross Section

To find the mid-point of a cross section, divide the cross section width in half. Using Example 2 (see forms at end of document);

- The total stream width is 26 ft with 20 cross sections and each cross section width is equal to 1.3 ft.
- Divide 1.3 ft in half and the mid-point of the first section is 0.65 ft. In this example the tape at waters edge is set at zero (0) ft.
- By adding 0.65 to zero the mid-point of the first section is 0.65 ft.
- Each subsequent mid-point is found by adding the section width (1.3 ft) to the previous mid-point. For example; MIDPOINT #1 is 0.65 + 0.0 = 0.65; MIDPOINT #2 is 0.65 + 1.3= 1.95 ft; MIDPOINT #3 is 1.95 + 1.3 = 3.25 ft and ....MIDPOINT # 20 is 24.05 +1.3.
- Place the top setting wading rod at 0.65 ft for the first measurement.
- Using a top setting wading rod, measure the depth at the mid-point of the first flow measurement section and record to the nearest 0.01 ft.

Figure 1. Top-Setting Wading Rod (Marsh-McBirney)



Adjusting the Sensor Depth at a Cross Section

Adjust the position of the sensor to the correct depth at each mid-point. The purpose of the top setting wading rod is to allow the user to easily set the sensor at 20%, 60%, and 80% of the total depth. The total depth can be measured with the *depth gage rod*. Each single mark represents 0.10 foot, each double mark represents 0.50 foot, and each triple mark represents 1.00 foot (see Figure 2).

For Depths < 2.5 Ft

If the depth is less than 2.5 ft, only one measurement is required at each measurement section. To set the sensor at 60% of the depth, line up the foot scale on the *sliding rod* with the *tenth scale*, located on top of the depth gage rod. If, for example, the total depth is 2.7 ft (as shown on Figure 2), then line up the 2 on the foot scale with the 7 on the tenth scale (Marsh-McBirney 1990).

For Depths > 2.5 Ft

If the depth is greater than 2.5 ft, two measurements should be taken at 20% and 80% of the total depth. To set the sensor at 20% of the depth, multiply the total depth by two. For example, if the total depth is 2.7 ft, the rod would be set at 5.4 ft (2.7 x 2). Line up the 5 on the sliding rod with the 4 on the tenth scale.

For Depths > 2.5 Ft (cont)

To set the sensor at 80% of the depth, divide the total depth by two. For example, the total depth is 2.7 ft the rod would be set at 1.35 ft (2.7/2). Line up the 1 on the sliding rod with the 0.35 on the tenth scale. The average of the two velocity measurements is used in the flow calculation. See page 2-36 for an example of a flow form recording measurements for depths greater than 2.5 ft.

NOTE: The point where the rod is set for 20 and 80% of the depth will not equal values derived by calculating 20 and 80% of the total depth.

Measuring Velocity (this has typically been measured at 6/10 of the total depth, for velocity-only measurements)

< Position the meter at the correct depth and place at the mid-point of the flow measurement section. Measure and record the velocity and depth. The wading rod is kept vertical and the flow sensor kept perpendicular to the tape rather than perpendicular to the flow while measuring velocity with an electronic flow meter. When using a propeller or pigmy-type meter, however, the instrument should be perpendicular to the flow.

< Permit the meter to adjust to the current for a few seconds. Measure the velocity for a minimum of 20 s with the Marsh-McBirney and Montedoro-Whitney meters. Measure velocity for a minimum of 40 s (preferably 2 min with the Price and pigmy meters).

< When measuring the flow by wading, stand in the position that least affects the velocity of the water passing the current meter. The person wading stands a minimum of 1.5 ft downstream and off to the side of the flow sensor.

- A flow sensor, equipped with cable and weight may be used to measure flows where the water is too deep to wade. Follow the procedure involving meters attached to wading rods.
- Report flow values less than 10 ft^2 /s to two significant figures. Report flow values greater than 10 ft^3/s to the nearest whole number, but no more than three significant figures.
- In cases where the flow is low and falling over an obstruction, it may be possible to measure the flow by timing how long it takes to fill a bucket of known volume.

Avoid measuring flow in areas with back eddies. The first choice would be to select a site with no back eddy development. However, this can not be avoided in certain situations. Measure the negative flows in the areas with back eddies. These negative values will be included in the final flow calculation.

Calculating Flow

To calculate flow, multiply the width x depth (ft^2) to derive the area of the flow measurement section. The area of the section is then multiplied by the velocity (ft/s) to calculate the flow in cubic feet per second (cfs or ft^3/sec) for that flow measurement section. When flow is calculated for all of the measurement sections, they are added together for the total stream flow (see Figure 2).

Q=Total Flow (or discharge), W=Width, D=Depth, V=Velocity.

$$Q = (W_1 * D_1 * V_1) + (W_2 * D_2 * V_2) + \ldots\ldots (W_n * D_n * V_n)$$

What to Do with Negative Values

<u>Do not</u> treat cross sections with negative flow values as zero. Negative values obtained from areas with back eddies should be subtracted during the summation of the flow for a site.

Flow Estimate (ft^3/s)

Flow estimate data may be recorded for a non-tidally influenced stream when it is not possible to measure flows by one of the methods described above. Flow estimates are subjective measures based on field personnel's experience and ability to estimate distances, depths, and velocities. If flow can not be measured at a routine non-tidal station, a new site should be selected where flow can be measured.

Flow Estimate Procedure

- Observe the stream and choose a reach of the stream where it is possible to estimate the stream cross section and velocity.
- Estimate stream width (ft) at that reach and record.
- Estimate average stream depth (ft) at that reach and record. Estimate stream velocity (ft/s) at that reach and record. A good way to do this is to time the travel of a piece of floating debris. If doing this method from a bridge, measure the width of the bridge. Have one person drop a floating object (something that can be distinguished from other

floating material) at the upstream side of the bridge and say start. The person on the downstream side of the bridge will stop the clock when the floating object reaches the downstream side of the bridge. Divide the bridge width by the number of seconds to calculate the velocity. The velocity can be measured at multiple locations along the bridge. These velocities are averaged. If this is done alone, watch for road traffic.

< Multiply stream width (ft) times average stream depth (ft) to determine the cross sectional area (in ft^2) which when multiplied by the stream velocity (in ft/s) and a correction constant, gives an estimated flow (ft^3/s).

<u>Example</u>*:* A stream sampler conducted a sampling visit to a stream while the flow meter was being repaired. The sampler looked at the creek downstream from the bridge and saw a good place to estimate flow. The stream width was around 15 ft. It appeared the average depth on this reach was about 0.75 ft. The sampler timed a piece of floating debris as it moved a distance of 10 ft in 25 s downstream over the reach. An estimated flow with a smooth bottom was calculated using the following formula.

Width x Depth x Velocity x A (correction factor)= estimated flow
15 ft (width) x 0.75 ft (depth) x 2.5 ft/s (velocity) x A =25 ft^3/s (cfs)

A is a correction constant: 0.8 for rough bottom and 0.9 for smooth bottom

Estimated flow should be reported to one or two significant figures.

Experienced field personnel are able to estimate flow to within 20% of actual flow for total flows less than 50 ft^3/s. The best way to develop this skill is to practice estimating flow before making measurements at all monitoring visits to non-tidally influenced flowing streams and then compare estimated flows with those obtained from USGS gages or from instantaneous flow measurements

Figure 2. Stream Flow (Discharge) Measurement

Example 1.
Stream Flow (Discharge) Measurement
Small Stream < 5 Ft Wide and #2.5 Ft Deep

Stream:____**OAK CREEK**____Date:__**5/29/91**___________
Station Description:_____**at US Hwy 90A**____
Time Begin:__**1545**______Time End:__**1630**_______Meter Type:__**Marsh-McBirney**_____________
Observers:_____**BK/MK**_______Stream Width*:____**5 ft**_____ Section Width:____**0.5 ft**__________
Observations:____
____

Section Midpoint (ft)	Section Depth (ft)	Observational Depth** Ft	Velocity		Area W x D (ft^2)	Discharge (Q) V x A (ft^3/s)
			At Point (ft/s)	Average (ft/s)		
0.25	**0.55**			**0.05**		**0.01375**
0.75	**0.80**			**0.11**		**0.044**
1.25	**0.85**			**0.27**		**0.42635**
1.75	**0.90**			**0.49**		**0.2205**
2.25	**1.10**			**0.58**		**0.275**
2.75	**1.50**			**0.72**		**0.540**
3.25	**1.20**			**0.76**		**0.456**
3.75	**0.90**			**0.76**		**0.342**
4.25	**0.75**			**0.44**		**0.165**
4.75	**0.30**			**0.00**		**0.00**

$m^3/s \times 35.3 = ft^3/s$

Total Discharge (3Q) (ft^3/s)	**2.4826**

Example 2.

Stream Discharge Measurement Example (Larger Stream > 5 Ft and #2.5 Ft Deep)

Stream: **RED RIVER** Date: **5/28/91**
Station Description: **Post Oak Creek 40 m Below Sherman WWTP Outfall**
Time Begin: **1542** Time End: **1601** Meter Type: **Marsh-McBirney**
Observers: **CM, EW, DO** Stream Width*: **26 ft** Section Width: **1.3 ft**
Observations:

Section Midpoint (ft)	Section Depth (ft)	Observational Depth** ft	Velocity		Area W x D (ft^2)	Discharge (Q) V x A (ft^3/s)
			At Point (ft/s)	Average (ft/s)		
0.65	0.55			2.03	0.715	1.451
1.95	0.40			2.04	0.520	1.061
3.25	0.42			2.02	0.546	1.103
4.55	0.38			1.77	0.494	0.874
5.25	0.40			1.75	0.520	0.910
7.15	0.42			1.93	0.546	1.054
8.45	0.40			1.99	0.52	1.035
9.75	0.37			1.92	0.481	0.924
11.05	0.37			1.56	0.481	0.750
12.35	0.43			1.32	0.559	0.738
13.65	0.40			1.36	0.520	0.707
14.95	0.42			1.33	0.546	0.726
16.25	0.40			1.35	0.520	0.702
17.55	0.45			1.64	0.585	0.959
18.85	0.48			1.70	0.624	1.061
20.15	0.48			2.00	0.624	1.248
21.45	0.50			1.95	0.650	1.268
22.75	0.40			2.18	0.520	1.134
24.05	0.48			1.71	0.624	1.067
25.35	0.50			0.60	0.650	0.390
			Total Discharge (3Q) (ft^3/s)			**19.162**

$m^3/s \times 35.3 = ft^3/s$

Example 3.

Stream Flow (Discharge) Measurement (Larger Stream > 5 Ft and >2.5 Ft Deep)

Stream:____ARROYO COLORADO______________________________Date:__**6/16/98**____________

Station Description:_____Downstream of Harlingen WWTP___________________________________

Time Begin:__**1400**______Time End:__**1445**_____Meter Type:__**Marsh-McBirney**______________

Observers:_____**JD, CK**________Stream Width*:___**47.5 ft**___ Section Width:___**2.375 ft**________

Observations: *Note that the starting point is at 4.7 ft on the measuring tape and not zero.

Section Midpoint (ft)	Section Depth (ft)	Observational Depth** ft	Velocity At Point (ft/sec)	Velocity Average (ft/sec)	Area W x D (ft^2)	Discharge (Q) V x A (ft^3/s)
4.70	**0.73**			**0.65**	**1.73**	**1.127**
7.08	**1.10**			**1.08**	**2.61**	**2.822**
9.45	**1.85**			**0.90**	**4.39**	**3.954**
11.83	**2.20**			**1.05**	**5.23**	**5.486**
14.20	**2.20**			**1.44**	**5.23**	**7.531**
16.58	**2.45**			**1.09**	**5.82**	**6.342**
18.95	**2.55**	**0.20** **0.80**	**1.75** **1.76**	**1.76**	**6.06**	**10.659**
21.33	**2.60**	**0.20** **0.80**	**1.79** **1.32**	**1.56**	**6.18**	**9.633**
23.70	**2.70**	**0.20** **0.80**	**1.63** **1.26**	**1.45**	**6.41**	**9.298**
26.10	**3.05**	**0.20** **0.80**	**1.68** **1.15**	**1.42**	**7.24**	**10.286**
28.48	**3.10**	**0.20** **0.80**	**1.23** **0.69**	**0.96**	**7.36**	**7.068**
30.85	**2.90**	**0.20** **0.80**	**1.22** **0.89**	**1.06**	**6.89**	**7.301**
33.23	**2.84**	**0.20** **0.80**	**0.60** **0.37**	**0.49**	**6.75**	**3.305**
35.60	**2.65**	**0.20** **0.80**	**0.80** **0.21**	**0.51**	**6.29**	**3.210**
37.98	**2.65**	**0.20** **0.80**	**0.85** **0.96**	**0.91**	**6.29**	**5.727**
40.35	**2.20**			**0.28**	**5.23**	**1.464**
42.73	**2.30**			**0.16**	**5.46**	**0.874**
45.10	**2.05**			**0.51**	**4.87**	**2.483**
47.48	**1.10**			**0.49**	**2.61**	**1.280**
49.86	**0.65**			**0.62**	**1.54**	**0.957**

$m^3/s \times 35.3 = ft^3/s$

Total Discharge (ΣQ) (ft^3/s)

Stream Flow (Discharge) Measurement Form

Stream:____Date:______________

Station Description:____

Time Begin:__________ Time End:____________ Meter Type:________________________

Observers:__________________Stream Width*:_____________ Section Width:__________

Observations:____

Section Midpoint (ft) (m)	Section Depth (ft) (m) (cm)	Observational Depth** ft-m-cm	Velocity At Point (ft/s) (m/s)	Velocity Average (ft/s)(m/s)	Area W x D (ft^2) (m^2)	Flow (Q) V x A (m^3/s) (ft^3/s)

m^3/s x 35.3 =ft^3/s

Total Flow (Discharge) (3Q) (ft^3/s) ____________

* Make a minimum of 10 measurements when the total width is > 5.0 ft, 20 measurements preferred.

** When water is < 2.5 ft deep take one measurement at each cross section. When water is > 2.5 ft deep, take two measurements at each cross section; one at 2 the total depth and the other at 2 x the total depth. Average the two velocity measurements. See SWAMP Procedures Manual for a detailed flow measurement method.

Summary of Significant Figures for Reporting Field Parameters

Parameter	Field Data Reporting Requirements
Water Temperature (^{o}C)	Report temperature to the nearest tenth of a degree. Round insignificant figures 0 through 4 down and 5 thru 9 up.
pH (s.u.)	Report pH to the nearest tenth of a pH standard unit.
D.O. mg/L **D.O.** (% saturation)	Report dissolved oxygen to the nearest tenth of a mg/L. Report % saturation to the nearest tenth of a percent
Specific Conductance (micro siemens/cm)	Report specific conductance to only three significant figures if the value exceeds 100. Do not report ORP which is displayed by some multiprobes.
Salinity (ppt)	Report salinity values above 2.0 ppt to the nearest tenth of a part per thousand. In estuarine waters report the actual values displayed by the multiprobe above 2.0 ppt and values less than 2.0 as <2.0 or <1.0 only. Determine if a station is estuarine (i.e., experiences cases where salinity is >2.0 ppt) and always report salinity at this station, regardless of the salinity during periods of high flow.
Secchi Disk (meters)	Report Secchi depth transparency in meters to two significant figures.
Days Since Last Significant Precipitation(days)	Report whole numbers. If it is raining when the sample is collected or has rained within the last 24 h, report a value of <1. If it has been over a week since a rainfall event, report a value of > 7.
Flow (ft^3/s)	Report instantaneous flow values less than 10 ft^3/s to two significant figures. Report flow values greater than 10 ft^3/s to the nearest whole number, but no more than three significant figures. When there is no flow (pools), report as 0.0. When there is no water, don't report a value, but report as "dry" in the observations.
Flow Severity (1-no flow, 2-low, 3-normal, 4-flood, 5-high, 6-dry)	When there is no flow (pools), report the severity as 1, and the instantaneous flow as 0.0 ft^3/s. If the stream is dry, record only flow severity, as a value of 6.

BEAUFORT SCALE: Specifications and equivalent speeds for use at sea

FORCE	EQUIVALEN SPEED 10 m above ground		DESCRIPTION	SPECIFICATIONS FOR USE AT SEA
	Miles/hour	knots		
0	0-1	0-1	Calm	Sea like a mirror
1	1-3	1-3	Light air	Ripples with the appearance of scales are formed, but without foam crests.
2	4-7	4-6	Light Breeze	Small wavelets, still short, but more pronounced. Crests have a glassy appearance and do not break.
3	8-12	7-10	Gentle Breeze	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered white horses.
4	13-18	11-16	Moderate Breeze	Small waves, becoming larger; fairly frequent white horses.
5	19-24	17-21	Fresh Breeze	Moderate waves, taking a more pronounced long form; many white horses are formed. Chance of some spray.
6	25-31	22-27	Strong Breeze	Large waves begin to form; the white foam crestsare more extensive everywhere. Probably some spray.
7	32-38	28-33	Near Gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.
8	39-46	34-40	Gale	Moderately high waves of greater length; edges of crests begin to break into spindrift. The foam is blown in well-marked streaks along the direction of the wind.
9	47-54	41-47	Severe Gale	High waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble, and roll over. Spray may affect visibility.
10	55-63	48-55	Storm	Very high waves with long over- hanging crests. he resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On he whole the surface of the sea takes on a white appearance. The 'tumbling' of the sea becomes heavy and shock-like. Visibility affected.

Last edited on 09 January, 1999 Dave Wheeler weatherman@zetnet.co.uk
Web Space kindly provided by Zetnet Services Ltd, Lerwick, Shetland.
http://www.zetnet.co.uk/sigs/weather/Met_Codes/beaufort.htm

Field Collection Procedures for Water Samples

Scope and Application

This protocol describes the techniques used to collect water samples in the field in a way that neither contaminates, loses, or changes the chemical form of the analytes of interest. The samples are collected in the field into previously cleaned and tested (if necessary) sample bottles of a material appropriate to the analysis to be conducted. Pre-cleaned sampling equipment is used for each site, whenever possible and/or when necessary. Appropriate sampling technique and measuring equipment may vary depending on the location, sample type, sampling objective, and weather. Trade names used in connection with equipment or supplies do not constitute an endorsement of the product.

Summary of Method

Appropriate sample containers and field measurement gear as well as sampling gear are transported to the site where samples are collected according to each sample's protocol. Water velocity, turbidity, temperature, pH, conductivity, dissolved oxygen as well as other field data are measured and recorded using the appropriate equipment. These field data measurement protocols are provided in the SWAMP Field Measurement SOP. Samples are put on ice and appropriately shipped to the processing laboratories. This procedure has been modified from the Texas Natural Resources Conservation Commission's Procedure Manual for Surface Water Quality Monitoring, with major input from the United State's Geological Survey's (USGS's) National Water Quality Assessment (NAWQA) Protocol for Collection of Stream Water Samples, for which due credit is herewith given.

WATER SAMPLE COLLECTION

Water chemistry and bacteriological samples, as requested, are collected at the same location. *Water samples are best collected before any other work is done at the site*. If other work (e.g., sediment sample collection, flow measurement or biological/habitat sample collection or assessment) is done after or downstream of the collection of water samples, it might be difficult to collect representative samples for water chemistry and bacteriology from the disturbed stream. Care must be taken, though, to not disturb sediment collection sites when taking water samples.

The following general information applies to all types of water samples, unless noted otherwise:

Sample Collection Depth

Sub-Surface Grab Sample Samples are collected at 0.1 m below the water surface. Containers should be opened and re-capped under water in most cases.

Depth-integrated Sample If a depth-integrated sample is taken, the sample is pumped from discrete intervals within the entire water column.

Surface Grab Sample Samples are collected at the surface when water depth is <0.1 m. Since there is a difference in water chemistry on the surface, compared to subsurface, surface water should be noted on the field data sheet as 0 m.

Where to Collect Samples

Water samples are collected from a location in the stream where the stream visually appears to be completely mixed. Ideally this would be at the centroid of the flow (*Centroid* is defined as the midpoint of that portion of the stream width, which contains 50% of the total flow), but depth and flow do not always allow centroid collection. For stream samples, the sampling spot must be accessible for sampling physicochemical parameters, either by bridge, boat or wading. Sampling from the shoreline of any water body (meaning standing on shore and sampling from there) is the least acceptable method, but in some cases is necessary.

In reservoirs, lakes, rivers, and coastal bays, samples are collected from boats at designated locations provided by Regional Water Quality Control Boards (Regional Boards).

Sampling Order if Multiple Media are Requested to be Collected

The order of events at every site has to be carefully planned. For example, if sediment is to be collected, the substrate can not be disturbed by stepping over or on it; water samples can not be taken where disturbed sediment would lead to a higher content of suspended matter in the sample. *For the most part, water samples are best collected before any other work is done at the site*. This information pertains to walk-in sampling.

Sample Container Labels

Label each container with the station ID, sample code, matrix type, analysis type, project ID, and date and time of collection (in most cases, containers will be pre-labeled). After sampling, secure the label by taping around the bottle with clear packaging tape.

Procedural Notes

For inorganic and organic water samples, bottles do not have to be rinsed if they are I-Chem 200 series or higher or ESS PC grade or higher. This means that the sample bottles are analyzed for contamination, and a certification of analysis is included with the bottles. Other sample containers are usually rinsed at least three times if the bottles do not meet these requirements. See filling instruction for each type of analyses if there is uncertainty. If applicable to the sample and analysis type, the sample container should be opened and re-capped under water.

Sample Short-term Storage and Preservation

Properly store and preserve samples as soon as possible. Usually this is done immediately after returning from the collection by placing the containers on bagged, crushed or cube ice in an ice chest. Sufficient ice will be needed to lower the sample temperature to at least 4 °C within 45 min after time of collection. Sample temperature will be maintained at 4 °C until delivered to the laboratory. Care is taken at all times during sample collection, handling and transport to prevent exposure of the sample to direct sunlight. Samples are preserved in the laboratory, if necessary, according to protocol for specific analysis (acidification in most cases).

Field Safety Issues

Proper gloves must be worn to prevent contamination of the sample and to protect the sampler from environmental hazards (disposable polyethylene, nitrile, or non-talc latex gloves are recommended, **<u>however, metals and mercury sample containers can only be sampled and handled using polyethylene gloves as the outer layer</u>**). Wear at least one layer of gloves, but two layers help protect against leaks. One layer of shoulder high gloves worn as a first (inside) layer is recommended to have the best protection for the sampler. Safety precautions are needed when collecting samples, especially samples that are suspected to contain hazardous substances, bacteria, or viruses.

Sample Handling and Shipping

Due to increased shipping restrictions, samples being sent via a freight carrier require additional packing. Although care is taken in sealing the ice chest, leaks can and do occur. Samples and ice should be bagged placed inside a large trash bag inside the ice chest for shipping. Ice should be double bagged to prevent melted ice water from leaking into the sample. The large trash bag can be sealed by simply twisting the bag closed (while removing excess air) and taping the tail down. Prior to shipping the drain plug of the ice chests have to be taped shut. Leaking ice chests can cause samples to be returned or arrive at the lab beyond the holding time.

Although glass containers are acceptable for sample collection, bubble wrap must be used when shipping glass.

Chain of Custody (COC) Forms

Every shipment must contain a complete Chain of Custody (COC) Form that lists all samples collected and the analyses to be performed on these samples.

Make sure a COC is included for every laboratory, every time you send a shipment of samples. Electronic COCs can also be emailed to the various laboratories but must be sent before the samples arrive at their destinations.
Include region and trip information as well as any special instructions to the laboratory on the COC.

The original COC sheet (not the copies) is included with the shipment (insert into ziplock bag) One copy goes to the sampling coordinator, and the sampling crew keeps one copy.

Samples collected should have the salinity (in ppt), depth of collection, and date/time collected for each station on every COC.

Write a comment on this form, if you want to warn the laboratory personnel about possibly hazardous samples that contain high bacteria, chlorine or organic levels.

Field QC Samples for Water Analyses

Field duplicates are currently submitted at an annual rate of 5%. Field travel blanks are required for volatile organic compounds at a rate of one per cooler shipped. Field blanks are required for trace metals (including mercury and methyl mercury), DOC, and volatile organic compounds in water at a rate of 5%. See Appendix C of the SWAMP QAMP for detailed Field QC requirements.

Field Site Data Sheets

Each visited field site requires a field observation completed SWAMP Field Data Sheet, even if no samples are collected (i.e. at a site which is found to be dry). If water and/or sediment samples are collected, all elements of the SWAMP Field Data Sheet must be completely filled out.

General Pre-Sampling Procedures

Instruments. All instruments must be in proper working condition. Make sure all calibrations are current. Multi-probe sondes should be pre-calibrated every morning prior to sampling and post-calibrated within 24 h of the original calibration. Conductivity should also be calibrated between stations if there is a significant change in salinity. Dissolved oxygen sensors should be re-calibrated if there is a 500 ft change in elevation.

Calibration Standards. Pack all needed calibration standards.

Sample Storage Preparations. A sufficient amount of cube ice, blue ice and dry ice as well as enough coolers of the appropriate type/size must be brought into the field, or sources for purchasing these supplies identified in advance.

Sample Container Preparation. After arriving at the sample station, pack all needed sample containers for carriage to the actual collection site, and label them with a pre-printed label containing Station ID, Sample Code, Matrix info, Analysis Type info, Project ID and blank fields for date and time (if not already pre-labeled).
Safety Gear. Pack all necessary safety gear like waders, protective gloves and safety vests.

Walk to the site. For longer hikes to reach a sample collection site, large hiking backpacks are recommended for transport of gear, instruments and containers. Tote bins can be used, if the sampling site can be accessed reasonably close to the vehicle.

GPS. At the sampling site, compare/record reconnaissance GPS reading with current site reading and note differences. GPS coordinates should be in Decimal Degrees (e.g. 38.12345 -117.12345).

COLLECTION OF WATER SAMPLES FOR ANALYSIS OF CONVENTIONAL CONSTITUENTS

In most streams, sub-surface (0.1 m below surface) water is representative of the water mass. A water sample for analysis of conventional constituents is collected by the grab method in most cases, immersing the container beneath the water surface to a depth of 0.1 m. Sites accessed by bridge can be sampled with a sample container-suspending device. Extreme care must be taken to avoid contaminating the sample with debris from the rope and bridge. Care must also be taken to rinse the device between stations. If the centroid of the stream cannot be sampled by wading, sampling devices can be attached to an extendable sampling pole.

In some cases, depth-integrated sampling is required, as requested by Regional Boards. This is useful when lakes or rivers are stratified and a sample is wanted that represents the entire water column. Depth-integrated sample collection is explained later in this document.

Conventional Water Constituents, Routinely Requested in SWAMP	Chloride, sulfate, nitrite, nitrate (or nitrate+nitrate), ortho-phosphate, fluoride, total phosphorus, ammonia, TKN, alkalinity, chlorophyll a.
Conventional Water Constituents, Occasionally Requested in SWAMP	Total Suspended Solids (TSS) or Suspended Sediment Concentration (SSC), Total Dissolved Solids (TDS--especially if total metals requested), Total Organic Carbon (TOC), Dissolved Organic Carbon (DOC), hardness (if trace metals analysis is requested).
Conventional Water Constituents Sample Volume	Due to the potential for vastly different arrays of requested analyses for conventional constituents, please refer to table at the end of this document, as well as the Sample Handling Requirements Tables in Appendix C of the QAMP, for information on the proper volume to collect for the various types of analyses.
Conventional Water Constituents Sample Container Type	Due to the potential for vastly different arrays of requested analyses for conventional constituents, please refer to table at the end of this document, as well as the Sample Handling Requirements Tables in Appendix C of the QAMP, for information on the proper type of sample containers.
Chlorophyll a Syringe Sample Method	**Chlorophyll a syringe method:** Chlorophyll a is sampled by forcing water with a 60-mL syringe through a filter holder containing a 25-mm glass microfiber filter. The 60-mL syringe and an in-line filter holder are rinsed three times with the ambient water before filtration. The syringe is then filled with 60 mL of ambient water. The filter holder is then removed and a 25-mm glass microfiber filter is placed inside. The filter holder is then screwed onto the syringe and the ambient water is then flushed through the filter. The filter holder is removed every time more water needs to be drawn into the syringe. The process is then repeated until the desired amount of Chlorophyll a is present (usually 60 to 360 mL depending on the water clarity). When filtering is complete the filter holder is opened and the filter is removed with tweezers without

touching the Chlorophyll a. The filter is then folded in half, then again, in half with the Chlorophyll a inside the folds. The folded filter is then wrapped in aluminum foil and placed in an envelope labeled with the site information and the volume filtered. The envelope is then immediately placed on dry ice until transferred to the lab.

APPENDIX C

FIELD DATA SHEETS

FIELD EQUIPMENT CHECKLIST

SITE: ____

CLIENT CONTACT/PHONE NUMBER: _____________________________________

REGULATOR/PHONE NUMBER:_____________________________________

Personal Equipment and Supplies

___ First aid kit

___ Rain Gear and waders

___ Flashlight

___ Cell phone and chargers

___ Map

___ Work Gloves

___ other: _____________________________________

Field Measurement Equipment and Supplies

___ Field Log Sheets/Field Folders

___ Field monitoring equipment

___ Multiprobe Sensor Instrument and calibration equipment/solutions

___ Flow meter and wading rods

___ Measuring tape/measuring stick

___ other: _____________________________________

Sampling Equipment and Supplies

___ Proper number of sample container, including extras. Also bubble wrap and zip locks for containers.

___ Proper labels, including extras

___ COC Forms

___ Nitrile gloves and Tyveks

___ Coolers and ice or artificial ice

___ Decontamination equipment

___ Extra deionized water

___ Dipping pole and clean secondary containers

___ Sheet flow sampling device

___ Peristaltic pump, plus extra batteries

___ Clean sample tubing

___ other: ________________________________

Other Office/Field Equipment and Supplies

___ Copies of MRPP, QAPP and SOPs

___ Calculator

___ Camera, phone, and watch

___ Extra pens

___ Trash bags

___ other: ________________________________

SWAMP Field Data Sheet (Water Chemistry & Discrete Probe) - EventType=WQ | Entered in d-base (initial/date) | Pg of Pgs

***StationID:** ___ ___ ___ ___ ___ ___ ___ ___ ___ | *Date (mm/dd/yyyy): / / | *Group: | *Agency:

***Funding:** ___ ___ ___ ___ ___ ___ ___ ___ | ArrivalTime: | DepartureTime: | *SampleTime (1st sample): | *Protocol:

***ProjectCode:** | *Personnel: | *Purpose (circle applicable): WaterChem WaterTox Habitat FieldMeas | *PurposeFailure:

***Location**: Bank Thalweg Midchannel OpenWater	*GPS/DGPS	**Lat (dd.ddddd)**	**Long (ddd.ddddd)**	OCCUPATION METHOD: Walk-in Bridge R/V _________ Other
GPS Device:	**Target:**		-	STARTING BANK (facing downstream): LB / RB / NA
Datum: NAD83 / Accuracy (ft / m):	***Actual:**		-	Point of Sample (if Integrated, then -88 in dbase)

Habitat Observations (CollectionMethod = Habitat_generic)

WADEABILITY: Y / N / Unk

BEAUFORT SCALE (see attachment):

DISTANCE FROM BANK (m):

STREAM WIDTH (m):

WATER DEPTH (m):

SITE ODOR: None,Sulfides,Sewage,Petroleum,Smoke,Other______

SKY CODE: Clear, Partly Cloudy, Overcast, Fog, Smoky, Hazy

WIND DIRECTION (from):

HYDROMODIFICATION: None, Bridge, Pipes, ConcreteChannel, GradeControl, Culvert, AerialZipline, Other

LOCATION (to sample): US / DS / WI / NA

OTHER PRESENCE: Vascular,Nonvascular,OilySheen,Foam,Trash,Other___

PHOTOS (RB & LB assigned when facing downstream; RENAME to StationCode_yyyy_mm_dd_uniquecode):

1: (RB / LB / BB / US / DS / ##)

DOMINANT SUBSTRATE: Bedrock, Concrete, Cobble, Gravel, Sand, Mud, Unk, Other__________________

WATERCLARITY: Clear (see bottom), Cloudy (>4" vis), Murky (<4" vis)

PRECIPITATION: None, Fog, Drizzle, Rain, Snow

2: (RB / LB / BB / US / DS / ##)

WATERODOR: None, Sulfides, Sewage, Petroleum, Mixed, Other____

PRECIPITATION (last 24 hrs): Unknown, <1", >1", None

WATERCOLOR: Colorless, Green, Yellow, Brown

EVIDENCE OF FIRES: No, <1 year, <5 years

3: (RB / LB / BB / US / DS / ##)

OVERLAND RUNOFF (Last 24 hrs): none, light, moderate / heavy, unknown

OBSERVED FLOW: NA, Dry Waterbody Bed, No Obs Flow, Isolated Pool, Trickle (<0.1cfs), 0.1-1cfs, 1-5cfs, 5-20cfs, 20-50cfs, 50-200cfs, >200cfs

Field Measurements (SampleType = FieldMeasure; Method = Field)

	DepthCollec (m)	Velocity (fps)	Air Temp (°C)	Water Temp (°C)	pH	O_2 (mg/L)	O_2 (%)	Specific Conductivity (uS/cm)	Salinity (ppt)	Turbidity (ntu)			
SUBSURF/MID/ BOTTOM/REP													
SUBSURF/MID/ BOTTOM/REP													
SUBSURF/MID/ BOTTOM/REP													
Instrument:													
Calib. Date:													

Samples Taken (# of containers filled) - Method=Water_Grab

Field Dup YES / NO: (SampleType = Grab / Integrated; LABEL_ID = FieldQA; create collection record upon data entry

SAMPLE TYPE: Grab / Integrated

COLLECTION DEVICE: Indiv bottle (by hand, by pole, by bucket); Teflon tubing; Kemmer; Pole & Beaker; Other _________________

	DepthCollec (m)	Inorganics	Bacteria	Chl a	TSS / SSC	TOC / DOC	Total Hg	Dissolved Mercury	Total Metals	Dissolved Metals	Organics	Toxicity	VOAs
Sub/Surface													
Sub/Surface													

COMMENTS:

PW ENVIRONMENTAL
230 Dove Court, Santa Paula CA 93060
805-525-5563 fax 805-525-2896

FIELD REPORT

Page ____ of ____

Site:	Sampling Event: Wet Dry Date:	
Site Address:	Weather Conditions: Clear Partly Cloudy Cloudy Light Precipitation Raining	
	Visit Duration: Arrival Time: AM PM	Project Manager: Zack Moran
	Departure Time: AM PM	QA Officer: Bryn Home
Nearest Cross Street:	Site Contact:	Prepared By:

Field notes (describe activities, site conditions, runoff pattern, etc.):

Site Visitors (inspectors, regulators, utilities):	Agency/Company:	Title:	Phone Number:

This report presents opinion formed as a result of activity observations relating to environmental field work. PW relies on the contractor, as applicable, to comply with the plans and specifications throughout the duration of the project irrespective of the presence of PW's representative. PW's work does not include supervision or direction of the actual work of the contractor, contractor's employees, and agents. PW will not be responsible for job or site safety on this project, unless PW directed site activities or directed by contract agreement.

Attachments: ______________________

Distribution: ______________________

Signed: ______________________

Stream Flow (Discharge) Measurement Form

Stream:______________________________ Date:______________

Station Description:______________________________

Time Begin:__________ Time End:____________ Meter Type:________________________

Observers:__________________ Stream Width*:_____________ Section Width:__________

Observations:______________________________

Section Midpoint (ft) (m)	Section Depth (ft) (m) (cm)	Observational Depth** ft-m-cm	Velocity		Area W x D (ft^2) (m^2)	Flow (Q) V x A (m^3/s) (ft^3/s)
			At Point (ft/s) (m/s)	Average (ft/s)(m/s)		

$m^3/s \times 35.3 = ft^3/s$

Total Flow (Discharge) (3Q) (ft^3/s)	

* Make a minimum of 10 measurements when the total width is > 5.0 ft, 20 measurements preferred.

** When water is < 2.5 ft deep take one measurement at each cross section. When water is > 2.5 ft deep, take two measurements at each cross section; one at 2 the total depth and the other at 2 x the total depth. Average the two velocity measurements. See SWAMP Procedures Manual for a detailed flow measurement method.

Notes to Standardize SWAMP Field Data Sheets
(For in the field use)

Key Reminders to identify samples:

1. **Sample Time** is the SAME for all samples (Water, Sediment, & Probe) taken at the sampling event. Use time of FIRST sample; important for COC.
2. **Group;** many diffrent ways to do a group, one suggestion is to create groups which assign trips to assess frequency of field QA

Collection Details

1. **Personnel**: S. Mundell, G Ichikawa (first person listed is crew leader)
2. **Location:** Use "openwater" in bay/estuary/harbor only if no distinguishable channel exists
3. **GRAB vs INTEGRATED**: GRAB samples are when bottles are filled from a single depth; INTEGRATED sample are taken from MULTIPLE depths and combined.
   a. GRAB: use 0.1 for subsurface samples; if too shallow to submerge bottle; depth =0
   b. INTEGRATED: -88 in depth sampled, record depths combined in sample comments
4. **TARGET LAT/LONG**: Refers to the existing station location that the sampling crew is trying to achieve; can be filled out prior to sampling
5. **ACTUAL LAT/ LONG**: is the location of the current sample event.
6. **HYDROMODIFICATION:** Describe existing hydromodifications such as a grade control, drainage pipes, bridge, culvert
7. **HYDROMOD LOC**: if there is an IMMEDIATE (with in range potentially effecting sample) hydromodification; Is the hydromodification upstream/downstream/within area of sample; if there is no hydromodification, NA is appropriate
8. **STREAM WIDTH and DEPTH**: describe in meters at point of sample.

FIELD OBSERVATIONS: (each one of these observations has a comment field in the database so use comment space on data sheet to add information about an observation if necessary)

1. **PICTURES:** use space to record picture numbers given by camera; be sure to rename accordingly back in the office. (StationCode_yyyy_mm_dd_uniquecode)
2. **WADEABILITY**: in general, is waterbody being sampled wadeable to the average person AT the POINT of SAMPLE
3. **DOMINANT SUBSTRATE**: if possible; describe DOMINANT substrate type; use UNK if you cannot see the dominant substrate type
4. **BEAUFORT SCALE**: use scale 0-12; refer to scales listed below.
5. **WIND DIRECTION**: records the direction from which the wind is blowing
6. **OTHER PRESENCE**: VASCULAR refers to terrestrial plants or submerged aquatic vegetation (SAV) and NONVASCULAR refers to plankton, periphyton etc. These definitions apply to vegetation IN the water at the immediate sampling area.
7. **OBSERVED FLOW**: Visual estimates in cubic feet/ second.
8. **WATER COLOR**: This is the color of the water from standing creek side
9. **WATER CLARITY**: this describes the clarity of the water while standing creek side; clear represents water that is clear to the bottom, cloudy may not be clear to bottom but greater than 4" can be seen through the water column.
10. **PRECIPITATION LAST24hrs:** refers to field crews best categorization of rainfall in the last 24 hrs; may or may not effect Overland Runoff Last 24 hrs
11. **OVERLAND RUNOFF LAST 24 hrs:** Light Precip = fog, drizzle, and/or light rain with no overland runoff; Mod to Heavy Precip = rain such that site probably or definitely received at least some overland runoff
12. **SedimentComp**: generally described sediments used for chemistry sample

Note: these reminders do not give all details needed to maintain equivalent SWAMP sampling protocols, they are strictly for "infield" use to help insure comparability of field observations.

BEAUFORT SCALE: Specifications and equivalent speeds for use at sea

FORCE	EQUIVALENT SPEED 10 m above ground miles/hour	knots	DESCRIPTION	SPECIFICATIONS FOR USE AT SEA
0	0-1	0-1	Calm	Sea like a mirror.
1	1-3	1-3	Light air	Ripples with the appearance of scales are formed, but without foam crests.
2	4-7	4-6	Light breeze	Small wavelets, still short, but more pronounced. Crests have a glassy appearance and do not break.
3	8-12	7-10	Gentle breeze	Large wavelets. Crests begin to break. Foam of glassy appearance. Perhaps scattered white horses.
4	13-18	11-16	Moderate breeze	Small waves, becoming larger; fairly frequent white horses.
5	19-24	17-21	Fresh breeze	Moderate waves, taking a more pronounced long form; many white horses are formed. Chance of some spray.
6	25-31	22-27	Strong breeze	Large waves begin to form; the white foam crests are more extensive everywhere. Probably some spray.
7	32-38	28-33	Near gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.
8	39-46	34-40	Gale	Moderately high waves of greater length; edges of crests begin to breakinto spindrift. The foam is blown in well-marked streaks along the direction of the wind.
9	47-54	41-47	Severe gale	High waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility.
10	55-63	48-55	Storm	Very high waves with long over-hanging crests. The resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On the whole the surface of the sea takes on a white appearance. The 'tumbling' of the sea becomes heavy and shock-like. Visibility affected.

Source:

Last edited on 09 January, 1999 Dave Wheeler weatherman@zetnet.co.uk

Web Space kindly provided by Zetnet Services Ltd, Lerwick, Shetland.

BEAUFORT SCALE: Specifications and equivalent speeds for use on land

FORCE	EQUIVALENT SPEED 10 m above ground miles/hour	knots	DESCRIPTION	SPECIFICATIONS FOR USE ON LAND
0	0-1	0-1	Calm	Calm; smoke rises vertically
1	1-3	1-3	Light air	Direction of wind shown by smoke drift, but not by wind vanes
2	4-7	4-6	Light Breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind
3	8-12	7-10	Gentle Breeze	Leaves and small twigs in constant motion; wind extends light flag
4	13-18	11-16	Moderate Breeze	Raises dust and loose paper; small branches are moved.
5	19-24	17-12	Fresh Breeze	Small trees in leaf begin to sway crested wavelets form on inland waters
6	25-31	22-27	Strong Breeze	Large branches in motion; whistling heard in telegraph wires umbrellas used with difficulty
7	32-38	28-33	Neargale	Whole trees in motion; inconvenience felt when walking against the wind
8	39-46	34-40	Gale	Breaks Twigs and generally impedes progress

Source:

Last edited on 09 January, 1999   Dave Wheeler weatherman@zetnet.co.uk

Web Space kindly provided by Zetnet Services Ltd, Lerwick, Shetland.

APPENDIX D

CHAIN OF CUSTODY DOCUMENTATION

Weck Laboratories, Inc.
Analytical Laboratory Services - Since 1964
14859 East Clark Avenue : Industry : CA 91745
Tel 626-336-2139 ♦ Fax 626-336-2634 ♦ www.wecklabs.com

CHAIN OF CUSTODY RECORD

STANDARD

Page 1 Of 1

CLIENT NAME:	PROJECT:
ADDRESS:	PHONE: FAX: EMAIL:
PROJECT MANAGER	SAMPLER

ID# (For lab Use Only)	DATE SAMPLED	TIME SAMPLED	SMPL TYPE	SAMPLE IDENTIFICATION/SITE LOCATION	# OF CONT.	ANALYSES REQUESTED										COMMENTS

SPECIAL HANDLING

- Same Day Rush 150%
- 24 Hour Rush 100%
- 48-72 Hour Rush 75%
- 4 - 5 Day Rush 30%
- Rush Extractions 50%
- 10 - 15 Business Days
- QA/QC Data Package

Charges will apply for weekends/holidays

Method of Shipment:

RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY
RELINQUISHED BY	DATE / TIME	RECEIVED BY

SAMPLE CONDITION:

Actual Temperature:

Received On Ice	Y / N
Preserved	Y / N
Evidence Seals Present	Y / N
Container Attacked	Y / N
Preserved at Lab	Y / N

SAMPLE TYPE CODE:
AQ=Aqueous
NA=Non Aqueous
SL = Sludge
DW = Drinking Water
WW = Waste Water
RW = Rain Water
GW = Ground Water
SO = Soil
SW = Solid Waste
OL = Oil
OT = Other Matrix

PRESCHEDULED RUSH ANALYSES WILL TAKE PRIORITY
OVER UNSCHEDULED RUSH REQUESTS
Client agrees to Terms & Conditions at: www.wecklabs.com

SPECIAL REQUIREMENTS / BILLING INFORMATION

COC version 042707