East San Joaquin Water Quality Coalition Quality Assurance Project Plan

The following document contains the most recently submitted revision to the Quality Assurance Project Plan (QAPP) for surface water monitoring by the East San Joaquin Water Quality Coalition (ESJWQC) under the Irrigated Lands Regulatory program (ILRP). All revisions made to the QAPP after December 2015 have been submitted using an ILRP Amendment Form. All amendments included in this document have been submitted to and approved by the Central Valley Regional Water Quality Control Board (CVRWQCB). Amendments to the QAPP submitted as ILRP Amendment Forms are not incorporated into a full revision of the QAPP and have been appended to the end of this pdf document for ease of reference. The table below lists the amendment forms submitted by the ESJWQC to the CVRWQCB and the date of approval. Each amendment is hyperlinked to the referenced amendment form at the end of this document.

Item No.	Update description	QAPP Reference Page No.	CVRWQCB Approval Date
QAPP Amendment Form Submitted February 13, 2017			
15	**Sampling Procedures**		
	Updated Standard Operating Procedures for sampling.	Replace Appendices I through X	April 12, 2017
QAPP Amendment Form Submitted September 21, 2017			
16	**Clarification of Field Quality Control Sample Frequency Requirements**		
	Updated language of the Field QC sample requirements to ensure that the Coalition is not expected to have a "full QC set" for each analyte during each sampling event. Additional requirements regarding the rotation of field staff performing field QC added as well.	Verbiage, page 47 Table 15, page 47	March 2, 2018
QAPP Amendment Form Submitted October 4, 2017			
17	**Updated Constituents for 2018 WY**		
	Updated eQAPP to reflect new 2018 WY constituents, and associated limits and Data Quality Objectives.	eQAPP (Excel workbook)	December 20, 2017
QAPP Amendment Form Submitted March 28, 2018 (resubmitted unchanged amendment form on April 23, 2018)			
18	**Subcontracted Sediment Laboratory for Grain Size and TOC**		
	Updated subcontracted laboratory performing Grain Size and sediment TOC analyses, as well as an associated change in analytical methods for both constituents.	Tables 2, 13, 15, and 16 Appendices XXIII and XXIV	April 27, 2018
	Updated all laboratory SOPs to current versions.		NA

Quality Assurance Project Plan

For Monitoring By The

East San Joaquin Water Quality Coalition

(Revision 3.0)

Originally submitted on: August 25, 2008
Amendment submitted on: October 20, 2010
Amendmenr submitted on: November 24, 2015

For The

Irrigated Lands Regulatory Program
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive #200
Rancho Cordova, California 95670-6114

Prepared by

Michael L. Johnson LLC
632 Cantrill Drive
Davis, CA 95618

Table A. Updates to ESJWQC QAPP submitted on August 25, 2008; amended on October 20, 2010, and January 15, 2013.

Item No.	Update description	QAPP Reference Page No.	CVRWQCB Approval Date
Amended on October 20, 2010			
1	**Caltest QA Officer**		
	Updated Caltest QA Officer. Sonya Babcock replaced Carmelita Oliveros as the Caltest QA Officer and assumed all the associated responsibilities.	Figure 1, Page 12 Table 17, Page 54 Table 18, page 56	October 20, 2010
2	**MLJ Sampling Coordinator**		
	Updated MLJ Sampling Coordinator. Frank Wulff replaced Jonathon Katz as MLJ Sampling Coordinator and assumed all the associated responsibilities.	Verbiage, Page 29 Table 8, Page 29 Table 17, Page 54 Table 18, Page 56 Table 19, Page 58	October 20, 2010
3	**Regional Board ILRP Monitoring Assessment Supervisor**		
	Updated Regional Board ILRP Monitoring Assessment Supervisor. Susan Fregien replaced Margie Read as the ILRP Monitoring Assessment Supervisor and assumed all the associated responsibilities.	Verbiage, Page 5 Verbiage, Page 10 Figure 1, Page 13	October 20, 2010
4	**Sample sites**		
	Removed South Slough @ Quinley Rd from Assessment site list.	Table 11, Page 34	June 3, 2010
	Exchanged Mootz Drain @ Langworth Rd with Mootz Drain downstream of Langworth Pond.	Table 11, Page 34	November 18, 2009
5	**Monitoring constituents**		
	Added deltamethrin:tralomethrin to the sediment pyrethroids analysis list. Deltamethrin is listed in the MRP but due to an oversight the analyte was not previously added to our MRPP or QAPP tables.	Table 2, Page 18 Table 5, Page 24 Table 13, Page 43	October 20, 2010
6	**Data Quality Objectives**		
	Separated Matrix Spike/Lab Control Spike Frequency into two columns. Updated sediment TOC MS/LCS frequency to MS=N/A, LCS=1 per batch; grain size updated to N/A for both LCS and MS.	Table 5, Page 24	October 20, 2010
	Updated sediment grain size Accuracy/Recovery from 90-110% to N/A.	Table 5, Page 24	October 20, 2010
	Updated glyphosate Accuracy/Recovery acceptability range from 72-131% to 85.7-121% to match the range recommended by the lab.	Table 5, Page 24	October 20, 2010

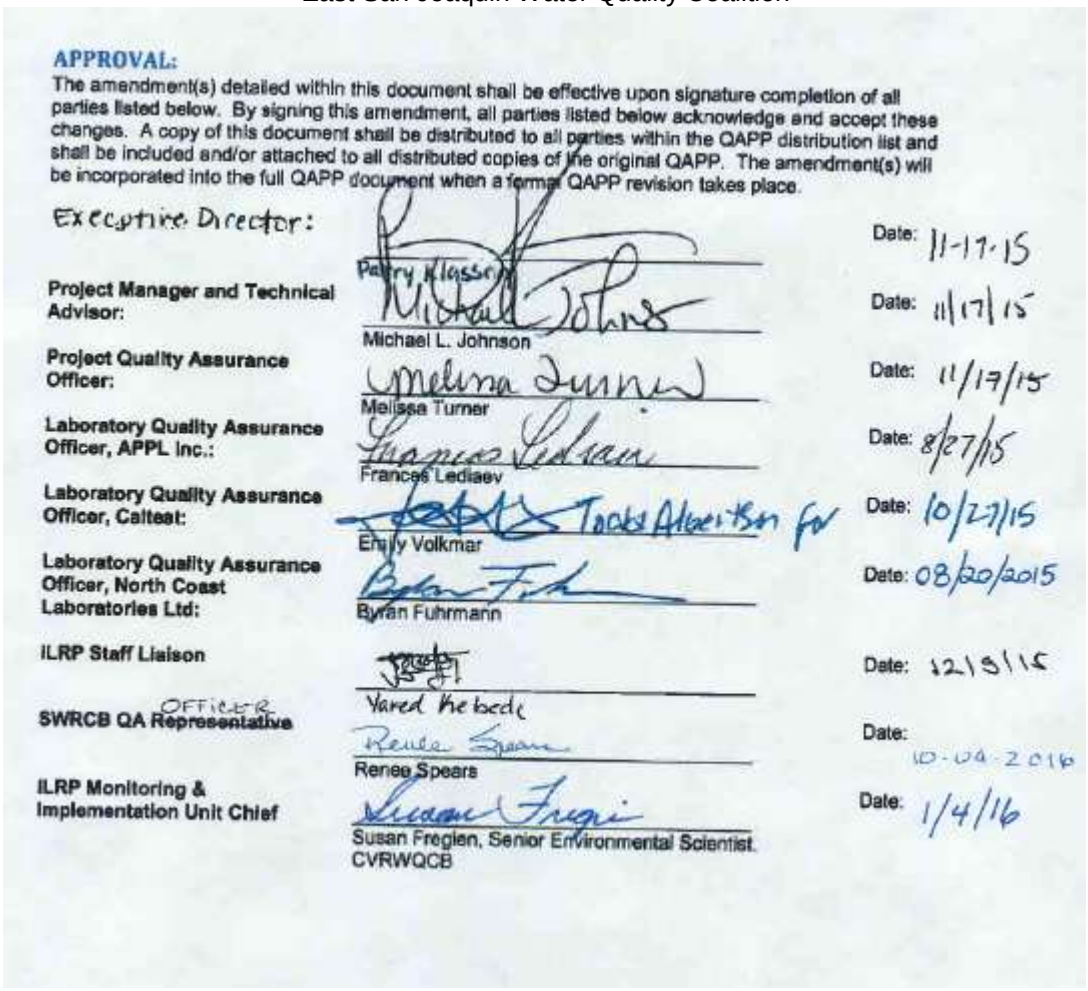
Item No.	Update description	QAPP Reference Page No.	CVRWQCB Approval Date
	Updated metals Accuracy/Recovery acceptability range from 75-125% to 85-115% and nutrients Accuracy/Recovery range from 80-120% to 90-110% to match the range recommended by the lab; updated lab precision RPDs from 25 to 20 for nutrients, metals and physical parameters to match the acceptability criteria used by the lab.	Table 5, Page 24	October 20, 2010
	Updated criteria for sediment toxicity criteria based on SWAMP recommendations for evaluating toxicity data.	Table 13, Page 44	January 21, 2016
7	**Analytical Methods**		
	Updated sediment toxicity method to EPA 600/R-99-064 from EPA 100.1. The original method listed is believed to be a typo and all samples analyzed for sediment toxicity have always used the EPA 600/R-99-064 method.	Table 2, Page 18 Table 13, Page 43 Table 15, Page 47 Table 16, Page 48	October 20, 2010
	Updated methamidophos method to EPA 8321A from EPA 8141A. Lab started using EPA 8321A to analyze for methamidophos in July 2010.	Table 2, Page 18 Table 13, Page 43	October 20, 2010
	Updated sediment pyrethroid analytical method from EPA 8270 to GCMS-NCI-SIM. Lab started using GCMS-NCI-SIM to analyze for sediment pyrethroids in April 2010.	Table 2, Page 18 Table 13, Page 43 Table 15, Page 47 Table 16, Page 48	October 20, 2010
	Removed requirement for Lab Control Spike/CRM/SRM from sediment grain size section of the Analytical QC table. This QC level is not required by SWAMP.	Table 16, Page 48	October 20, 2010
	Removed requirements for internal standards performed for Organic Parameters: OPs, OCHs, carbamates, and additional herbicides.	Table 16, Page 48	October 20, 2010
	Updated trifluralin RL to 0.05 µg/L from 0.01 µg/L. The original (and not feasible) value of 0.01 µg/L is believed to be a typo, while the value to 0.05 µg/L is that recommended in the MRP.	Table 13, Page 43	October 20, 2010
	Updated sediment pyrethroid MDL and RL values to match those recommended by the lab.	Table 13, Page 43	October 20, 2010
	Updated glyphosate, cadmium, lead, molybdenum, TKN and ammonia MDL values to match those achievable by the lab.	Table 13, Page 43	October 20, 2010
	Updated turbidity, hardness, molybdenum, lead and TKN RL values to match those achievable by the lab (turbidity 0.5 NTU to 0.05 NTU, hardness 10 mg/Lto 5 mg/L, molybdenum 0.3 µg/L to 0.25 µg/L, lead 0.5 µg/L to 0.25 µg/L, and TKN 0.5 mg/L to 0.1 mg/L).	Table 13, Page 43	October 20, 2010
	Updated the spelling of "demeton-s." It was previously misspelled as "dimeton-s."	Table 13, Page 43	October 20, 2010
	Updated dichlorvos and demeton-s RL values from 0.2 µg/L to 0.1 µg/L to correct an original typo.	Table 13, Page 43	October 20, 2010
8	**Quality Control**		
	Updated organic and inorganic Field Blank Acceptable Limits from "<MDL" to "<RL or <sample/5" to agree with Table 7, Element 7, page 24.	Table 15, Page 47	October 20, 2010
	Added precision calculation for sediment grain size.	Verbiage, Page 53	October 20, 2010
9	**Data Management**		
	Updated location of Regional Data Center from UCD-AEAL to Central Valley RDC.	Verbiage, Page 59	October 20, 2010

Item No.	Update description	QAPP Reference Page No.	CVRWQCB Approval Date
		Figure 4, Page 62	
10	**Standard Operating Procedures**		
	Updated chemistry and toxicity data verification, validation and loading SOPs; updated sample detail excel file creation SOP.	Appendices XXXV-XXXVII	October 20, 2010
	Updated laboratory inorganic chemistry SOPs for EPA 619, EPA 8081A, EPA 8141A, EPA 549, EPA 8321A; updated laboratory toxicity SOPs for Acute *Ceriodaphnia*, Acute *Pimephales*, and Chronic *Selenastrum* toxicity tests; updated inorganic chemistry SOPs as needed.	Appendices XI-XXXII	October 20, 2010
Amended on February 13, 2014			
11	**Monitoring sites**		
	Deleted site: Yori Grove Drain @ East Taylor Rd to be consistent with MRP.	Table 11, Page 34	February 7, 2012
	Deleted site: Duck Slough @ Hwy 99 to be consistent with MRP.	Table 11, Page 34	April 26, 2012
	Deleted site: Peaslee Creek @ Lake Rd to be consistent with MRP.	Table 11, Page 34	January 4, 2013
	Deleted site: Burnett Lateral @ 28 Mile Rd to be consistent with MRP.	Table 11, Page 34	March 8, 2013
	Deleted site: Silva Drain @ Meadow Dr to be consistent with MRP.	Table 11,Page 34	February 13, 2014
12	**Sample Handling and Custody**		
	Updated Sediment Total Organic Carbon Initial Preservation/Holding time to "Store at ≤ 6°C (not frozen), analyze or freeze (-20C) within 28 days" and maximum hold time to "28 days (not frozen) 12 Months (frozen)".	Verbiage, Page 36 Table 12, Page 39	January 15, 2013
	Updated Sediment Toxicity Maximum Hold Time from 28 days to 14 days to be consistent with MRP.	Verbiage, Page 36 Table 12, Page 39	January 15, 2013
	Updated Sediment Chemistry from "freeze or analyze within 48 hours" to "Store at ≤ 6°C (not frozen), analyze or freeze (-20C) within 14 days" and Maximum Hold Time to "14 days (not frozen) 12 Months (frozen)" to be consistent with approved sediment chemistry and TOC methods.	Verbiage, Page 37 Table 12, Page 39	January 15, 2013
	Updated Sediment Grain Size Maximum Hold Time from 14 days to 28 days to be consistent with the MRP.	Table 12, Page 39	January 15, 2013
	Updated the preservation temperature requirements from 4°C to ≤ 6°C for all water and sediment analysis and updated *E. coli* holding time temperature from 4°C to < 8°C based on the most recent method requirements.	Verbiage, Page 36 Table 12, Page 39	January 15, 2013
13	**Analytical Methods and Method Detection Limits**		
	Triazines method changed from EPA 619 to EPA 8141A for the analysis of Atrazine, Cyanazine and Simazine, as determined by the laboratory.	Table 2, Page 18 Table 13,Page 43	January 15, 2013
Amended on November 24, 2015			
14	**Data Quality Objectives**		
	Updated MS/D and LCS recovery limits for methods: EPA 8140A (organophosphates), EPA 8270_M (sediment pesticides), and EPA 549.2 (paraquat dichloride).	Table 5, Page 24	January 8, 2016

GROUP A: PROJECT MANAGEMENT

1. APPROVAL SIGNATURES

East San Joaquin Water Quality Coalition



APPROVAL:

The amendment(s) detailed within this document shall be effective upon signature completion of all parties listed below. By signing this amendment, all parties listed below acknowledge and accept these changes. A copy of this document shall be distributed to all parties within the QAPP distribution list and shall be included and/or attached to all distributed copies of the original QAPP. The amendment(s) will be incorporated into the full QAPP document when a formal QAPP revision takes place.

Executive Director: Patry Klasser — Date: 11-17-15

Project Manager and Technical Advisor: Michael L. Johnson — Date: 11/17/15

Project Quality Assurance Officer: Melissa Turner — Date: 11/17/15

Laboratory Quality Assurance Officer, APPL Inc.: Frances Lediaev — Date: 8/27/15

Laboratory Quality Assurance Officer, Caltest: Emily Volkmar — Date: 10/27/15

Laboratory Quality Assurance Officer, North Coast Laboratories Ltd: Byran Fuhrmann — Date: 08/20/2015

ILRP Staff Liaison Yared Hebede — Date: 12/9/15

SWRCB QA Officer Representative Renee Spears — Date: 10-04-2016

ILRP Monitoring & Implementation Unit Chief Susan Fregien, Senior Environmental Scientist, CVRWQCB — Date: 1/4/16

* This is a contractual document. The signature dates indicate the earliest date when the project can start.

2. TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

AMR	Annual Monitoring Report
APC	Atmospheric pressure chemical ionization
APPL	Agriculture and Priority Pollutants Laboratories Inc.
BU	Beneficial Use
CCC	Continuing Calibration Check
CD-ROM	Compact Disc Read-Only Memory
COC	Chain of Custody
CRM	Certified Reference Material
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
DAI	Direct aqueous injection
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DI	Deionized
DO	Dissolved Oxygen
DQO	Data Quality Objective
E	Environmental sample
EC	Specific Conductance
ECD	Electron capture detector
EDD	Electronic Data Deliverable
EPA	Environmental Protection Agency
ESI	Electrospray ionization
ESJWQC	East San Joaquin County Water Quality Coalition
FB	Field Blank
FD	Field Duplicate
FDe	Fluorescence Detection
GC	Gas Chromatography
GPS	Global Positioning System
HDPE	High density polyethylene
HPLC	High performance liquid chromatography ILRP
ID	Identification
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
ILRP	Irrigated Land and Regulatory Program
LC	Liquid chromatography
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MLJ-LLC	Michael L. Johnson, LLC
MPN	Most Probable Number
MRP	Monitoring and Reporting Program Order No. R5-2008-0005
MRPP	Monitoring and Reporting Program Plan
MS	Matrix Spike or Mass Spectrometry
MSD	Matrix Spike Duplicate
MUN	Municipal and Domestic Supply (beneficial use)
NA	Not Applicable
NCL	North Coast Laboratories Ltd.
ND	Not Detected
NDIR	Non-dispersive infrared
NM	Normal Monitoring
OP	Organophosphate
PCD	Post column detection
PDF	Portable Document Format
PR	Percent Recovery
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QMR	Quarterly Monitoring Report
RL	Reporting Limit
RPD	Relative Percent Difference
RS	Resample
RSD	Relative Standard Deviation
SIM	Selective Ion Monitoring
SOP	Standard Operating Procedure
SPE	Solid phase extraction
SRM	Standard Reference Material
SWAMP	Surface Water Ambient Monitoring Program
TDS	Total Dissolved Solids
TIC	Technical Issues Committee
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TSS	Total Suspended Solids
VOA	Volatile Organic Analyte
WQTL	Water Quality Trigger Limit

LIST OF UNITS

cfs	cubic feet per second
cm	centimeter
kg	kilogram
L	Liter
lbs	pounds
mg	milligram
mL	milliliter
ng	nanogram
NTU	Nephelometric Turbidity Units
pH	Power of Hydrogen
sec	second
TUa	Toxic Unit (acute)
µg	microgram
µm	micrometer
µS	microsiemen

3. Distribution List

Distribution list of the 2008 East San Joaquin Water Quality Coalition QAPP.

Title:	Name (Affiliation):	Tel. No.:	QAPP No:
Project Manager	Michael Johnson (MLJ-LLC)	(530) 400-6725	
Project QA Officer	Melissa Turner (MLJ-LLC)	(916) 607-5602	
Regional Board Coalition Liaison	Dania Huggins (CVRWQCB)	(916) 464-4843	
Regional Board ILRP Monitoring Assessment Supervisor	Susan Fregien (CVRWQCB)	(916) 464-4624	
Regional Board QA Officer	Leticia Valadez (CVRWQCB)	(916) 464-4634	
Board Chairman, ESJWQC	Parry Klassen (ESJWQC)	(530) 325-9855	
Lab Manager	Jeff Miller (AQUA-Science)	(530) 753-5456	
Lab Manager	Diane Anderson (APPL Inc)	(559) 275-2175	
Lab Manager	Todd Albertson (Caltest Labs)	(707) 258-4000	
Lab Manager	Roxanne Golich-Moore (NCL)	(707) 822-4649	

4. PROJECT/TASK ORGANIZATION

4.1 Involved parties and roles.

The East San Joaquin Water Quality Coalition (ESJWQC, or Coalition) is a consortium of farms and farmers obligated to monitor agricultural wastewater discharge from member areas. The broad goal of the ESJWQC is to conform to the Conditional Waiver of the Irrigated Lands Regulatory Program (ILRP) developed by the Central Valley Regional Water Quality Control Board (CVRWQCB) and thereby improve water quality. Monitoring and active outreach are developed by the ESJWQC Board of Directors. Constituents monitored and associated water quality trigger limits (WQTLs) are defined by the CVRWQCB; the CVRWQCB also reviews and approves all monitoring and activities of the ESJWQC. To facilitate compliance with the CVRWQCB the ESJQWC hired Michael L. Johnson LLC (MLJ-LLC) to provide technical support and sampling services. MLJ-LLC initiates and maintains working contracts with the necessary laboratories, including Agriculture and Priority Pollutants Laboratories Inc. (APPL) in Clovis, Caltest Laboratories (Caltest) in Napa, AQUA-Science in Davis, and North Coast Laboratories Ltd. (NCL) in Arcata.

4.2. Responsibilities of involved parties.

MLJ-LLC is responsible for providing technical support for the selection of sampling locations, techniques and sample collection, including delivery of samples to laboratories, synthesis of data from laboratories, and report submission to the CVRWQCB. MLJ-LLC will submit data to the CVRWQCB and will maintain copies of chains of custody (COC) forms and field sheets at their office. MLJ-LLC will maintain an ILRP SWAMP Comparable database in which the field results and laboratory results are recorded. MLJ-LLC will also submit to the CVRWQCB the reports listed in Table 20. The laboratories mentioned above will provide analytical services for this project in accordance with all method and quality assurance (QA) requirements found in this QAPP, and will return data to MLJ-LLC in both hardcopy and in approved electronic data deliverable (EDD) format.

Table 1. (Element 4) Personnel responsibilities.

Name	Organizational Affiliation	Title	Contact Information (Telephone number, fax number, email address.)
Dania Huggins	CVRWQCB	Regional Board Coalition Liaison	Phone: (916) 464-4843 Fax: (916) 464-4774 dhuggins@waterboards.ca.gov
Parry Klassen	ESJWQC	Board Chairman, ESJWQC	Phone: (559) 288-8125 Fax: 559-646-2225 pklassen@unwiredbb.com
Michael Johnson	MLJ-LLC	Project Manager and Technical Advisor	Phone: (530) 400-6725 Fax: (530) 756-5225 mjohnson@mlj-llc.com
Melissa Turner	MLJ-LLC	Project QA Officer	Phone: (916) 607-5602 Fax: (530) 756-5225 mturner@mlj-llc.com
Jeff Miller	AQUA-Science	Lab Manager	Phone: (530) 753-5456 Fax: (530) 753-6001 aquasci@aol.com
Diane Anderson	APPL Inc	Lab Manager	Phone: (559) 275-2175 Fax: (559) 275-4422 danderson@applinc.com
Todd Albertson	Caltest Labs	Lab Manager	Phone: (707) 258-4000 Fax: (707) 226-1001 todd_albertson@caltestlabs.com
Roxanne Golich-Moore	NCL	Lab Manager	Phone: (707) 822-4649 Fax: (707) 822-4649 rgolich@northcoastlabs.com

4.3 Quality Assurance Officer role.

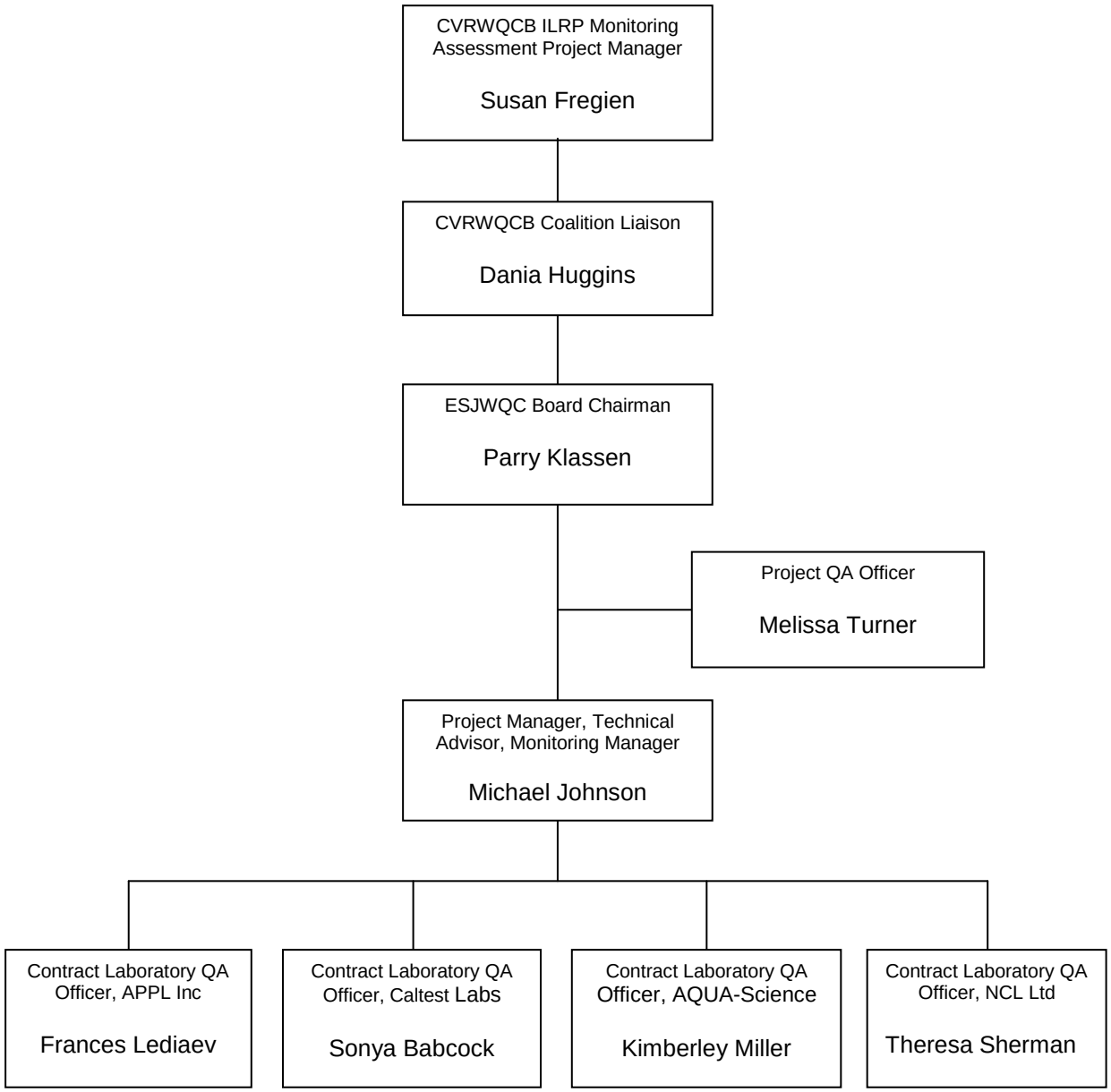
The project QA Officer, Melissa Turner of MLJ-LLC, is responsible for establishing the QA/QC guidelines for field sampling and analysis procedures in this QAPP. In addition to procedural QA/QC, Melissa Turner tracks the percentage of QA/QC samples analyzed during the time frame specified within this QAPP to maintain more than the minimum of 5% field QA/QC samples and 5% or 1 per batch lab QA/QC samples where applicable. Melissa Turner is responsible for reviewing laboratory protocol to confirm laboratory compliance with ILRP analysis guidelines and she is ultimately responsible for reviewing hard-copy and electronic data both for accuracy and SWAMP comparability.

4.4 Persons responsible for QAPP update and maintenance.

Melissa Turner, MLJ-LLC and project QA Officer, is responsible for creating, maintaining, and updating the official approved QAPP. Changes and updates to this QAPP may be made after a review of the evidence for change by CVRWQCB's Project Manager and Quality Assurance Officer, and with the concurrence of the ESJWQC's board. The MLJ-LLC QA Officer will be responsible for making the changes, submitting drafts for review, preparing a final copy, and submitting the final version for signature.

4.5 Organizational chart and responsibilities

Figure 1. Organizational chart.



4.6. Project team members and project advisors.

The ESJWQC monitoring project team is composed of the ESJWQC Board of Directors (chairman: Parry Klassen) and the QA Officer Melissa Turner of MLJ-LLC. Michael Johnson of MLJ-LLC provides technical support to the ESJWQC while also managing the monitoring and compiling the data. MLJ-LLC manages the contract laboratories and their individual QA Officers listed in Section 3.1. Additional technical support comes from the ILRP Technical Issues Committee (TIC) and the CVRWQCB.

5. PROBLEM DEFINITION/BACKGROUND

5.1 Problem statement.

Agricultural lands may be the source of water discharged to water bodies. The discharged water may be initially taken into the irrigation system and subsequently discharged as a result of a variety of practices including flood irrigation practices or as surplus water at the tail end of furrow irrigation. Discharge may also be the result of rains during the storm season. Once water has passed through an irrigation system its physical properties can change, and on occasion its chemical content may change as well. Examples of the physical changes include increasing water temperature, lowered dissolved oxygen, or increased turbidity. Examples of chemical changes include flushing nutrients, pesticides, or salts from fields into the receiving water body. The effect of return flow on a water body can be reduced water quality sufficiently to limit the potential of the water to be used for this same or other beneficial uses. This project is undertaken to characterize discharge from irrigated agriculture and determine if the discharge is impairing beneficial uses of water bodies. Once impaired water bodies are identified, it is the responsibility of the Coalition to contact members and suggest alternative practices or solutions that may prevent further degradation.

5.2 Decisions or outcomes.

The State of California Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands Resolution No. R5-2003-0105 (Order), Monitoring and Reporting Program Order No. R5-2005-0833, amended by Monitoring and Reporting Program Order No. R5-2006-0053, Monitoring and Reporting Program Order No. R5-2006-0077, and most recently Monitoring and Reporting Program Order No. R5-2008-0005, (hereafter referred to as the Conditional Waiver) regulates discharge from agricultural lands. The results of the monitoring outlined in this QAPP will allow the ESJWQC to determine which water bodies are impaired and institute appropriate outreach measures. Impairment is based on Conditional Waiver WQTLs which were developed based on the CVRWQCB Basin Plan. The WQTL's are set at a level to protect the most sensitive beneficial use for a given monitored constituent.

5.3 Water quality or regulatory criteria.

Under the guidelines established by the Conditional Waiver the CVRWQCB set specific WQTLs for a number of parameters and compounds; no waters within Coalition boundaries should exceed these WQTLs. To determine if water discharged within the Coalition area meets the WQTLs, the Coalition conducts monthly monitoring based on the MRPP.

This ongoing project will continue to monitor water quality within the ESJWQC region (defined in the ESJWQC Watershed Evaluation Report, submitted April 1, 2004) by regularly analyzing water samples collected from sites within subwatersheds in the region. Field parameters will be measured *in situ*, while some physical parameters and chemical content will be analyzed in a laboratory environment. The sampling methods used are adapted from those used in the past by MLJ-LLC; the laboratory analytical methods used are approved EPA methods specific to each compound or test. All methods are explained in detail in the appendices of this QAPP.

Previous monitoring by the ESJWQC under the Conditional Waiver has characterized water quality issues within the Coalition area as a result of agricultural discharge. Regular monitoring has allowed Coalition members to take active steps and focus efforts and funding to prevent waste discharge. Ultimately, the goal of the ESJWQC is to achieve 100% compliance with all WQTLs through a combination of approaches including but not limited to refining or implementing management practices by the growers responsible for the discharges. The monitoring program will help identify areas in which management practices or different pesticide application practices may be most effective, and also help to identify areas in which water quality meets the defined objectives. The specific WQTLs that the project has agreed to meet are periodically reviewed and updated; at the time of this QAPP submittal, the WQTLs for each constituent are shown in Table 13 and Table 14 (Element 13), but are subject to change.

6. PROJECT DESCRIPTION

6.1 Work statement and produced products.

Coalition ambient water and sediment quality monitoring for agricultural discharge will occur with three types of monitoring: Core Monitoring, Assessment Monitoring, and Management Plan Monitoring. Combined, these three levels of monitoring are designed to characterize the discharge from irrigated agriculture as a result of irrigation and storm water runoff. Core Monitoring will occur at sites that have undergone intensive monitoring in the past to assess general water quality trends over time. Assessment Monitoring will occur at sites that have not been well characterized by previous monitoring. Samples collected from Assessment Monitoring locations will be analyzed for a large suite of constituents to adequately characterize water quality at those sites. This monitoring strategy allows for comprehensive monitoring in the short term and general trend monitoring over successive years.

The Coalition area has been divided into six zones based on hydrology, crop types, land use, soil types, and rain fall. For a description of each zone in regards to land use, hydrology, precipitation, soil types and crop patterns refer to the Description of Coalition Area section of this MRPP. The zone names are based on the core monitoring location within that area and include: 1) Dry Creek @ Wellsford Zone, 2) Prairie Flower Drain @ Crows Landing Zone, 3) Highline Canal @ Hwy 99 Zone, 4) Merced River @ Santa Fe Zone, 5) Duck Slough @ Gurr Rd Zone, and 6) Cottonwood Creek @ Rd 20 Zone. Each zone contains one Core Monitoring location and one Assessment Monitoring location that will rotate every two years.

To allow the Coalition to monitor a large number of waterbodies across the six zones, the Assessment sites will be rotated every two years. If an Assessment site exhibits more than one water quality exceedance within the two years of monitoring, it will become part of the ESJWQC Management Plan monitoring which requires additional monitoring beyond the initial two years. For site subwatersheds that are currently under a management plan, the Coalition will continue to monitor at that location for the constituents within the management plan for which it is listed. For additional details on the monitoring strategy of the Coalition, refer to the Monitoring and Reporting Project Plan (MRPP).

Toxicity tests to assess survival or growth relative to a control sample will occur during assessment monitoring. Highly toxic samples that reduce survival >50% relative to the control or for algae exhibit suppressed growth of >50% relative to the control will undergo a Toxicity Identification Evaluation (TIE), and in cases where there is no survival or growth a dilution series is initiated. The results of toxicity tests will be compared to the results of water column chemical analyses to support a stronger interpretation of each toxicity result.

In addition to the water column analyses the Coalition will conduct sediment quality monitoring twice per year between the dates listed in Table 4. Sediment sampling will consist of a toxicity test to *Hyalella azteca* and additional physical parameters identified in Table 2. Samples which show statistically significantly toxicity to *H. azteca* and exhibit a >20% reduction in survival compared to the control will require pesticide analysis of the pesticides listed in Table 2.

During a calendar year MLJ-LLC will provide the CVRWQCB with exceedance reports within five business days of receiving field and analytical results, as well as three quarterly data deliveries and one annual report. Report requirements are described in the MRPP.

6.2 Constituents to be monitored and measurement techniques

All constituents listed in the MRP are included in Table 2 except for fecal coliform (Group A pesticides are listed in Table 3). The Coalition has been monitoring for *E. coli* since 2004 using the water quality trigger limit (WQTL) WQTL of 235 MPN/100mL (a fecal coliform number). E. coli is a sub-category of fecal coliform and therefore if the amount of *E. coli* detected in a sample is above the WQTL than it is assumed

that the fecal coliform is also above the WQTL and the sample is treated as exceeding a fecal coliform WQTL. It is not necessary therefore to also collect a sample for fecal coliform analysis.
A total of 17 constituents and parameters will be measured at each visit to each Core Monitoring site, including a three-species water column toxicity test. Assessment Monitoring sites, and every third year for each Core Monitoring site, will be monitored for a total of 63 constituents and parameters. Twice per year, once in the dormant season and once during irrigation season sediment will be collected and analyzed for toxicity, total organic carbon (TOC), and grain size will be measured at all sites. Sediment samples exhibiting toxicity will be analyzed for eight pesticides. Measurement techniques for water and sediment constituents vary by analyte and all are listed with the full constituent list in Table 2.

Table 2. (Element 6) Constituents and parameters.

Constituents and parameters measured, grouped by category. Laboratory SOPs are available in the appendices.

Constituent	Matrix	Analyzing Lab	Method	Analysis Type	Assessment (A) and/or Core (C) Monitoring
Physical Parameters					
Photo Monitoring	NA	NA	Digital capture	NA	With every event
Flow	Fresh Water	Field Measure	USGS R2Cross streamflow Method	Electromagnetic Induction	A, C
pH	Fresh Water	Field Measure	EPA 150.1	Glass Electrode	A, C
Electrical Conductivity	Fresh Water	Field Measure	EPA 120.1	Electrode Cell	A, C
Dissolved oxygen	Fresh Water	Field Measure	SM 4500-O	Steady State Polarographic	A, C
Temperature	Fresh Water	Field Measure	SM 2550	Thermistor	A, C
Turbidity	Fresh Water	Caltest	EPA 180.1	Nephelometric	A, C
Total Dissolved Solids	Fresh Water	Caltest	SM2540C	Filtration/Evaporation	A, C
Total Suspended Solids	Fresh Water	Caltest	SM2540D	Filtration/Dry Weight	A, C
Hardness	Fresh Water	Caltest	SM2340C	Na_2EDTA Titration	A, C
Total Organic Carbon	Fresh Water		SM5310B	NDIR Detection	A, C
Pathogens					
Escherichia coli	Fresh Water	Caltest	SM 9223B	Colilert media	A, C
Toxicity					
Water Column Toxicity	Fresh Water	AQUA-Science	EPA 821-R-02-012	Acute 96 Hour Survival	A
	Fresh Water	AQUA-Science	EPA 821-R-02-013	Chronic 96 Hour Growth	A
Sediment Toxicity	Sediment	AQUA-Science	EPA 600/R-99-064	Acute 10 day Survival	A
Carbamates					
Aldicarb	Fresh Water	APPL Inc	EPA 8321	HPLC, ESI/APC, LC/MS	A
Carbaryl	Fresh Water	APPL Inc	EPA 8321	HPLC, ESI/APC, LC/MS	A
Carbofuran	Fresh Water	APPL Inc	EPA 8321	HPLC, ESI/APC, LC/MS	A
Methiocarb	Fresh Water	APPL Inc	EPA 8321	HPLC, ESI/APC, LC/MS	A
Methomyl	Fresh Water	APPL Inc	EPA 8321	HPLC, ESI/APC, LC/MS	A
Oxamyl	Fresh Water	APPL Inc	EPA 8321	HPLC, ESI/APC, LC/MS	A
Organochlorines					
DDD	Fresh Water	APPL Inc	EPA 8081A	GC,ECD	A
DDE	Fresh Water	APPL Inc	EPA 8081A	GC,ECD	A
DDT	Fresh Water	APPL Inc	EPA 8081A	GC,ECD	A
Dicofol	Fresh Water	APPL Inc	EPA 8081A	GC,ECD	A
Dieldrin	Fresh Water	APPL Inc	EPA 8081A	GC,ECD	A
Endrin	Fresh Water	APPL Inc	EPA 8081A	GC,ECD	A
Methoxychlor	Fresh Water	APPL Inc	EPA 8081A	GC,ECD	A
Organophosphates					
Azinphos-methyl	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Chlorpyrifos	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Diazinon	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Dichlorvos	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Dimethoate	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Dimeton-s	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Disulfoton	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Malathion	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Methamidiphos	Fresh Water	APPL Inc	EPA 8321	HPLC, ESI/APC, LC/MS	A
Methidathion	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Parathion, methyl	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Phorate	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Phosmet	Fresh Water	APPL Inc	EPA 8141A	Capillary Column, GC/MS	A
Herbicides					
Atrazine	Fresh Water	APPL Inc	EPA 619	GC	A
Cyanazine	Fresh Water	APPL Inc	EPA 619	GC	A

Constituent	Matrix	Analyzing Lab	Method	Analysis Type	Assessment (A) and/or Core (C) Monitoring
Diuron	Fresh Water	APPL Inc	EPA 8321	HPLC, ESI/APC, LC/MS	A
Glyphosate	Fresh Water	NCL Ltd	EPA 547	DAI HPLC, PCD, FD	A
Linuron	Fresh Water	APPL Inc	EPA 8321	HPLC, ESI/APC, LC/MS	A
Paraquat dichloride	Fresh Water	APPL Inc	EPA 549.1	SPE, HPLC, UV detection	A
Simazine	Fresh Water	APPL Inc	EPA 619	GC	A
Trifluralin	Fresh Water	APPL Inc	EPA 8141	Capillary Column, GC/MS	A
Metals					
Arsenic	Fresh Water	Caltest	EPA 200.8	ICP-MS (Collision Cell)	A
Boron	Fresh Water	Caltest	EPA 200.8	ICP-MS (Collision Cell)	A
Cadmium	Fresh Water	Caltest	EPA 200.8	ICP-MS (Collision Cell)	A
Copper	Fresh Water	Caltest	EPA 200.8	ICP-MS (Collision Cell)	A
Lead	Fresh Water	Caltest	EPA 200.8	ICP-MS (Collision Cell)	A
Molybdenum	Fresh Water	Caltest	EPA 200.8	ICP-MS (Collision Cell)	A
Nickel	Fresh Water	Caltest	EPA 200.8	ICP-MS (Collision Cell)	A
Selenium	Fresh Water	Caltest	EPA 200.8	ICP-MS (Collision Cell)	A
Zinc	Fresh Water	Caltest	EPA 200.8	ICP-MS (Collision Cell)	A
Nutrients					
Total Kjeldahl Nitrogen	Fresh Water	Caltest	SM4500NH3 C	Tecator Auto Titration	A, C
Nitrate (as N)+ Nitrite (as N)	Fresh Water	Caltest	EPA 353.2	Colorimetric, Automated Cadmium Reduction	A, C
Total Ammonia	Fresh Water	Caltest	SM4500NH3 C	Tecator Auto Titration	A, C
Total Phosphorus	Fresh Water	Caltest	SM4500PE	Colorimetric Analysis	A, C
Soluble Orthophosphate	Fresh Water	Caltest	SM4500PE	Colorimetric Analysis	A, C
Sediment					
Bifenthrin	Sediment	Caltest	GCMS-NCI-SIM	GC/MS/SIM	A[1]
Cyfluthrin	Sediment	Caltest	GCMS-NCI-SIM	GC/MS/SIM	A[1]
Cypermethrin	Sediment	Caltest	GCMS-NCI-SIM	GC/MS/SIM	A[1]
Deltamethrin: Tralomethrin	Sediment	Caltest	GCMS-NCI-SIM	GC/MS/SIM	A[1]
Esfenvalerate	Sediment	Caltest	GCMS-NCI-SIM	GC/MS/SIM	A[1]
Lambda-Cyhalothrin	Sediment	Caltest	GCMS-NCI-SIM	GC/MS/SIM	A[1]
Permethrin	Sediment	Caltest	GCMS-NCI-SIM	GC/MS/SIM	A[1]
Fenpropathrin	Sediment	Caltest	GCMS-NCI-SIM	GC/MS/SIM	A[1]
Chlorpyrifos	Sediment	Caltest	GCMS-NCI-SIM	GC/MS/SIM	A[1]
Total Solids	Sediment	Caltest	SM2540B	Gravimetric	A
Total Organic Carbon	Sediment	Caltest[2]	Walkley Black	Oxidation & Titration	A[5]
Grain Size	Sediment	Caltest[2]	ASTM D-422-63[3], ASTM D4464M-85[4]	Dry Sieve[3] & Laser Light Scattering[4]	A[5]

NDIR: Non-dispersive infrared
HPLC: High performance liquid chromatography
ESI: Electrospray ionization
APC: Atmospheric pressure chemical ionization
LC: Liquid chromatography
MS: Mass spectrometry
ICP-MS: Inductively coupled plasma mass spectroscopy
GC: Gas Chromatography
ECD: Electron capture detector
DAI: Direct aqueous injection
PCD: Post column detection
FDe: Fluorescence detection
SPE: Solid phase extraction
SIM: Selective Ion Monitoring

[1] If needed based on criteria described in text above
[2]Subcontracted to PTS Geo Laboratories
[3]For particle sizes 6.351-0.037 mm
[4]For particle sizes 0.4-2000 µm
[5] Simultaneous with sediment toxicity sampling

Special Project monitoring will include specific targeted studies for the implementation of a Management Plan that results from more than one exceedance within three years of either Core or Assessment Monitoring. Monitoring for Management Plans may include more extensive monitoring than what is required in the Core Monitoring or Assessment Monitoring schedules. The schedule for Special Project Monitoring will be determined as outlined in the ESJWQC Management Plan which is updated on a yearly basis. Special Project monitoring may also occur in areas where Total Maximum Daily Load (TMDL) studies are required (refer to the Special Project Monitoring section of the Monitoring and Reporting Program Plan (MRPP)). The six Coalition zones are distinct by land use, crop type, depth to ground water and climate. Therefore, by monitoring for TMDL constituents at any Assessment Monitoring site within the zone, the Coalition is providing an assessment for the listed constituent through the representativeness of the site within the zone. In addition, the Assessment Monitoring locations within each zone are tributaries to the 303(d) listed water bodies. Currently, all TMDLs are within Zone 1 (Dry Creek @ Wellsford Ave Zone), Zone 2 (Prairie Flower Drain @ Crows Landing Zone), Zone 3 (Highline Canal @ Hwy 99 Zone) and Zone 4 (Merced River @ Santa Fe Rd Zone). The Coalition has monitored for all listed TMDL constituents at one or more locations within each of these zones with the exception of Group A pesticides. Starting in October 2008, the Coalition will monitor for Group A pesticides at sites listed in Table 3.

Group A pesticides are considered legacy pesticides and based on pesticide use reports (PUR) the most recent use of any Group A pesticide was in 2004 (endosulfan). Therefore, if the Coalition does not detect any Group A pesticides during 2008/2009 monitoring, the Coalition will have demonstrated that these pesticides are not impacting water quality and will discontinue monitoring for Group A pesticides in 2010. The status of TMDLs and 303(d) listed water bodies and their associated constituents will be reviewed annually at the time of the Annual Monitoring Report.

Table 3. (Element 6) Additional constituents monitored for CWA 303(d) compliance.

Site Name	Constituent	Matrix	Analyzing Lab	Method	Analysis Type	Assessment (A) and/or Core (C) Monitoring
Merced River @ Santa Fe Dr Lateral 2 ½ Near Keyes Rd Mootz Drain downstream of Langworth Pond	Aldrin	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies
	Chlordane	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies
	Heptachlor	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies
	Heptachlor epoxide	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies
	Hexachlorocyclohexane (alpha-BHC)	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies
	Hexachlorocyclohexane (beta-BHC)	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies
	Hexachlorocyclohexane (gamma-BHC; Lindane)	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies
	Hexachlorocyclohexane (delta-BHC)	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies
	Endosulfan	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies
	Toxaphene	Fresh Water	APPL Inc	EPA 8081A	GC, ECD	As needed to characterize 303d listed waterbodies

6.3 Project schedule

The project will advance with deliverable dates outlined in the table below. The table provides dates for the first year this QAPP is active as an example. Beyond 2009 the year advances but the month and day of each date will remain roughly the same. If in subsequent years the deliverable due date is not a weekday it will change to the nearest weekday to the listed date that is not later than the listed date.

Table 4. (Element 6) Project schedule timeline.

Activity	Date (MM/DD/YY)		Deliverable	Deliverable Due Date
	Anticipated Date of Initiation	Anticipated Date of Completion		
Prior Year Monitoring	01/01/09	12/31/09	Annual Monitoring Report	03/01/10
Quarter 1 Monitoring, Monthly	01/01/09	03/31/09	Quarterly Monitoring Data Report	06/01/09
Sediment Monitoring #1	03/01/09	04/30/09	Results included in Quarterly Monitoring Report	Either 06/01/09 or 09/01/09
Quarter 2 Monitoring, Monthly	04/01/09	06/30/09	Quarterly Monitoring Data Report	09/01/09
Quarter 3 Monitoring, Monthly	07/01/09	09/30/09	Quarterly Monitoring Data Report	12/01/09
Sediment Monitoring #2	08/15/09	10/15/09	Results included in Quarterly or Annual Monitoring Report	Either 12/01/09 or 03/01/10

6.4 Geographical setting.

The ESJWQC area includes Stanislaus, Merced, Madera, Tuolumne, and Mariposa Counties and the portion of Calaveras County that drains into the Stanislaus River. The region that drains into the Coalition area is bordered by the crest of the Sierra Nevada on the east and the San Joaquin River on the west, the Stanislaus River on the north to the San Joaquin River on the south. The southern portion of the Coalition area has been expanded to now include the area that was formerly within the Root Creek Coalition area. Additionally, there are landholdings in the vicinity of the Lone Willow Slough watershed (west of the Eastside Bypass) that have joined the Westside Coalition.

The only surface water export from the Coalition area is northward via the San Joaquin River. This river drains watersheds on the east and west side of the California Central Valley (Valley), though only east side watersheds are relevant with respect to the Coalition area. San Joaquin River water is eventually either exported to the San Francisco Bay through the Delta, or conveyed southward via the State Water Project and the Delta Mendota Canal. The Coalition area also includes within its boundaries portions of all six irrigation districts: Oakdale Irrigation District, Merced Irrigation District, Turlock Irrigation District, Modesto Irrigation District, Chowchilla Irrigation District and Madera Irrigation District. Water bodies may have both irrigation district and Coalition involvement only when they convey both irrigation supply and agriculture return water. Oakdale Irrigation District, Merced Irrigation District, Turlock Irrigation District and Modesto Irrigation District are covered by individual waivers.

Apart from the San Joaquin River, there are five major rivers in the watershed: the Fresno River, Chowchilla River, Merced River, Tuolumne River and Stanislaus River. In addition, the Eastside Bypass is considered a major water body. These east side tributaries of the San Joaquin River drain the Sierra Nevada range from east to west. Typically, only the Stanislaus, Merced, and Tuolumne Rivers maintain flows during the summer months. Flow in the Chowchilla and Fresno Rivers are intermittent to nonexistent as the irrigation season progresses into the fall and remain dry unless major storm events produce sufficient precipitation in the immediate vicinity of the rivers. Intermediate sized water bodies in the Coalition area (e.g. Dry Creek, Duck Slough, and Highline Canal) originate either in the Sierra Nevada foothills or the Valley itself and are tributaries to the major rivers. The remaining water bodies are small in size (e.g. Silva Drain, Mustang Creek) and are primarily agricultural canals and ditches that convey water to one of the larger rivers or intermediate-sized creeks/sloughs.

Although exact acreage is difficult to estimate due to rapidly changing land use, the Coalition area contains 1,186,889 acres that are considered irrigated agriculture. For Stanislaus, Merced, Mariposa, Tuolumne, and Madera Counties, the Coalition used the Department of Water Resources (DWR) land use estimates for irrigated agriculture to determine total acreage. DWR does not provide land use data

for Calaveras County. Instead, the Coalition used data from the County Agricultural Commissioner's office.

6.5 Photo monitoring

A minimum of four photos of each sampling site will be submitted to the CVRWQCB with the Annual Monitoring Report along with the target GPS coordinates. The photos will depict a general site overview, an upstream view, a downstream view, and the entrance to the location where the samples are collected.

6.6 Constraints

Certain periods of high runoff volume, such as during intense storms, may completely flush contaminants through a water system before they can be captured and measured. Assessment of water quality for the Conditional Waiver is thus a best estimate based on discrete instantaneous measurements.

Water quality parameters may be expressed as instantaneous load (µg constituent/second). This method of expressing load is not always accurate for some reasons and not always possible for other reasons, including that the water body may flow intermittently and so may not be flowing during the sampling visit, or the sampler may be unable to measure discharge safely when a sample is collected.

7. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

7.1. Data quality objectives.

Data quality objectives are listed below and in Tables 5-7.

Measurement or Analyses Type	Applicable Data Quality Objective
Field Measurements	Accuracy, Precision, Completeness
Physical Parameters	Accuracy, Precision, Completeness, Recovery
Toxicity	Precision, Completeness
Pathogens	Precision, Completeness, Contamination
Nutrients	Accuracy, Precision, Completeness, Recovery, Contamination
Metals	Accuracy, Precision, Completeness, Recovery, Contamination
Carbamates	Accuracy, Precision, Completeness, Recovery, Contamination
Organochlorines	Accuracy, Precision, Completeness, Recovery, Contamination
Organophosphates	Accuracy, Precision, Completeness, Recovery, Contamination
Pyrethroids	Accuracy, Precision, Completeness, Recovery, Contamination
Herbicides	Accuracy, Precision, Completeness, Recovery, Contamination

Data quality objectives for accuracy, precision, completeness, recovery, and contamination are determined through a combination of instrument calibration and the analysis of duplicates, blanks, and spikes. Completeness is assessed with each annual monitoring report based on the number of samples successfully obtained and validated for use and the proportion of quality control samples that are within acceptance criteria.

Field measurements are taken with a YSI 556 MPS multi-parameter system and a Marsh McBirney FloMate 2000; accuracy and precision are measured during calibration (if applicable), taking into account the manufacturers specifications. For all other types of analysis accuracy, precision, and recovery are assessed through use of QC samples, including lab spikes and matrix spikes to assess accuracy and recovery, and lab and field duplicates to assess precision.

7.2 Project action limits.

Project action limits, also referred to as WQTLs, are listed in Table 13 and Table 14 (Element 13).

7.3 Acceptance criteria of previously collected information.

All data used by this project must meet the accuracy, precision, and recovery criteria in Tables 5-7 (where applicable). Data that fails to meet the criteria will undergo a review following the guidelines established in Group D, Element 22 of this QAPP before being accepted for use.

Table 5. (Element 7) Data quality objectives for field and laboratory accuracy, precision, and completeness measurements.

Data quality objectives in measurements of accuracy, precision, and completeness.

Constituent	Matrix	Matrix Spike Frequency†	Lab Control Spike Frequency†	Matrix Spike Accuracy/ Recovery	Laboratory Control Spike Accuracy/Recovery	Lab Duplicate Frequency†	Precision	Completeness
Physical Parameters								
Flow	Fresh Water	NA	NA	NA	NA	1 per batch	±2%	90%
pH	Fresh Water	NA	NA	NA	NA	1 per batch	±0.5 units	90%
Specific Conductivity	Fresh Water	NA	NA	NA	NA	1 per batch	±5%	90%
Dissolved oxygen	Fresh Water	NA	NA	NA	NA	1 per batch	±0.5 mg/L or ±10%	90%
Temperature	Fresh Water	NA	NA	NA	NA	1 per batch	±0.5°C or 10%	90%
Turbidity	Fresh Water	NA	NA	NA	NA	1 per batch	RPD ≤ 20%	90%
Total Dissolved Solids	Fresh Water	NA	NA	NA	NA	1 per batch	RPD ≤ 20%	90%
Total Suspended Solids	Fresh Water	NA	NA	NA	NA	1 per batch	RPD ≤ 20%	90%
Hardness	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Total Organic Carbon	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Pathogens								
Escherichia coli	Fresh Water	1 per batch	1 per batch	NA	NA	1 per batch	R_{log} ≤ 3.27*mean R_{log}	90%
Toxicity								
Water Column Toxicity	Fresh Water	1 per batch	1 per batch	NA	NA	1 per batch	RPD ≤ 25%	90%
Sediment Toxicity	Sediment	1 per batch	1 per batch	NA	NA	1 per batch	RPD ≤ 25%	90%
Carbamates								
Aldicarb	Fresh Water	1 per batch	1 per batch	31-133%	31-133%	1 per batch	RPD ≤ 25%	90%
Carbaryl	Fresh Water	1 per batch	1 per batch	44-133%	44-133%	1 per batch	RPD ≤ 25%	90%
Carbofuran	Fresh Water	1 per batch	1 per batch	36-165%	36-165%	1 per batch	RPD ≤ 25%	90%
Methiocarb	Fresh Water	1 per batch	1 per batch	35-142%	35-142%	1 per batch	RPD ≤ 25%	90%
Methomyl	Fresh Water	1 per batch	1 per batch	23-152%	23-152%	1 per batch	RPD ≤ 25%	90%
Oxamyl	Fresh Water	1 per batch	1 per batch	10-117%	10-117%	1 per batch	RPD ≤ 25%	90%
Organochlorines								
DDD	Fresh Water	1 per batch	1 per batch	38-135%	38-135%	1 per batch	RPD ≤ 25%	90%
DDE	Fresh Water	1 per batch	1 per batch	21-134%	21-134%	1 per batch	RPD ≤ 25%	90%
DDT	Fresh Water	1 per batch	1 per batch	18-145%	18-145%	1 per batch	RPD ≤ 25%	90%
Dicofol	Fresh Water	1 per batch	1 per batch	40-135%	40-135%	1 per batch	RPD ≤ 25%	90%
Dieldrin	Fresh Water	1 per batch	1 per batch	48-121%	48-121%	1 per batch	RPD ≤ 25%	90%
Endrin	Fresh Water	1 per batch	1 per batch	24-143%	24-143%	1 per batch	RPD ≤ 25%	90%
Methoxychlor	Fresh Water	1 per batch	1 per batch	30-163%	30-163%	1 per batch	RPD ≤ 25%	90%
Organophosphates								
Azinphos-methyl	Fresh Water	1 per batch	1 per batch	30-172%	30-172%	1 per batch	RPD ≤ 25%	90%
Chlorpyrifos	Fresh Water	1 per batch	1 per batch	40-144%	40-144%	1 per batch	RPD ≤ 25%	90%
Diazinon	Fresh Water	1 per batch	1 per batch	45-130%	45-130%	1 per batch	RPD ≤ 25%	90%
Dichlorvos	Fresh Water	1 per batch	1 per batch	13-161%	13-161%	1 per batch	RPD ≤ 25%	90%

Constituent	Matrix	Matrix Spike Frequency†	Lab Control Spike Frequency†	Matrix Spike Accuracy/ Recovery	Laboratory Control Spike Accuracy/Recovery	Lab Duplicate Frequency†	Precision	Completeness
Dimethoate	Fresh Water	1 per batch	1 per batch	40-170%	40-170%	1 per batch	RPD ≤ 25%	90%
Demeton-s	Fresh Water	1 per batch	1 per batch	35-130%	35-130%	1 per batch	RPD ≤ 25%	90%
Disulfoton	Fresh Water	1 per batch	1 per batch	28-131%	28-131%	1 per batch	RPD ≤ 25%	90%
Malathion	Fresh Water	1 per batch	1 per batch	30-137%	30-137%	1 per batch	RPD ≤ 25%	90%
Methamidiphos	Fresh Water	1 per batch	1 per batch	36-124%	36-124%	1 per batch	RPD ≤ 25%	90%
Methidathion	Fresh Water	1 per batch	1 per batch	50-150%	50-150%	1 per batch	RPD ≤ 25%	90%
Parathion, methyl	Fresh Water	1 per batch	1 per batch	55-164%	50-150%	1 per batch	RPD ≤ 25%	90%
Phorate	Fresh Water	1 per batch	1 per batch	42-125%	42-125%	1 per batch	RPD ≤ 25%	90%
Phosmet	Fresh Water	1 per batch	1 per batch	40-153%	40-153%	1 per batch	RPD ≤ 25%	90%
Herbicides								
Atrazine	Fresh Water	1 per batch	1 per batch	39-156%	39-156%	1 per batch	RPD ≤ 25%	90%
Cyanazine	Fresh Water	1 per batch	1 per batch	22-172%	22-172%	1 per batch	RPD ≤ 25%	90%
Diuron	Fresh Water	1 per batch	1 per batch	52-136%	52-136%	1 per batch	RPD ≤ 25%	90%
Glyphosate	Fresh Water	1 per batch	1 per batch	85.7-121%	85.7-121%	1 per batch	RPD ≤ 25%	90%
Linuron	Fresh Water	1 per batch	1 per batch	49-144%	49-144%	1 per batch	RPD ≤ 25%	90%
Paraquat dichloride	Fresh Water	1 per batch	1 per batch	70-130%	70-130%	1 per batch	RPD ≤ 25%	90%
Simazine	Fresh Water	1 per batch	1 per batch	21-179%	21-179%	1 per batch	RPD ≤ 25%	90%
Trifluralin	Fresh Water	1 per batch	1 per batch	40-148%	40-148%	1 per batch	RPD ≤ 25%	90%
Metals								
Arsenic	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Boron	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Cadmium	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Copper	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Lead	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Molybdenum	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Nickel	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Selenium	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Zinc	Fresh Water	1 per batch	1 per batch	80-120%	80-120%	1 per batch	RPD ≤ 20%	90%
Nutrients								
Total Kjeldahl Nitrogen	Fresh Water	1 per batch	1 per batch	90-110%	NA	1 per batch	RPD ≤ 20%	90%
Nitrate (as N) + Nitrite (as N)	Fresh Water	1 per batch	1 per batch	90-110%	NA	1 per batch	RPD ≤ 20%	90%
Total Ammonia	Fresh Water	1 per batch	1 per batch	90-110%	NA	1 per batch	RPD ≤ 20%	90%
Total Phosphorus	Fresh Water	1 per batch	1 per batch	90-110%	NA	1 per batch	RPD ≤ 20%	90%
Soluble Orthophosphate	Fresh Water	1 per batch	1 per batch	90-110%	NA	1 per batch	RPD ≤ 20%	90%
Sediment Sampling								
Bifenthrin	Sediment	1 per batch	1 per batch	31-200%	65-148%	1 per batch	RPD ≤ 25%	90%
Cyfluthrin	Sediment	1 per batch	1 per batch	51-149%	51-149%	1 per batch	RPD ≤ 25%	90%
Cypermethrin	Sediment	1 per batch	1 per batch	70-152%	63-149%	1 per batch	RPD ≤ 25%	90%
Deltamethrin:Tralomethrin	Sediment	1 per batch	1 per batch	31-174%	43-139%	1 per batch	RPD ≤ 25%	90%
Esfenvalerate	Sediment	1 per batch	1 per batch	30-175%	58-157%	1 per batch	RPD ≤ 25%	90%
Lambda-Cyhalothrin	Sediment	1 per batch	1 per batch	27-164%	44-131%	1 per batch	RPD ≤ 25%	90%
Permethrin	Sediment	1 per batch	1 per batch	30-200%	50-184%	1 per batch	RPD ≤ 25%	90%
Fenpropathin	Sediment	1 per batch	1 per batch	48-176%	44-178%	1 per batch	RPD ≤ 25%	90%

Constituent	Matrix	Matrix Spike Frequency†	Lab Control Spike Frequency†	Matrix Spike Accuracy/ Recovery	Laboratory Control Spike Accuracy/Recovery	Lab Duplicate Frequency†	Precision	Completeness
Chlorpyrifos	Sediment	1 per batch	1 per batch	8-190%	53-131%	1 per batch	RPD ≤ 25%	90%
Total Solids	Sediment	NA	NA	NA	NA	1 per batch	RPD ≤ 25%	90%
Total Organic Carbon	Sediment	NA	1 per batch	NA	75-125%	1 per batch	RPD ≤ 20%*	90%
Grain Size	Sediment	NA	NA	NA	NA	1 per batch	RPD ≤ 25%	90%

†Either a matrix spike duplicate or a lab control spike duplicate may function as the lab duplicate in any batch. A CRM may be used in place of a lab control spike.
*if result > 10x MDL

Table 6. (Element 7). Data quality objectives for field and laboratory accuracy and precision measurements of additional constituents monitored for CWA 303(d) compliance.

Data quality objectives in measurements of accuracy, precision, and completeness of constituents monitored for CWA 303(d) compliance. Either a Matrix Spike duplicate or a Lab Control Spike duplicate may function as the lab duplicate in any batch.

Site Name	Constituent	Matrix	Matrix Spike/Lab Control Spike Frequency	Accuracy/ Recovery	Lab Duplicate Frequency	Precision	Completeness
Merced River @ Santa Fe Dr Lateral 2 ½ Near Keyes Rd Mootz Drain downstream of Langworth Pond	Aldrin	Fresh Water	1 per batch	11-138%	1 per batch	RPD ≤ 25%	90%
	Chlordane	Fresh Water	1 per batch	44-152%	1 per batch	RPD ≤ 25%	90%
	Heptachlor	Fresh Water	1 per batch	24-124%	1 per batch	RPD ≤ 25%	90%
	Heptachlor epoxide	Fresh Water	1 per batch	58-109%	1 per batch	RPD ≤ 25%	90%
	Hexachlorocyclohexane (alpha-BHC)	Fresh Water	1 per batch	33-111%	1 per batch	RPD ≤ 25%	90%
	Hexachlorocyclohexane (beta-BHC)	Fresh Water	1 per batch	49-119%	1 per batch	RPD ≤ 25%	90%
	Hexachlorocyclohexane (gamma-BHC; Lindane)	Fresh Water	1 per batch	40-114%	1 per batch	RPD ≤ 25%	90%
	Hexachlorocyclohexane (delta-BHC)	Fresh Water	1 per batch	12-97%	1 per batch	RPD ≤ 25%	90%
	Endosulfan I	Fresh Water	1 per batch	50-131%	1 per batch	RPD ≤ 25%	90%
	Endosulfan II	Fresh Water	1 per batch	55-128%	1 per batch	RPD ≤ 25%	90%
	Toxaphene	Fresh Water	1 per batch	23-140%	1 per batch	RPD ≤ 25%	90%

Table 7. (Element 7) Data quality objectives for field and laboratory contamination measurements.

Includes additional constituents monitored for CWA 303(d) compliance.

Group	Field/Method Blank Criterion	Field Blank Frequency	Method Blank Frequency
Physical Parameters	FB < RL *or* < sample/5, MB < RL *or* if n≥3 avg ±2 s.d < RL	5%	1 per batch
Toxicity	NA	NA	NA
Pathogens	FB < RL *or* < sample/5, MB < RL *or* if n≥3 avg ±2 s.d < RL	5%	1 per batch
Nutrients	FB < RL *or* < sample/5, MB < RL *or* if n≥3 avg ±2 s.d < RL	5%	1 per batch
Metals	FB < RL *or* < sample/5, MB < RL *or* if n≥3 avg ±2 s.d < RL	5%	1 per batch
Carbamates	FB < RL *or* < environmental sample/5	5%	1 per batch
Organochlorines	FB < RL *or* < environmental sample/5	5%	1 per batch
Organophosphates	FB < RL *or* < environmental sample/5	5%	1 per batch
Pyrethroids	FB < RL *or* < environmental sample/5	5%	1 per batch
Herbicides	FB < RL *or* < environmental sample/5	5%	1 per batch

FB: Field Blank
MB: Method Blank
RL: Reporting Limit

7.4. Precision and accuracy as pertains to this data set.

Data quality will be attained by maximizing the accuracy and precision of the methods used. Any changes in procedures due to equipment changes or to improved precision and accuracy will be documented. All analyses and determinations must be performed by qualified personnel in conformance with all current EPA standards and procedures. All laboratories under contract by MLJ-LLC will employ only methods and techniques which have been determined to produce measurement data of a known and verifiable quality and which are of quality sufficient to meet the overall objectives of the project.

7.5. Representativeness and completeness.

Sampling locations are selected to represent agricultural discharges within a zone. Requirements for selecting sample sites are discussed in more detail in the MRPP. Only approved/documented sample collection methods, sample transport/holding methods, and analytical methods will be used to ensure that the measurement data represents the conditions at the sample site to the extent possible. The water bodies monitored are physically dynamic and may be altered by rate of flow, dredging, aquatic vegetation, rate of discharge/input, and many other factors. Locations and methodology are chosen to maximize representativeness, where possible and applicable; however, the samples collected can only represent the specific time and place where collected.

Completeness is defined as a measure of the amount of valid data obtained from a measurement system as compared to the planned amount. Project completeness is divided into two areas: field and transport completeness and laboratory completeness. The completeness goal of 90% is the combination of these two areas on an annual basis.

Field and transport completeness requires that samplers successfully visit each site, document the visit and collect the field information and samples as outlined in Elements 10-12. In addition, the samples must be successfully transported to the laboratories. A properly documented dry site does not reduce the completeness of the event.

Laboratory completeness refers to the process of sample reception, COC documentation, storage and in-house preservation, extraction, analysis, and laboratory QA/QC.

7.6. Minimizing bias.

Bias in sample timing is minimized by using a predetermined sample schedule that rigidly defines the sample dates for each site months in advance. In this way sampling at any given site will not be subjectively influenced by temporal factors that risk introducing intentional or unintentional sampling bias, such as irrigation events or weather patterns.

Bias in field sampling quality control monitoring is minimized by randomly distributing QC samples among all sites throughout the year. Additionally, the samplers collecting the QC samples are randomly assigned to minimize the chances of a single site or single sampler exerting more influence on overall sample quality than randomness would predict.

Bias in analysis is minimized through the use of professional, private, objective third-party labs. Any potential bias that may be introduced by these labs is assessed with semi-blind QC samples; field QC samples are not overtly identified to the lab.

Sediment sample collection is intentionally biased towards the finest sediments available, which are most likely to have been most recently deposited and are also most likely contain high K_{OC} compounds. These samples may not thoroughly represent the area of sample collection, but are necessary to achieve the goals of the program.

8. SPECIAL TRAINING NEEDS/CERTIFICATION

8.1 Specialized training or certifications.

All personnel performing sampling are trained in proper sampling techniques under the supervision of the QA Officer at MLJ-LLC, Melissa Turner. Training includes a review of all Standard Operating Procedures (SOPs) and detailed information on filling sample bottles for the various types of analysis (some constituents have specific SOPs; see appendices), proper procedures for filling field QC samples, and measuring discharge with a Marsh McBirney FloMate 2000 and Rickly Hydrological wading rod. Other topics covered are sample transport, calibration use and maintenance of YSI meters, GPS use and sample site confirmation. To further safeguard against sampling error, all sampling by recently trained personnel is done under the supervision of more experienced personnel who accompany sampling crews each time they go in the field for reference at any time. The field and laboratory SOPs in the appendices to this document are available for all staff to familiarize themselves. In addition to sampling training all sampling staff attend a field safety course presented by the MLJ-LLC QA Officer, Melissa Turner. Field safety is supplemented by a brief course in office safety and ergonomics.

8.2 Training personnel.

Melissa Turner, MLJ-LLC QA Officer, is responsible for training all sampling personnel in field sampling and safety. Assistance is provided by the MLJ-LLC Sampling Coordinator, Frank Wulff.

Table 8. (Element 8) Specialized personnel training or certification.

Specialized Training Course Title or Description	Training Provider	Personnel Receiving Training/ Organizational Affiliation	Location of Records & Certificates
Field Sampling (4 hours)	Melissa Turner and Frank Wulff, MLJ-LLC	All MLJ-LLC Sampling Personnel	MLJ-LLC Office
Field Safety/Office Safety (4 hours)	Melissa Turner and Frank Wulff, MLJ-LLC	All MLJ-LLC Sampling Personnel	MLJ-LLC Office

8.3 Training and certification documentation.

All training of sampling personnel is done at or near the MLJ-LLC office in Davis, CA. Training courses and refresher courses are presented twice annually, approximately every six months; once before storm season and again before irrigation season. Training generally consists of a lecture and presentation, a variety of supporting literature, a field excursion, and occasionally a quiz. Attendance at each training event is documented with the date and trainer noted.

8.4. Training and certification oversight.

It is the responsibility of the QA officers to ensure that all employees achieve satisfactory training, including any necessary certifications. This includes the sampling QA Officer and the QA Officers of the contract laboratories. Signatures of participants are collected as evidence of attendance and this documentation is kept in the MLJ-LLC office.

8.5. Obtaining training and certification records.

To obtain copies of sampler training materials and documentation contact the MLJ-LLC QA Officer, Melissa Turner. Contract laboratory training and certification records can be obtained from the contract laboratory QA Officer identified in Element 1.6 of this QAPP.

9. DOCUMENTS AND RECORDS

9.1. Report format.

MLJ-LLC maintains field records, sample records, and data records for each sample collected. Many of these records are presented to the CVRWQCB in the Quarterly Monitoring Reports or the Annual Monitoring Report; originals and occasionally copies of all records are kept at the MLJ-LLC office. Any records not available within a Quarterly or Annual Monitoring Report may be requested from MLJ-LLC.

Reports from the laboratories are received both as hard copies and in a SWAMP comparable EDD which is uploaded into a SWAMP comparable ILRP database by the MLJ-LLC QA Officer Melissa Turner.

9.2. Additional documents and records.

All samples collected are accompanied to the lab by a chain of custody (COC) form which identifies continuous sample custody from collection to login at the laboratory. Field data gathered at the time of sample collection is recorded on field sheets, along with positive confirmation of sampling location (latitude/longitude coordinates and photos), and entered into a SWAMP comparable database.

The exceedance reports will be submitted electronically to the CVRWQCB throughout the year following each sampling event as needed. Copies of each exceedance report will be retained at the MLJ-LLC office and incorporated into the Annual Monitoring Report, which is submitted to the CVRWQCB in both hard-copy and digital form.

9.3. Document and record archives.

Melissa Turner, MLJ-LLC QA Officer, will maintain all sample collection, chain of custody, and field analyses forms at the MLJ-LLC office for a minimum of five years. The respective laboratories will maintain all records associated with the receipt and analysis of samples analyzed for pesticides for at least five years. All electronic data entered into a SWAMP comparable database will be permanently stored in the database. CVRWQCB coalition liaison Dania Huggins will oversee the actions of these persons and will arbitrate any issues relative to records retention and any decisions to discard records.

Table 9. (Element 9) Document and record retention, archival, and disposition information.

Record Type	Record Needed	Retention	Archival	Disposition
Sample Collection Records	COC forms	Original at lab or at MLJ-LLC Office	Copies at MLJ-LLC Office	Stored at lab or in MLJ-LLC office for at least 5 years
Field Records	Field Sheets	MLJ-LLC Office	MLJ-LLC Office	Stored in MLJ-LLC office for at least 5 years
Analytical Records	Hard Copy Lab Reports	MLJ-LLC Office	MLJ-LLC Office	Stored in MLJ-LLC office for at least 5 years
	Electronic Data Deliverables	MLJ-LLC office	MLJ-LLC Office	Stored in MLJ-LLC office for at least 5 years
Data Records	ILRP SWAMP Comparable Database	UCD AEAL Office	UCD AEAL Office	Permanent Storage at UCD AEAL
Assessment Records	Event Exceedance Reports	MLJ-LLC office	MLJ-LLC Office and CVRWQCB	Permanent Storage at CVRWQCB
	Quarterly Monitoring Reports	MLJ-LLC office	MLJ-LLC Office and CVRWQCB	Permanent Storage at CVRWQCB
	Annual Monitoring Reports	MLJ-LLC office	MLJ-LLC Office and CVRWQCB	Permanent Storage at CVRWQCB

9.4. Electronic record backups.

Melissa Turner will maintain the database; data management procedures including back-up plans for data stored electronically are outlined in Element 19 of this QAPP.

9.5. QAPP distribution.

Copies of this QAPP will be distributed to all parties involved with the project. Hard copies will be sent to all labs for review and reference. Any future amended QAPPs will be held and distributed in the same fashion. All originals and subsequent amended QAPPs will be held at the CVRWQCB. Copies of versions, other than the most current, will be discarded.

GROUP B: DATA GENERATION AND ACQUISITION

10. SAMPLING PROCESS DESIGN

For full sampling process design, see the Monitoring and Reporting Program Plan (MRPP) submitted to the CVRWQCB. The MRPP can be requested from Melissa Turner, QA Officer at MLJ-LLC, or Dania Huggins, Coalition liaison at the CVRWQCB. A brief summary of the MRPP description is reproduced below.

The Coalition area has been divided into six zones based on hydrology, crop types, land use, soil types, and rain fall. For a description of each zone in regards to land use, hydrology, precipitation, soil types and crop patterns refer to the Description of Coalition Area section in the MRPP. The zone names are based on the Core site within that area and include: 1) Dry Creek @ Wellsford Zone, 2) Prairie Flower Drain @ Crows Landing Zone, 3) Highline Canal @ Hwy 99 Zone, 4) Merced River @ Santa Fe Zone, 5) Duck Slough @ Gurr Rd Zone, and 6) Cottonwood Creek @ Rd 20 Zone. Each zone contains one Core site and one Assessment site that will rotate every two years.

Core sites have been selected from water bodies that have a history of monitoring and are suitable to track water and sediment quality trends over extended periods of time. A list of criteria used to select these sites is provided below. Core sites will undergo Assessment Monitoring every three years in order to evaluate the effects of changes in land-use and management practices and provide information about long-term trends and effectiveness of the management practices. Management plan monitoring may also occur at Core sites. Core Monitoring is not limited to largest volume water bodies, but includes a diversity of water body size and flows. Data generated from the Core sites will be used to establish trend information about the effectiveness of the Coalition's efforts to reduce or eliminate the impact of irrigated agriculture on surface waters.

Assessment Monitoring will focus on a diverse group of monitoring sites that are representative within their individual zones. Assessment Monitoring sites were selected based on the sizes and flows of surface water bodies and land uses (e.g., agricultural activities, crops and pesticide use), and include water bodies that carry agricultural drainage into natural water bodies, both directly and indirectly. Sites with known water quality impairments (such as, but not limited to those in the Clean Water Act 303(d) listing) and sites undergoing compliance monitoring for TMDLs will also be included in this monitoring. Assessment Monitoring sites are selected in order to adequately characterize water quality for all waters of the State within the Coalition region. In conjunction with Core Monitoring for trends and Special Projects focused on specific problems, Assessment Monitoring will demonstrate the effectiveness of management practices and identify locations for implementation of new management practices, as needed.

The Assessment sites will be rotated every two years to allow the Coalition to monitor a large number of waterbodies across the six zones. Each zone will contain an Assessment site and those sites will represent a specific subwatershed including the crop type, land use and hydrology specific to that subwatershed. If an Assessment site exhibits more than one water quality exceedance within the two years, it will become part of the ESJWQC Management Plan monitoring which requires additional monitoring beyond the initial two years.

Special project monitoring will include specific targeted studies for the implementation of a Management Plan that results from more than one exceedance. Monitoring for Management Plans may include more extensive monitoring than what is required in the Core Monitoring or Assessment Monitoring schedules. The schedule for Special Project Monitoring will be determined as outlined in the ESJWQC Management Plan which is updated on a yearly basis.

10.3. Total number of samples.

The total number of samples anticipated to be collected once each month, December-September, is outlined in Table 10 and Table 11 below. Sediment samples will be collected at Assessment Monitoring sites twice per year.

Table 10. (Element 10) Core site names, site IDs, and number of water samples collected each month.

Site Name	Station Code	Lattitude	Longitude	Zone	Analytical Parameter	# Samples	Sampling SOP	Sample Volume	Containers
Cottonwood Creek @ Rd 20	545XCCART	36.8686	-120.1818	1	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Dry Creek @ Wellsford Rd	535XDCAWR	37.6602	-120.8743	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Duck Slough @ Gurr Rd	535XDSAGR	37.2142	-120.5596	3	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Highline Canal @ Hwy 99	535XHCHNN	37.4153	-120.7557	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Merced River @ Santa Fe	535XMRSFD	37.4271	-120.6721	5	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	37.4422	-121.0024	6	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Field Duplicate Samples	Random				All parameters	1 per event	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Field Blank Samples	Random				All parameters except toxicity	1 per event	Appendices I-IV	8 L (2.1 gallons)	See Table 12
Matrix Spike Samples	Random				Pesticides, nutrients, metals, TOC	1 per event	Appendices I-IV	15.8 L (4.2 gallons)	See Table 12

Table 11. (Element 10) Assessment site names, site IDs, and number of samples collected each month.

Site Name	Station Code	Latitude	Longitude	Zone	Analytical Parameter	# Samples	Sampling SOP	Sample Volume	Containers
Mootz Drain downstream of Langworth Pond	535XMDDLP	37.70551	-120.89438	1	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Rodden Creek @ Rodden Rd	535XRCARD	37.79042	-120.80790	1	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Hatch Drain @ Tuolumne Rd	535XHDATR	37.51490	-121.01220	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Hilmar Drain @ Central Ave	535XHDACA	37.39060	-120.95820	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Lateral 2 1/2 near Keyes Rd	535LTHNKR	37.54780	-121.09274	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Lateral 5 1/2 @ South Blaker Rd	535LFHASB	37.45823	-120.96726	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Lateral 6 and 7 @ Central Ave	535LSSACA	37.39779	-120.95971	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Levee Drain @ Carpenter Rd	535XLDACR	37.47903	-121.03012	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Lower Stevinson @ Faith Home Rd	535LSAFHR	37.37238	-120.92318	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Unnamed Drain @ Hogin Rd	535XUDAHR	37.43129	-120.99380	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Westport Drain @ Vivian Rd	535XWDAVR	37.53680	-121.04860	2	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Highline Canal @ Lombardy Ave	535XHCHNN	37.45560	-120.72070	3	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Mustang Creek @ East Ave	535XMCAEA	37.49180	-120.68390	3	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Bear Creek @ Kibby Rd	535XBCAKR	37.31280	-120.41380	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Black Rascal Creek @ Yosemite Rd	535BRCAYR	37.33210	-120.39470	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Canal Creek @ West Bellevue Rd	535CCAWBR	37.36075	-120.54941	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Howard Lateral @ Hwy 140	535XHLAHO	37.30790	-120.78200	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Livingston Drain @ Robin Ave	535XLDARA	37.31690	-120.74230	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
McCoy Lateral @ Hwy 140	535XMLAHO	37.30945	-120.78759	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Unnamed Drain @ Cemetary Rd	535XUDACR	37.32835	-120.92290	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Unnamed Drain @ Hwy 140	535XUDAHO	37.31370	-120.89110	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Unnamed Drain near Bear Creek @ West Bose Rd	535UNDAWB	37.29159	-120.81410	4	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Deadman Creek @ Gurr Rd	535XDCAGR	37.19360	-120.56120	5	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Deadman Creek @ Hwy 59	535DMCAHF	37.19810	-120.48690	5	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Duck Slough @ Hwy 99	535XDSAHN	37.25010	-120.41000	5	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Miles Creek @ Reilly Rd	535XMCARR	37.25820	-120.47550	5	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Ash Slough @ Ave 21	545XASAAT	37.05450	-120.41580	6	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Berenda Slough along Ave 18 1/2	545XBSAAE	37.01820	-120.32650	6	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Dry Creek @ Rd 18	545XDCARE	36.98180	-120.21950	6	See Table 5	1	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Field Duplicate Samples	Random				All parameters	5% of total #	Appendices I-IV	28 L (7.4 gallons)	See Table 12
Field Blank Samples	Random				All parameters except toxicity	5% of total #	Appendices I-IV	8 L (2.1 gallons)	See Table 12
Matrix Spike Samples	Random				Pesticides, nutrients, metals, TOC	5% of total #	Appendices I-IV	15.8 L (4.2 gallons)	See Table 12

It is the sampler's responsibility to positively locate each sampling site even when the sampler is unfamiliar with the site. To facilitate a positive location latitude/longitude coordinates, photographs and detailed notes are taken when the sites are initially scouted. A description that includes suggested driving directions, local landmarks, the latitude and longitude of the site, and photos for verification is provided to the samplers. Samplers should refer to the MLJ-LLC SOP presented in Appendix VIII. The sample should be collected from the location at the site identified in the description.

If a site becomes inaccessible for any reason, including personal danger due to high water, a failing bank, or aerial pesticide application, it is up to the discretion of the samplers whether a sample can be collected. The samplers may choose to leave and return later to collect samples or if necessary they should notify the QA Officer Melissa Turner. The reason for not sampling a site must be documented in writing on the field sheet and if possible by photo as well; if it is determined that no sample can be collected samplers must notify the project QA Officer Melissa Turner.

Samples are collected according to a defined once-per-month schedule discussed in Element 6.1. After samples are collected the proper holding requirements of each sample, listed in Table 12, are met by employing separate couriers to deliver samples to each laboratory. The sample with the shortest holding time defines the time-frame within which all samples to a given lab are delivered. A general schedule for sampling that begins at time 00:00 is:

- 00:00-14:00 — sampling for all sites scheduled
- 14:00-15:00 — courier delivers samples to APPL
- 15:00-22:00 — samples are transferred to secure facility for overnight storage
- 22:00-23:00 — courier delivers samples to Caltest, 24-hr holding period pathogen tests are initiated
- 23:00-26:00 — samples remain in secure facility for storage
- 26:00-27:00 — courier delivers samples to AQUA-Science, 36 hr holding period toxicity tests are initiated
- 27:00 — samples to NCL packed and shipped via overnight UPS or FedEx

Because the ESJWQC has planned to implement a long term monitoring program, data that are not successfully collected for a specific sample event or site can typically be recollected at a later sampling event. Therefore, no one specific measurement made is deemed critical (e.g., required to achieve project objectives). Each measurement will undergo close scrutiny during the data gathering and review process. The expected number of samples, specific analytical methods and procedures, and defined acceptance criteria for QC samples (as described in other sections of this QAPP) shall be included as part of the data review process.

Steps taken to minimize bias in sample collection and analysis are reviewed in Element 7.5 of this QAPP.

11. SAMPLING METHODS

All samples are collected according to detailed SOPs for collection of samples for trace metals analysis, pathogen analysis, water toxicity analysis, general chemistry analysis, or sediment toxicity analysis found in Appendices I-X to this QAPP. The SOPs contain instructions for collecting samples and cleaning equipment between samples. These methods are summarized below.

All bottles collected from a site are considered a single sample, so all bottles share a common site ID and sample time. All bottles are certified pre-cleaned and, with the exception of the bottle for trace metals analysis, are collected by one sampler who dons clean nitrile gloves, wades to mid-channel if it is safe to do so, uncaps the bottle and fills it approximately 0.1 m below the water surface. For trace metals analysis samples are collected using "clean hand-dirty hand" technique that minimizes sampler induced contamination. This method involves two samplers. One sampler opens the bottle wearing new clean gloves; this sampler touches nothing but the bottle cap with clean gloves. The other sampler fills the bottle wearing gloves which are immersed in native water during the filling process, taking care not to touch the bottle near the open mouth. Trace metals samples are preserved with HNO_3 to less than pH 2 and chilled to $\leq$ 6°C. Toxicity samples are collected in new certified pre-cleaned 1-gallon amber glass bottles which are triple rinsed with native water before being filled with sample water. All other samples for general chemistry analysis are collected into analysis-specific containers, both glass and plastic. Where appropriate bottles are amber or brown to block light and prevent UV decay of analytes. Samples collected in pre-preserved bottles are filled to within 1 cm of the top to avoid preservative loss; all other samples are collected into a bottle with zero headspace.

After each bottle is full the sampler returns it to the bank. Another sampler immediately rinses the outside of the bottle with deionized water and places it into a cooler of ice away from direct sunlight. Field parameters are measured simultaneous to sample collection. After all bottles have been placed on ice, discharge is measured using a Marsh McBirney FloMate 2000. Samples are kept away from sunlight at $\leq$6°C until extraction or analysis. Although all bottles are considered a single sample, to prevent unnecessary contamination of the sample no volumes are homogenized. All are potentially subject to rare minor inter-bottle variations as a result.

Field duplicates and samples for matrix spike analysis are collected by both samplers donning nitrile gloves and filling bottles as simultaneously as possible. Field blanks are collected in an identical bottle to the environmental sample using an identical process, but bottles are filled with DI water and capped. Field QC samples are stored at $\leq$6°C alongside environmental samples until extraction or analysis.

Sediment samples are collected by a sampler wearing clean nitrile gloves using clean and acetone rinsed stainless steel scoops. Sediment from the topmost 2cm of bed substrate is scooped from the bed, some natant liquid is carefully decanted, and the sample is placed into the appropriate containers for toxicity testing, grain size and TOC analyses, and any chemistry that may be necessary in case of toxicity. Containers are rinsed with DI water and stored away from sunlight and chilled to $\leq$6°C. Sediments collected for chemistry analyses must be extracted within 14 days or frozen within 48 hours for future analyses for up to 12 months. Sediments collected for TOC analysis must be frozen within 28; after samples are frozen within that time period, samples must be analyzed within 12 months.

An acceptable water sample will meet the following criteria:

- Water samples in correct container and correct volume
- Water samples free of sampler induced contamination (no touching the inside of cap or open bottle, collected upstream of sampler)
- Water samples without sediments stirred up from water body bed
- Water samples collected below water surface
- Water samples representative of greater sample area (from a segment where water is well mixed)
- Water samples in multiple bottles apparently identical
- Water samples without headspace (unless in an acid-preserved bottle)

- Water samples in acid preserved bottles reduced to pH<2 (no preservative lost)
- Water samples immediately moved to a cooler with ice to prevent target constituent breakdown
- Water samples clearly identifiable with proper/unique sample ID noted on bottle, COC, and field sheet
- Water samples delivered to laboratories with sufficient time for analysis or extraction within hold time
- Water samples collected along with complete field data consisting of ambient environmental notes, water parameters, photo documentation, and latitude and longitude recorded.

An acceptable sediment sample will meet the following criteria:

- Sediment sampled from beneath overlying water or at the minimum moist sediment
- Sediment samples in correct containers and correct volume
- Sediment samples free of sampler induced contamination (no touching the inside of cap or open bottle, samples collected as sampler moves downstream to upstream)
- Sediment samples consisting of top 2 cm of recently deposited silt/clay, not gravel or sand
- Sediment samples representative of greater sample area (from multiple areas around sampling location)
- Sediment samples in multiple bottles apparently identical
- Sediment samples immediately moved to a cooler with ice to prevent target constituent breakdown
- Sediment samples clearly identifiable with proper/unique sample ID noted on bottle, COC, and field sheet
- Sediment samples properly frozen within hold time, if required
- Sediment samples delivered to laboratories with sufficient time for analysis or extraction within hold time and hold temperature
- Sediment samples collected along with complete field data consisting of ambient environmental notes, water parameters, photo documentation, and latitude and longitude.

Any samples that do not meet the above criteria are considered unacceptable and will not be analyzed. Samples collected in multiple bottles are not homogenized by the samplers and are only homogenized by the lab if the method specifically requires it. Samples are unfiltered unless the method specifically requires it.

Any deviation from the written SOP requires notification of the project QA Officer Melissa Turner. All deviation or problems will be noted both on the field sheet and subsequently in the SWAMP comparable database. Corrective action will be determined by the project QA Officer Melissa Turner.

12. SAMPLE HANDLING AND CUSTODY

All sample bottles are labeled with indelible marker clearly stating sample ID (composed of region code, hydrologic unit code and site ID), collection date and time, and collector. Immediately after collection, sample bottle caps are checked for tightness and bottles are placed into padded sleeves (if necessary) and packed in wet ice within an insulated cooler and kept out of direct sunlight. All samples are kept in wet ice to maintain a temperature of $\leq$6°C until delivered into lab custody. Transfer of custody by MLJ-LLC staff is outlined in an SOP located in Appendix V of this QAPP. Samples are delivered to labs or shipped by currier on wet ice within insulated coolers; if the sample is shipped, the COC is placed in a plastic bag taped to the inside of the lid and the ice chest is sealed with tape. A custodian at the receiving laboratory examines the samples for correct documentation and proper preservation while adhering to proper holding times. Method of preservation and duration of holding time varies by target analyte; these details are provided in Table 12 below. Contract laboratories follow sample custody procedures outlined in their QA plans; contract laboratory QA plans are on file with the respective laboratories. It is the responsibility of the personnel of each analytical laboratory to ensure that all applicable regulations are followed in the disposal of samples or related chemicals remaining after successful completion of analyses.

Custody of all samples is documented and traceable from collection time to submittal for analysis on a COC form. A COC form is provided as Figure 2. The COC accompanies the samples at all times. Samples are considered under custody if:

- it is in actual possession;
- it is in view after being in physical possession;
- it is placed in a secure area (accessible by or under the scrutiny of authorized personnel only after in possession).

All transfer of custody will proceed according to the appropriate SOP located in Appendix V of this QAPP.

All samples and accompanying COCs are submitted to analyzing laboratories by the samplers, by private overnight courier, or by overnight common parcel service. Once in the lab's possession it is the responsibility of the analyzing laboratory to maintain custody logs sufficient to track each sample submitted and to analyze or preserve each sample within specified holding times.

Field crews are required to fill out standardized field sheets for each sampling event. A standardized field sheet is provided as Figure 3.

Table 12. (Element 12). Sample handling and custody.

Analytical Parameter	Sample Volume	Containers # size type	Initial Preservation/Holding Requirements	Maximum Holding Time:
Total Dissolved Solids	500 mL	1x 2000 mL Polyethylene	Store at ≤6°C	7 Days
Total Suspended Solids	500 mL			7 Days
Turbidity	150 mL			48 Hours
Soluble Orthophosphate	1 L			
TKN, Ammonia, Total Phosphorus, Nitrate-Nitrite as N	500 mL	1x 500 mL Polyethylene	Preserve to ≤pH 2 with H_2SO_4, store at ≤6°C	28 Days
Metals/Trace Elements, Hardness	500 mL	1x 500 mL Polyethylene	Filter as necessary; preserve to ≤pH 2 with HNO_3, store at ≤6°C	180 Days
E. coli (pathogens)	150 mL	1x 100 mL Polyethylene	Store at 8°C	24 Hours
Fecal coliform (pathogens)	100 mL	1x 100 mL Polyethylene	Store at ≤6°C	24 Hours
Total Organic Carbon	120 mL	3x 40 mL Glass VOA with PTFE-lined cap	Preserve with HCl, store at ≤6°C	28 Days
Carbamates	1 L	4x 1 L Amber Glass	Store at ≤6°C; extract within 7 days	40 Days
Organochlorines	1 L			
Organophosphates	1 L			
Herbicides (general)	1 L			
Herbicides (paraquat dichloride)	1 L	1x 1 L brown Polyethylene	Store at ≤6°C; extract within 7 days	21 days
Herbicides (glyphosate)	80 mL	2x 40 mL Glass VOA	Store at ≤6°C; freeze (-20°C) within 2 weeks	6 Months
Aquatic Toxicity	5 Gallons	5x 1 Gallon Amber Glass	Store at ≤6°C	36 Hours
Sediment Toxicity	2 L	2x 1 L Glass	Store at ≤6°C, do not freeze	14 Days
Sediment Grain Size	250 mL	1x 250 mL Glass	Store at ≤6°C, do not freeze	28 days
Sediment Total Organic Carbon	250 mL	1x 250 mL Glass	Store at ≤6°C (not frozen), analyzed or freeze (-20ºC) within 28 days	28 days (not frozen) or 12 Months (frozen)
Sediment Chemistry	1 L	4x 250 mL Amber Glass	Store at ≤6°C, freeze (-20°C) within 48 hours	12 Months
Sediment Total Solids	250 mL	1x 250 mL Glass	Store at ≤6°C	7 Days

MICHAEL L JOHNSON LLC
ECOSYSTEMS CONSULTING
1490 Drew Ave., Suite 175, Davis, CA 95618
OFFICE: (530) 756-5200 Fax: (530) 756-5225

APPL CHAIN-OF-CUSTODY RECORD

Client Name:	MLJ-LLC
Address:	1490 Drew Ave. Suite 175, Davis, CA 95618
Sampled By:	
Phone:	(530) 756-5200
Fax:	(530) 756-5225
Project Manager:	Michael Johnson
Project Name:	East Joaquin Water Quality Coalition

	Sample Identification	Sample Date	Sample Time	Sample Matrix	Number	Type	Preservative	Carbamate pesticides by EPA 8321 or EPA 632*	Organochlorine pesticides by EPA 8081A or EPA 608*	Organophosphorus pesticides by EPA 8141A or EPA 614*	Herbicides by EPA 615, EPA 8321, EPA 8141A*	Paraquat by EPA 549.1	SAMPLE COMMENTS
1	535XWDAVR-GR			FW	4	1-L Amber Glass	Ice	X	X	X	X		
2					1	1-L Brown Poly	Ice					X	
3	535XHDATR-GR			FW	4	1-L Amber Glass	Ice	X	X	X	X		
4					1	1-L Brown Poly	Ice					X	
5	535XPFDCL-GR			FW	4	1-L Amber Glass	Ice	X	X	X	X		
6					1	1-L Brown Poly	Ice					X	
7	535XHDACA-GR			FW	4	1-L Amber Glass	Ice	X	X	X	X		
8					1	1-L Brown Poly	Ice					X	
9	535XLDARA-GR			FW	4	1-L Amber Glass	Ice	X	X	X	X		
10					1	1-L Brown Poly	Ice					X	
11	535XLDARA-FD			FW	4	1-L Amber Glass	Ice	X	X	X	X		
12					1	1-L Brown Poly	Ice					X	
13	535XLDARA-FB			FW	4	1-L Amber Glass	Ice	X	X	X	X		
14					1	1-L Brown Poly	Ice					X	
15	535XLDARA-MS			FW	3	1-Gal Amber Glass	Ice	X	X	X	X		**MATRIX SPIKE**
16					1	1-L Brown Poly	Ice					X	**MATRIX SPIKE**
17													
18													

Comments:

Please fax signed and completed COC to MLJ LLC:
(530) 756-5225
* See project-specific guidelines for exact analyte list

Temperature at Log In:
(°C)

Relinquished By		Relinquished By	
Signature		Signature	
Print Name		Print Name	
Organization		Organization	
Date	Time	Date	Time
Received By		**Received By**	
Signature		Signature	
Print Name		Print Name	
Organization		Organization	
Date	Time	Date	Time

Matrix codes: SED = sediment, **FW** = freshwater, **WW** = wastewater, **STRMW** = stormwater

Figure 2. Sample COC form

Figure 3. Sample Field Sheet

ESJWQC Field Data Sheet: Water Sampling (EventType = WQ) | Entered in d-base (initial/date) | double checker: | Pg of Pgs

Station Name: Cottonwood Creek @ Road 20

StationID: 545XCCART

Funding: 04ES5001

Group: Irrigation 4 2009

Personnel:

Agency: MLJ-LLC

Protocol: MLJ-LLC FieldSOP 09/17/07

DATE (mm/dd/yyyy):

Arrival Time: | **SAMPLE TIME:** | **Departure Time:**

Purpose (Circle all that apply): WaterChem WaterTox Habitat FieldMeasure | **Purpose Failure:**

OCCUPATION METHOD: Walk-in, Bridge, Other

COLLECTION EQUIPMENT: Indiv bottle by hand, By pole, UCD 3L PTFE, Other

SAMPLE TYPE: Grab, Integrated

SAMPLE LOCATION: Bank, Near Bank, Thalweg, Midchannel, Open Water

HYDRO-MODIFICATION: None, Bridge, Pipes, Concrete Channel, Grade Control, Culvert, Other

HYDROMODLOC: US / DS / NA

STARTING BANK: LB / RB / NA

*GPS/DGPS	Lat (dd.ddddd)	Long (ddd.ddddd)
Target:	36.8686	-120.1818
*Actual:		-
Difference:		
GPS Model:	MLJ-LLC Garmin eTrex	Datum: NAD 83
		Accuracy (ft / m):

Field Observations (Sample Type: Habitat)

PRECIPITATION: None, Foggy, Drizzle, Rain, Snow | **PICTURE NUMBER:**

PRECIPITATION (last 24 hrs): Unknown, <1", >1", None | **PICTURE NAME:**

OBSERVED FLOW: NA, Dry Waterbody Bed, No Observed Flow, Isolated Pool, 0.1 - 1cfs, 1 - 5 cfs, 5 - 20 cfs, 20 - 50 cfs, 50 - 200 cfs, >200cfs

WIND: Calm, Light Breeze, Gusty

WIND DIRECTION (from): circle direction in compass at right → N / W / E / S

WATERCOLOR: Colorless, Green, Yellow, Brown, Other

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

WATER ODOR: None, Sulfides, Sewage, Petroleum, Mixed, Other

WADEABLE: YES / NO

OTHER PRESENCE: Vascular, Nonvascular, OilySheen, Foam, Trash, None, Other

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

SITE ODOR: None, Sulfides, Sewage, Petroleum, Mixed, Other

DOMINANT SUBSTRATE: Concrete, Cobble, Gravel, Sand, Mud, Unk., Other

Field Measurements (SampleType=FieldMeasure; Method=Field)	
Air Temp (Celsius)	
Water Temp (Celsius)	
EC (uS/cm)	
DO (mg/L)	
pH	
TDS	
ORP	
YSI Meter ID	
Midchannel depth (ft / m)	
Wet Channel Width (ft / m)	
Stage	
Calculated Site Discharge	

Samples Taken (# of Containers Filled) Method = Water_Grab | **Field Dup: Yes / No** | Position Water Column: Subsurface (Depth = 0.1 m, Field/Water); Not Applicable (Depth = 2 cm, Sediment)

Samples Collected	Analyte	Container	Number	Notes
545XCCART-GR	Tox tests: Acute FH Minnow & Ceriodaphnia, Chronic Selenastrum	1-Gal Amber Glass	5	
545XCCART-GR	Total Kjeldahl Nitrogen, Total Ammonia, Total Phosphorus (as P)	500 mL Plastic (w/H2SO4)	1	
545XCCART-GR	TOC	40-mL Glass Amber vial, set of 3	1	
545XCCART-GR	Carbamates, OCs, OPs, Herbicides	1-L Amber Glass	4	
545XCCART-GR	Paraquat	1-L Plastic	1	
545XCCART-GR	Metals, Hardness (as CaCO3)	500-mL Plastic (w/HNO3)	1	
545XCCART-GR	Glyphosate	40-mL Glass Amber vial	2	
545XCCART-GR	E. coli	100-mL Polyethylene	1	
545XCCART-GR	Turbidity, TOC, TSS, Nitrate + Nitrite (as N), Soluble Orthophosphate (as P)	2-L Plastic Jug	1	

13. ANALYTICAL METHODS

Field and laboratory analyses will require the equipment listed in Table 17 and Table 18; analytical methods are listed in Table 13 below. In the event of equipment failure, the laboratory QA officer or Project manager should notify the project QA Officer Melissa Turner as soon as possible and appropriate documentation and corrective action can be initiated. This documentation will be appended to the appropriate report from MLJ-LLC to the CVRWQCB. Corrective action must be determined on a case-by-case basis but may include re-extraction, re-analysis, resampling or data rejection if the sample cannot be salvaged. If the failure necessitates a qualifier or flag in the database it is the project QA Officer's responsibility to ensure that the correct qualifier or flag is applied.

A laboratory may store surplus volume for as long as it sees fit for re-extraction if necessary. The laboratory shall dispose of all samples in accordance with state and federal regulations.

Table 13. (Element 13) Field and laboratory analytical methods.

See Table 2 for a description of measurement principles for each analysis. Requirements of field measurements include, but are not limited to clean/calibrated sensors which are not buried in the bed of the river.

Constituent	Matrix	Analyzing Lab	WQTL	RL	MDL	Analytical Method		
						Method	SOP/Appendix	Modified for Method
Physical Parameters								
Flow	Fresh Water	Field Measure	NA[1]	1 cfs	NA	USGS R2Cross streamflow Method	Appendix IV	Yes
pH	Fresh Water	Field Measure	6.5-8.5	0.1 pH units	NA	EPA 150.1	Appendix IX	No
Electrical Conductivity	Fresh Water	Field Measure	700 uS	100 uS	NA	EPA 120.1	Appendix IX	No
Dissolved oxygen	Fresh Water	Field Measure	7 mg/L	0.1 mg/L	NA	SM 4500-O	Appendix IX	No
Temperature	Fresh Water	Field Measure	NA[1]	0.1 °C	NA	SM 2550	Appendix IX	No
Turbidity	Fresh Water	Caltest	variable	0.05 NTU	0.020 NTU	EPA 180.1	SOPW-TURB-rev7, Appendix XXIX	No
Total Dissolved Solids	Fresh Water	Caltest	450 mg/L	10 mg/L	4.0 mg/L	SM2540C	SOP W-TDS-rev8, Appendix XXVI	No
Total Suspended Solids	Fresh Water	Caltest	NA[2]	3 mg/L	2.0 mg/L	SM2540D	SOP B-TSS-rev7, Appendix XXX	No
Hardness	Fresh Water	Caltest	NA[1]	5 mg/L	3.0 mg/L	SM2340C	SOP W-HARD-rev8, Appendix XXII	No
Total Organic Carbon	Fresh Water	Caltest	NA[1]	0.5 mg/L	0.30 mg/L	SM5310B	SOP W-TOC/DOC-rev10, Appendix XXVIII	No
Pathogens								
Escherichia coli	Fresh Water	Caltest	235 MPN/100 mL	1 MPN/100 mL	1.0 MPN/100 mL	SM 9223	SOP B-MMOMUG-REV11, Appendix XXI	No
Toxicity								
Water Column Toxicity	Fresh Water	AQUA-Science	No Toxicity	NA	NA	EPA 821-R-02-012	SOP 6.1A-5/Appendix XV, SOP 6.2A-5/Appendix XVI	No
	Fresh Water	AQUA-Science	No Toxicity	NA	NA	EPA 821-R-02-013	SOP 6.3C-4/ Appendix XVII	No
Sediment Toxicity	Sediment	AQUA-Science	Statistical difference compared to the control and survival <80%	NA	NA	EPA 600/R-99-064	Appendix XVIII	No
Carbamates								
Aldicarb	Fresh Water	APPL Inc	3 µg/L	0.4 µg/L	0.20 µg/L	EPA 8321	SOP HPL8321A/ Appendix XIV	No
Carbaryl	Fresh Water	APPL Inc	2.53 µg/L	0.07 µg/L	0.050 µg/L	EPA 8321	SOP HPL8321A/ Appendix XIV	No
Carbofuran	Fresh Water	APPL Inc	ND	0.07 µg/L	0.050 µg/L	EPA 8321	SOP HPL8321A/ Appendix XIV	No
Methiocarb	Fresh Water	APPL Inc	0.5 µg/L	0.4 µg/L	0.20 µg/L	EPA 8321	SOP HPL8321A/ Appendix XIV	No
Methomyl	Fresh Water	APPL Inc	0.52 µg/L	0.07 µg/L	0.050 µg/L	EPA 8321	SOP HPL8321A/ Appendix XIV	No
Oxamyl	Fresh Water	APPL Inc	50 µg/L	0.4 µg/L	0.20 µg/L	EPA 8321	SOP HPL8321A/ Appendix XIV	No
Organochlorines								
DDD	Fresh Water	APPL Inc	0.00083 µg/L	0.01 µg/L	0.003 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
DDE	Fresh Water	APPL Inc	0.00059 µg/L	0.01 µg/L	0.004 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
DDT	Fresh Water	APPL Inc	0.00059 µg/L	0.01 µg/L	0.007 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Dicofol	Fresh Water	APPL Inc	NA[1]	0.1 µg/L	0.01 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Dieldrin	Fresh Water	APPL Inc	0.00014 µg/L	0.01 µg/L	0.005 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Endrin	Fresh Water	APPL Inc	0.036 µg/L	0.01 µg/L	0.007 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No

Constituent	Matrix	Analyzing Lab	WQTL	RL	MDL	Analytical Method		
						Method	SOP/Appendix	Modified for Method
Methoxychlor	Fresh Water	APPL Inc	0.03 µg/L	0.01 µg/L	0.008 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Organophosphates								
Azinphos-methyl	Fresh Water	APPL Inc	0.01 µg/L	0.1 µg/L	0.02 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Chlorpyrifos	Fresh Water	APPL Inc	0.015 µg/L	0.015 µg/L	0.003 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Diazinon	Fresh Water	APPL Inc	0.1 µg/L	0.02 µg/L	0.004 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Dichlorvos	Fresh Water	APPL Inc	0.085 µg/L	0.1 µg/L	0.02 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Dimethoate	Fresh Water	APPL Inc	1.0 µg/L	0.1 µg/L	0.08 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Demeton-s	Fresh Water	APPL Inc	NA[2]	0.1 µg/L	0.01 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Disulfoton	Fresh Water	APPL Inc	0.05 µg/L	0.05 µg/L	0.02 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Malathion	Fresh Water	APPL Inc	ND	0.1 µg/L	0.05 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Methamidiphos	Fresh Water	APPL Inc	0.35 µg/L	0.2 µg/L	0.08 µg/L	EPA 8321	SOP HPL8321A/ Appendix XIV	No
Methidathion	Fresh Water	APPL Inc	0.7 µg/L	0.1 µg/L	0.04 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Parathion, methyl	Fresh Water	APPL Inc	ND	0.1 µg/L	0.075 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Phorate	Fresh Water	APPL Inc	0.7 µg/L	0.1 µg/L	0.07 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Phosmet	Fresh Water	APPL Inc	140 µg/L	0.2 µg/L	0.06 µg/L	EPA 8141A	SOP ANA8141A/Appendix XIII	No
Herbicides								
Atrazine	Fresh Water	APPL Inc	1.0 µg/L	0.5 µg/L	0.07 µg/L	EPA 619	SOP ANA619/Appendix XI	No
Cyanazine	Fresh Water	APPL Inc	1.0 µg/L	0.5 µg/L	0.09 µg/L	EPA 619	SOP ANA619/Appendix XI	No
Diuron	Fresh Water	APPL Inc	2 µg/L	0.4 µg/L	0.2 µg/L	EPA 8321	SOP HPL8321A/ Appendix XIV	No
Glyphosate	Fresh Water	NCL Ltd	700 µg/L	5 µg/L	2.77 µg/L	EPA 547	SOP ME075v08/Appendix XIX	No
Linuron	Fresh Water	APPL Inc	1.4 µg/L	0.4 µg/L	0.2 µg/L	EPA 8321	SOP HPL8321A/ Appendix XIV	No
Paraquat dichloride	Fresh Water	APPL Inc	3.2 µg/L	0.5 µg/L	0.08 µg/L	EPA 549.1	SOP ME019v10/Appendix XX	No
Simazine	Fresh Water	APPL Inc	4.0 µg/L	0.5 µg/L	0.08 µg/L	EPA 619	SOP ANA619/Appendix XI	No
Trifluralin	Fresh Water	APPL Inc	5 µg/L	0.05 µg/L	0.036 µg/L	EPA 8141	SOP ANA8141A/Appendix XIII	No
Metals								
Arsenic	Fresh Water	Caltest	10 µg/L	0.5 µg/L	0.01 µg/L	EPA 200.8 (ICPMS Collision Cell)	SOP M-2008-3MODErev2, Appendix XXIII	No
Boron	Fresh Water	Caltest	700 µg/L	10 µg/L	0.47 µg/L	EPA 200.8 (ICPMS Collision Cell)	SOP M-2008-3MODErev2, Appendix XXIII	No
Cadmium	Fresh Water	Caltest	Variable[3] (MUN=2.0 µg/L)	0.1 µg/L	0.011 µg/L	EPA 200.8 (ICPMS Collision Cell)	SOP M-2008-3MODErev2, Appendix XXIII	No
Copper	Fresh Water	Caltest	Variable[3] (MUN=170 µg/L)	0.5 µg/L	0.06 µg/L	EPA 200.8 (ICPMS Collision Cell)	SOP M-2008-3MODErev2, Appendix XXIII	No
Lead	Fresh Water	Caltest	Variable[3] (MUN=2.0 µg/L)	0.25 µg/L	0.071 µg/L	EPA 200.8 (ICPMS Collision Cell)	SOP M-2008-3MODErev2, Appendix XXIII	No
Molybdenum	Fresh Water	Caltest	10 µg/L	0.25 µg/L	0.016 µg/L	EPA 200.8 (ICPMS Collision Cell)	SOP M-2008-3MODErev2, Appendix XXIII	No
Nickel	Fresh Water	Caltest	Variable[3] (MUN=12 µg/L)	0.5 µg/L	0.01 µg/L	EPA 200.8 (ICPMS Collision Cell)	SOP M-2008-3MODErev2, Appendix XXIII	No
Selenium	Fresh Water	Caltest	50 µg/L (5 µg/L 4 day average)	1 µg/L	0.06 µg/L	EPA 200.8 (ICPMS Reaction Cell)	SOP M-2008-3MODErev2, Appendix XXIII	No

Constituent	Matrix	Analyzing Lab	WQTL	RL	MDL	Analytical Method		
						Method	SOP/Appendix	Modified for Method
Zinc	Fresh Water	Caltest	Variable[3.] (MUN=5000 µg/L)	1 µg/L	0.8 µg/L	EPA 200.8 (ICPMS Collision Cell)	SOP M-2008-3MODErev2, Appendix XXIII	No
Nutrients								
Total Kjeldahl Nitrogen	Fresh Water	Caltest	NA[1]	0.1 mg/L	0.07 mg/L	SM4500NH3 C	SOP W-NH3-TKN-rev10, Appendix XXVII	No
Nitrate (as N)+ Nitrite (as N)	Fresh Water	Caltest	10,000 µg/L	0.05 mg/L	0.05 mg/L	EPA 353.2	SOP W-NNO3-rev2, Appendix XXIV	No
Total Ammonia	Fresh Water	Caltest	1.5 mg/L or variable[4]	0.1 mg/L	0.060 mg/L	SM4500NH3 C	SOP W-NH3-TKN-rev10, Appendix XXVII	No
Total Phosphorus	Fresh Water	Caltest	NA[1]	0.01 mg/L	0.040 mg/L	SM4500P E	SOP W-PHOS-rev8, Appendix XXV	No
Soluble Orthophosphate	Fresh Water	Caltest	NA[1]	0.01 mg/L	0.010 mg/L	SM4500P E	SOP W-PHOS-rev8, Appendix XXV	No
Sediment								
Bifenthrin	Sediment	Caltest	NA[5]	0.33 µg/kg	0.1 µg/kg	GCMS-NCI-SIM	SOP O-Pyrethroidsncirev1, APPENDIX XXXII	No
Cyfluthrin	Sediment	Caltest	NA[5]	0.33 µg/kg	0.11 µg/kg	GCMS-NCI-SIM	SOP O-Pyrethroidsncirev1, APPENDIX XXXII	No
Cypermethrin	Sediment	Caltest	NA[5]	0.33 µg/kg	0.1 µg/kg	GCMS-NCI-SIM	SOP O-Pyrethroidsncirev1, APPENDIX XXXII	No
Deltamethrin: Tralomethrin	Sediment	Caltest	NA[5]	0.33 µg/kg	0.12 µg/kg	GCMS-NCI-SIM	SOP O-Pyrethroidsncirev1, APPENDIX XXXII	No
Esfenvalerate	Sediment	Caltest	NA[5]	0.33 µg/kg	0.13 µg/kg	GCMS-NCI-SIM	SOP O-Pyrethroidsncirev1, APPENDIX XXXII	No
Lambda-Cyhalothrin	Sediment	Caltest	NA[5]	0.33 µg/kg	0.06 µg/kg	GCMS-NCI-SIM	SOP O-Pyrethroidsncirev1, APPENDIX XXXII	No
Permethrin	Sediment	Caltest	NA[5]	0.33 µg/kg	0.11 µg/kg	GCMS-NCI-SIM	SOP O-Pyrethroidsncirev1, APPENDIX XXXII	No
Fenpropathrin	Sediment	Caltest	NA[5]	0.33 µg/kg	0.07 µg/kg	GCMS-NCI-SIM	SOP O-Pyrethroidsncirev1, APPENDIX XXXII	No
Chlorpyrifos	Sediment	Caltest	NA[5]	0.33 µg/kg	0.12 µg/kg	GCMS-NCI-SIM	SOP O-Pyrethroidsncirev1, APPENDIX XXXII	No
Total Solids	Sediment	Caltest	NA	0.1%	0.1%	SM2540B	SOP W-RESIDUE-rev7, APPENDIX XXXI	No
Total Organic Carbon	Sediment	Caltest[6]	NA[1]	200 mg/kg	100 mg/kg	Walkley Black	PTS SOP #4, Appendix XXXIV	No
Grain Size	Sediment	Caltest[6]	NA[1]	1% sand, silt, clay, gravel	0.4 µm	ASTM D-422-63, ASTM D4464M-85	PTS SOP #3, Appendix XXXIII	No

[1] Not available until completion of evaluation studies or no Water Quality Trigger Limit applicable.
[2]Currently these constituents do not have a WQTL designated by the Regional Board however this may change in the future.
[3] Variable WQTLs based on hardness. Municipal and domestic supply WQTLs in parenthesis are regardless of hardness.
[4] Variable WQTLs based on pH and temperature. Municipal and domestic supply WQTLs in parenthesis are regardless of pH and temperature.
[5] Sediment chemistry result reported if positive sediment toxicity is measured.
[6] Subcontracted to PTS Laboratories.

Table 14. (Element 13). Laboratory analytical methods of constituents monitored for CWA 303(d) compliance.

Constituent	Matrix	Analyzing Lab	WQTL	RL	MDL	Analytical Method		
						Method	SOP/Appendix	Modified for Method
Aldrin	Fresh Water	APPL Inc	0.00013 µg/L[1] 3 µg/L[2]	0.01 µg/L	0.009 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Chlordane	Fresh Water	APPL Inc	0.00057 µg/L[1] 0.0043 µg/L[2]	0.01 µg/L	0.007 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Heptachlor	Fresh Water	APPL Inc	0.00021 µg/L[1] 0.0038 µg/L[2]	0.01 µg/L	0.008 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Heptachlor epoxide	Fresh Water	APPL Inc	0.0001 µg/L[1] 0.0038 µg/L[2]	0.01 µg/L	0.007 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Hexachlorocyclohexane (alpha-BHC)	Fresh Water	APPL Inc	0.0039 µg/L[1,3] 0.95 µg/L[2,3]	0.01 µg/L	0.005 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Hexachlorocyclohexane (beta-BHC)	Fresh Water	APPL Inc	0.0039 µg/L[1,3] 0.95 µg/L[2,3]	0.01 µg/L	0.008 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Hexachlorocyclohexane (gamma-BHC; Lindane)	Fresh Water	APPL Inc	0.0039 µg/L[1,3] 0.95 µg/L[2,3]	0.01 µg/L	0.005 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Hexachlorocyclohexane (delta-BHC)	Fresh Water	APPL Inc	0.0039 µg/L[1,3] 0.95 µg/L[2,3]	0.01 µg/L	0.005 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Endosulfan I	Fresh Water	APPL Inc	110 µg/L[1,4] 0.056 µg/L[2,4]	0.01 µg/L	0.005 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Endosulfan II	Fresh Water	APPL Inc	110 µg/L[1,4] 0.056 µg/L[2,4]	0.01 µg/L	0.004 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No
Toxaphene	Fresh Water	APPL Inc	0.00073 µg/L[1] 0.0002 µg/L[2]	0.5 µg/L	0.380 µg/L	EPA 8081A	SOP ANA8081A/Appendix XII	No

[1] Municipal and domestic supply
[2] Cold freshwater habitat, spawning
[3] WQTL is total Hexachlorocyclohexane
[4] WQTL is total Endosulfan

14. QUALITY CONTROL

This project will comply with all current SWAMP QC guidelines to maintain comparability of data quality throughout the ILRP SWAMP Comparable database. Field QC frequencies are calculated to ensure that a minimum of 5% all analyses are for QC purposes. All analytical QCs must be analyzed at a frequency of 5% and 1 per batch. QC activities for this project are listed in the tables below.

Table 15. (Element 14) Field Sampling QC.

Sample Type	Frequency	Acceptable Limits	Corrective Action	Sampling SOP	Analytical SOP & Method
Water Column Toxicity					
Field Duplicate	5% annual total, minimum 5% per event	RPD ≤25%	Determine cause, take appropriate corrective action.	Appendix I	Appendix XV; EPA821-R02-12
Organic and Inorganic Chemistry Parameters					
Field Blank	5% annual total	Detectable substance contamination <RL or < sample/5	Determine cause of problem, remove sources of contamination.	Appendix II	See Table 16
Field Duplicate	5% annual total	RPD ≤25%	Determine cause, take appropriate corrective action.		
Sediment Toxicity					
Field Duplicate	5% annual total, minimum 5% per event	RPD ≤25%	Determine cause, take appropriate corrective action.	Appendix IV	Appendix XVIII, EPA 600/R-99-064
Sediment Chemistry					
Field Blank	5% annual total	Detectable substance contamination <MDL	Determine cause of problem, remove sources of contamination.	Appendix IV	Appendix XXXII; GCMS-NCI-SIM
Field Duplicate	5% annual total	RPD ≤25%	Determine cause, take appropriate corrective action.		
Sediment TOC					
Field Duplicate	5% annual total	RSD ≤20%	Determine cause, take appropriate corrective action.	Appendix IV	Appendix XXXIV; Walkley Black Method
Sediment Grain Size					
Field Duplicate	5% annual total	RSD ≤20%	Determine cause, take appropriate corrective action.	Appendix IV	Appendix XXXIII; ASTM D422-63

Table 16. (Element 14) Analytical QC.

Sample Type	Frequency	Acceptable Limits	Corrective Action	Sampling SOP	Analytical SOP & Method
Water Column Toxicity					
Lab Control Sample, *Ceriodaphnia dubia*	1 per 20 samples, minimum 1 per batch	Survival in control samples ≥90%; all performance criteria outlined in SOP are met.	Determine cause, take appropriate corrective action. Reanalyze all suspect samples.	Appendix I	Appendix XV; EPA821-R02-12
Lab Control Sample, *Pimephales promelas*	1 per 20 samples, minimum 1 per batch	Survival in control samples ≥80%, all performance criteria outlined in SOP are met.	Determine cause, take appropriate corrective action. Reanalyze all suspect samples.		
Lab Control Sample, *Selenastrum capricornutum*	1 per 20 samples, minimum 1 per batch	> 200,000 cells/mL, variability of controls <20%, all performance criteria outlines in SOP are met.	Determine cause, take appropriate corrective action. Reanalyze all suspect samples.	Appendix I	Appendix XVII; EPA821-R02-13
Organic Parameters: Organophosphates, Organochlorines, Carbamates, and Additional Herbicides					
Lab Blanks (method, reagent, instrument)	1 per 20 samples, minimum 1 per batch	Detectable substance contamination <RL	Determine cause of problem, remove sources of contamination, reanalyze suspect samples or flag all suspect data.	Appendix II	Appendices XI-XIV, XIX, XX; ANA 619, EPA 8081A, EPA 8141A, EPA 8321A, EPA 547, EPA 549.2
Lab Duplicate*	1 per 20 samples, minimum 1 per batch	RPD ≤25%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Matrix Spike*	1 per 20 samples, minimum 1 per batch	% Recovery =50-150% or control limits based on 3x the standard deviation of the labs actual method recoveries	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data. Zero percent recovery requires rejection of all suspect data.		
Matrix Spike Duplicate*	1 per 20 samples, minimum 1 per batch	RPD ≤25%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Lab Control Spike, CRM, or SRM	1 per 20 samples, minimum 1 per batch	Measured value <95% confidence intervals, if certified. Otherwise % recovery =50-150%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Surrogates	In every calibration standard, sample, and blank analyzed for organics by GC or isotope dilution GC-MS; added to samples prior to extraction	Based on 3x the standard deviation of the lab's actual method recoveries	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Inorganic Parameters: Nutrients, Metals, Total Organic Carbon					

Sample Type	Frequency	Acceptable Limits	Corrective Action	Sampling SOP	Analytical SOP & Method
Lab Blanks (method, reagent, instrument)	1 per 20 samples, minimum 1 per batch	Detectable substance contamination <RL	Determine cause of problem, remove sources of contamination, reanalyze suspect samples or flag all suspect data.	Appendix II, Appendix III	Appendices XXVII, XXIII, XXVIII; EPA 353.2, EPA 200.8, EPA 415.1
Lab Duplicate*	1 per 20 samples, minimum 1 per batch	RPD ≤25%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Matrix Spike*	1 per 20 samples, minimum 1 per batch	% Recovery =75-125%	If SRMs are in control then proceed. If not, determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Matrix Spike Duplicate*	1 per 20 samples, minimum 1 per batch	RPD ≤25%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Lab Control Spike, CRM, or SRM	1 per 20 samples, minimum 1 per batch	% Recovery =75-125%	Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Internal Standards	EPA 200.8 - Must be present on all samples. Standards and blanks at identical levels	EPA 200.8 – Absolute response of any one internal standard must not deviate outside of 70-125% of the original response in the calibration blank	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Inorganic Parameters: Turbidity, Total Dissolved Solids, Total Suspended Solids					
Lab Blanks (method, reagent, instrument)	1 per 20 samples, minimum 1 per batch	Detectable substance contamination <RL	Determine cause of problem, remove sources of contamination, reanalyze suspect samples or flag all suspect data.	Appendix II	Appendices XXVI , XXIX, XXX; SM 2540C/EPA 160.1, EPA 180.1/SM 2130B, EPA 160.2/SM 2540D
Lab Duplicate*	1 per 20 samples, minimum 1 per batch	RPD ≤25%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Lab Control Spike, CRM, or SRM	1 per 20 samples, minimum 1 per batch	Measured value <95% confidence intervals, if certified. Otherwise % recovery =80-120%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Pathogens					

Sample Type	Frequency	Acceptable Limits	Corrective Action	Sampling SOP	Analytical SOP & Method
Lab Blanks (method)	1 per 20 samples, minimum 1 per batch	Detectable substance contamination <RL	Identify contamination source. Clean equipment and prepare new media, check reagents, reanalyze samples.	Appendix II	Appendix XXI; SM 9223
Lab Negative Control	1 per culture medium or reagent lot	Detectable substance contamination <RL	Identify contamination source. Clean equipment and prepare new media, reanalyze samples.		
Lab Positive Control	1 per culture medium or reagent lot	Detectable substance contamination <RL	Identify and correct problem. Re-examine positive control.		
Lab Duplicates	1 per 10 samples, minimum 1 per batch	$R_{log} \leq 3.27$ x mean R_{log}	Recalibrate and reanalyze.		
Sediment Toxicity					
Lab Control Sample, *Hyalella azteca*	1 per 20 samples, minimum 1 per batch	Survival in control samples ≥80%; measurable growth in the controls, all performance criteria outlined in SOP are met.	Determine cause, take appropriate corrective action. Reanalyze all suspect samples.	Appendix IV	Appendix XVIII, EPA 600/R-99-064
Sediment Organics					
Lab Blanks (method, reagent, instrument)	1 per 20 samples, minimum 1 per batch	Detectable substance contamination <MDL	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.	Appendix IV	Appendix XXXII; GCMS-NCI-SIM
Lab Duplicate*	1 per 20 samples, minimum 1 per batch	RPD ≤25%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Matrix Spike*	1 per 20 samples, minimum 1 per batch	% Recovery =50-150% or control limits based on 3x the standard deviation of the labs actual method recoveries	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data. Zero percent recovery requires rejection of all suspect data.		
Matrix Spike Duplicate*	1 per 20 samples, minimum 1 per batch	RPD ≤25%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Lab Control Spike, CRM, or SRM	1 per 20 samples, minimum 1 per batch	Measured value 70-130% of the 95% confidence intervals, if certified. Otherwise %Recovery =50-150%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		

Sample Type	Frequency	Acceptable Limits	Corrective Action	Sampling SOP	Analytical SOP & Method
Surrogates	In every calibration standard, sample, and blank analyzed for organics by GC or isotope dilution GC-MS; added to samples prior to extraction	Determined by Lab Manager	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Internal Standards	According to frequency in lab SOP	Linear regression, r>0.995	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.		
Sediment TOC					
Lab Blanks (method, reagent, instrument)	1 per 20 samples, minimum 1 per batch	Detectable substance contamination <MDL or <30% of lowest sample	Identify and eliminate contamination source. Reanalyze all samples in batch. Qualify data as needed.	Appendix IV	Appendix XXXIV; Walkley Black Method
Lab Control Spike, CRM, or SRM	1 per 15 samples,	Within 95% confidence interval of the certified value; if not certified within 20-25% consensus value	Review raw data quantification reports. Check instrument response using calibration standard. Recalibrate and reanalyze CRM and samples. Repeat until control limits are met.		
Lab Duplicates	1 per 20 samples, minimum 1 per batch	RSD ≤20%	Check calculations and instruments. Recalibrate and reanalyze. If problem persists, then identify and eliminate source of imprecision and reanalyze.		
Sediment Grain Size					
Lab Duplicates	1 per 12 samples,	RSD ≤20%	Check calculations and instruments. Recalibrate and reanalyze. If problem persists, then identify and eliminate source of imprecision and reanalyze.	Appendix IV	Appendix XXXIII; ASTM D422-63

*For the purposes of this project it is acceptable for the matrix spike duplicate or the laboratory control duplicate to stand in for the lab duplicate as a measure of the precision of the analytical method.

When control limits are exceeded the lab QA officer and Project QA Officer must agree on a potential cause and develop a response that ensures it will not happen again. Detections in blanks must be sourced and field, analytical, or cleaning practices must be modified to reduce the risk of further contamination. Excessive RPD values or recovery rates outside of criteria may also require a change of field or laboratory practices. Exceedances of analytical control limits must be reported in the appropriate lab report. Precision in this project is assessed through a combination of field duplicate samples and laboratory duplicate samples. Precision of a pair of samples is measured as the relative percent difference (RPD) between a sample and its duplicate—a laboratory control sample (LCS) and its duplicate (LCSD), a matrix spike (MS) and matrix spike duplicate (MSD), an environmental sample (E) and field duplicate (FD), or an environmental sample and its associated lab duplicate. It is calculated as follows:

$$RPD(\%) = \left| \frac{2(V_i - V_D)}{V_i + V_D} \right| x\ 100$$

V_i = The measured concentration of the initial sample
V_D = The measured concentration of the sample duplicate

This same calculation is done for field duplicates and the associated environmental sample.

For precision assessment purposes any lab duplicate, including a matrix spike duplicate or a lab control spike duplicate, may function as the lab duplicate in any batch.

For sediment grain size samples, individual grain size classes are reported as a percentage based on the composition of the entire sample and therefore are not values that can be evaluated individually (they are not independent variables). Precision for sediment grain size is evaluated by the relative percent difference between grain size standard deviations of the environmental sample and the duplicate. The grain size standard deviation (SD) for all classes of a single sample is calculated using the following Folk and Ward 1957 Logarithmic equation:

$$SD = \sigma_1 = \frac{\Phi_{84} - \Phi_{16}}{4} + \frac{\Phi_{95} - \Phi_5}{6.6}$$

Where Φ_{84} = phi value of the 84th percentile sediment grain size category
Φ_{16} = phi value of the 16th percentile sediment grain size category
Φ_{95} = phi value of the 95th percentile sediment grain size category
Φ_5 = phi value of the 5th percentile sediment grain size category

Precision is calculated based on the relative percent difference between the standard deviation of the environmental sample and the standard deviation of a duplicate sample using the following formula:

$$RPD_{SD} = \left| \frac{2(SD_i - SD_D)}{(SD_i + SD_D)} \right| 100$$

SD_i= standard deviation of the initial or environmental sample based on the Folk and War Logarithmic equation
SD_D= standard deviation of the field or laboratory duplicate sample based on the Folk and War Logarithmic equation

Accuracy in this project is assessed using either an LCS or MS. For an LCS lab water is spiked with a known concentration of a target analyte and the percent recovery (PR) is reported. PR in an LCS is calculated as follows:

$$\%\ Recovery = \left(\frac{V_{LCS}}{V_{Spike}} \right) x\ 100$$

V_{LCS} = The measured concentration of the spiked control sample

V_{Spike} = The expected spike concentration

A MS can also be used to assess accuracy. For a MS, environmental water is spiked with a known concentration of a target analyte and the PR is reported. PR in and MS is calculated as follows:

$$\%\ Recovery = \left(\frac{V_{MS} - V_{E}}{V_{Spike}} \right) x\ 100$$

V_{MS} = The measured concentration of the spiked matrix sample
V_{Spike} = The concentration of the spike added
V_{E} = The measured concentration of the original (unspiked) matrix sample

The MS should not be used solely to assess accuracy due the likelihood of matrix interference however if an LCS does not fall within acceptance criteria an MS may be used to validate a batch if the MS is within acceptance criteria. Some constituents are difficult to spike (e.g. turbidity) and therefore a laboratory may chose to analyze a certified reference material (CRM). A CRM analysis may be used in place of an LCS analysis.

If results for any precision or accuracy samples do not meet the data quality objectives provided in this QAPP, the laboratory must implement corrective measures as outlined in Table 16. If corrective measures require reanalysis of the sample, and the results repeatedly fail to meet the objectives, then the lab is obligated to halt the analysis of samples, identify the source of the imprecision, and make corrections where appropriate before proceeding. If results for any field duplicates and associated environmental samples do not meet the data quality objectives listed in the above tables then the samplers must assess sampling practices and make corrections to their field procedures which will ensure homogeneity in the samples before proceeding.

15. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Laboratory equipment is maintained by a qualified technician at the frequency listed in Table 17. MLJ-LLC field meters are maintained according to the owner's manual specifications at the frequency listed in Table 18. Laboratories are responsible for maintaining all laboratory equipment according to manufacturer specifications or SWAMP requirements, whichever are more stringent. Frequency and procedures for maintenance of analytical equipment used by each laboratory are documented in the Quality Assurance Manual for each laboratory, which is available from the laboratory on request. Laboratories are responsible for testing, inspecting, and maintaining all analytical equipment. In the event of equipment failure, the source of the failure must be identified and rectified, the equipment must be recalibrated, and any samples analyzed outside of calibration limits must be reanalyzed.

Table 17. (Element 15) Testing, inspection, maintenance of field and analytical instruments.

Due to the complexity and sensitivity of most laboratory instruments the testing, inspection, and maintenance procedures are difficult to summarize. A brief and general summary for each instrument follows; however, this table is not intended to describe all testing, inspection, and maintenance procedures for all tests, nor will this QAPP attempt to report SOPs for all such procedures. It is expected that laboratories will employ knowledgeable staff capable of testing, inspecting, and maintaining analytical instruments to ensure a level of data quality that matches or exceeds that demanded in this QAPP.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Responsible Person	Frequency	SOP Reference
YSI 556MPS with Glass Electrode pH	Clean glass bulb and visually inspect	F. Wulff	<24 hours before sampling	Appendix IX
YSI 556MPS with Steady State Polarographic DO Sensor	Change membrane and KCl solution	F. Wulff	Every 30 days	Appendix IX
YSI 556MPS with Electrode Cell EC and Thermistor Temperature Probe	Clean electrodes	F. Wulff	<24 hours before sampling	Appendix IX
Tecator auto analyzer (Model 2400)	Clean manifold	Sonya Babcock	According to manufacturers specifications	Retained in laboratory
Turbidimeter	Periodic meter zero, calibration in each range	Sonya Babcock	When switching ranges	W-TURB-rev4 Appendix XXXI
ICP-MS	Check and replace water filter, replace pump gaskets, check source filament, check multiplier gain, clean ion source, replace lamp	Sonya Babcock	According to manufacturers specifications	Retained in laboratory
Shimadzu TOC-Vcsh Analyzer Shimadzu 68 place auto analyzer Model ASI-V	Change: catalyst, sample pump tubing, permcation tube, halide scrubber, acid reagent bottle,rinse bottle, humidifier water	Sonya Babcock	According to manufacturers specifications	W-TOC/DOC-rev9 Appendix XXX

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Responsible Person	Frequency	SOP Reference
Ion Chromatograph (DX 320)	Inspect pump and injector seals for leaks, inspect tubing for clogs, inspect or replace precolumn filter, inspect detector for leaks and air bubbles, replace old lamps	Sonya Babcock	According to manufacturers specifications	Retained in laboratory
Spectrophotometer	Check/replace lamp	Sonya Babcock	According to manufacturers specifications	Retained in laboratory
Hewlett Packard 1090L HPLC; Agilent 100 Liquid Chromatograph	Inspect pump and injector seals for leaks, inspect tubing for clogs, inspect or replace precolumn filter, inspect detector for leaks and air bubbles, replace old lamps	Leonard Fong	According to manufacturers specifications	Retained in laboratory
Finnigan LCQ Ion Trap Mass Spectrometer; Agilent 1100 G1946D SL Mass Spectrometer	Check and replace water filter, replace pump gaskets, check source filament, check multiplier gain, clean ion source, replace lamp	Leonard Fong	According to manufacturers specifications	Retained in laboratory
Hewlett Packard 6890 Gas Chromatograph, Agilent Technologies 6890 Gas Chromatograph, Hewlett Packard 5890 Gas Chromatograph	Check and clean detector and injector, check syringe and column for integrity and installation, rinse column with solvent, check column for leaks,	Leonard Fong	According to manufacturers specifications	Retained in laboratory
Perkin Elmer Series 200 Pump, post column pump, and Perkin Elmer LC 240 Fluorescence Detector	Inspect pump and injector seals for leaks, inspect tubing for clogs, inspect or replace precolumn filter, inspect detector for leaks and air bubbles, replace old lamps	Theresa Sherman	Every analytical analysis	Retained in laboratory

16. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

MLJ-LLC field meters are calibrated according to the owner's manual specifications at the frequency listed in Table 18. Laboratories are responsible for calibrating all laboratory equipment according to manufacturer specifications or SWAMP requirements, whichever are more stringent. Frequency and procedures for calibration of analytical equipment used by each laboratory are documented in the Quality Assurance Manual for each laboratory, which is available from the laboratory on request. All equipment capable of being calibrated must be successfully calibrated before analysis. If calibration fails, all affected samples must be re-analyzed or the data flagged and the equipment must be repaired before further analysis.

Table 18. (Element 16) Calibration of field and analytical equipment.

Equipment / Instrument	SOP Reference	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
YSI 556MPS with Glass Electrode pH	Appendix IX	3 Point calibration at pH 4, 7, and 10; calibration must be accepted by YSI meter	<24 hours before sampling	F. Wulff
YSI 556MPS with Steady State Polarographic DO Sensor	Appendix IX	H_20 Saturated air calibration ($\%O_2$) at default 760mm Hg	Before every measurement	F. Wulff
YSI 556MPS with Electrode Cell EC and Thermistor Temperature Probe	Appendix IX	Calibration to 1413 µS/cm; calibration must be accepted by YSI meter. Temperature calibration is factory set and does not require user calibration	<24 hours before sampling	F. Wulff
Tecator auto analyzer (Model 2400)	W-TKN-rev9 Appendix XXIX	For TKN calibrate with TKN digestion tablet. For NH_3 standardize with 100mL sample with 5mL borate buffer all adjusted to pH 9.5 with NaOH	Every analytical analysis	Sonya Babcock
Turbidimeter	W-TURB-rev6 Appendix XXXI	Periodic meter zero, calibration in each range	When switching ranges	Sonya Babcock
ICP-MS	M-200.8-rev5E Appendix XXIV	Three calibration standards per linear range, MDL determination, ICV, CCV	When analyst observes calibration is necessary, MDL determined annually, ICV immediately after calibration, CCV after every 10 samples and at end of sample run	Sonya Babcock
Shimadzu TOC-Vcsh Analyzer Shimadzu 68 place auto analyzer Model ASI-V	W-TOC/DOC-rev9 Appendix XXX	a. 2 calibration curves: curve 10 – 6 points, curve 200 – 5 points. $r^2 = 0.995$ b. Analyze blank & LCS, ICV for every 20 samples, CCV, spike and spike duplicate, every 10 samples	a. Every month b. Every 20 or 10 samples respectively	Sonya Babcock
Ion Chromatograph (DX 320)	W-DIONEXrev5 Appendix XXVI	Mixed-standard curve calibration	Every analytical analysis	Sonya Babcock

Equipment / Instrument	SOP Reference	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
Spectrophotometer	W-NO2-rev5 Appendix XXV	Four standard calibration curve, reagent blank, QC blanks, spikes, control samples, and duplicates	Every batch of every analytical analysis	Sonya Babcock
Hewlett Packard 1090L HPLC	HPL8321A Appendix XIV	Calibration with minimum of five stock standard concentrations	Every analytical sequence	Leonard Fong
Agilent 100 Liquid Chromatograph	HPL8321A Appendix XIV	Calibration with minimum of five stock standard concentrations. Calibration check after every 20 samples.	Every analytical sequence	Leonard Fong
Finnigan LCQ Ion Trap Mass Spectrometer	HPL8321A Appendix XIV	Calibration with minimum of five stock standard concentrations. Calibration check after every 20 samples.	Every analytical sequence	Leonard Fong
Agilent 1100 G1946D SL Mass Spectrometer	HPL8321A Appendix XIV	Calibration with minimum of five stock standard concentrations. Calibration check after every 20 samples.	Every analytical sequence	Leonard Fong
Hewlett Packard 6890 Gas Chromatograph, Agilent Technologies 6890 Gas Chromatograph	ANA8081A ANA8141B Appendix XII Appendix XIII	Calibration with minimum of five stock standard concentrations. Calibration check after every 20 samples.	Every analytical sequence	Leonard Fong
Hewlett Packard 5890 Gas Chromatograph, Hewlett Packard 6890 Gas Chromatograph	ANA619 Appendix XI	Three point calibration. Calibration verification check standard analyzed after every 20 samples	Every analytical sequence	Leonard Fong
Perkin Elmer Series 200 Pump, post column pump, and Perkin Elmer LC 240 Fluorescence Detector	NCL ME 075 Appendix XIX	Five calibration standard levels. Calibration verification check standard analyzed after every 20 samples	Every analytical analysis	Theresa Sherman

17. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

MLJ-LLC project consumables are listed in Table 19. Consumables are rejected for use if obvious signs of contamination or tampering exist. Calibrating standard solution acceptance records are maintained alongside calibration records. Bottle integrity records are maintained alongside receiving records. All records are available upon request at the MLJ-LLC office. All laboratories are responsible for inspecting and testing all consumables against a laboratory-specific acceptance criteria and maintaining adequate records.

Table 19. (Element 17) Inspection/acceptance testing requirements for consumables and supplies.

Project-Related Supplies (source)	Inspection / Testing Specifications	Acceptance Criteria	Frequency	Responsible Individual
pH standard calibrating solutions (Fisher Scientific)	Solution bottles are inspected to verify factory seal; initial measurements are compared to prior standard measurement	Manufacturer's seal intact, measurements within ±0.2	Upon opening a fresh standard solution	F. Wulff
EC standard calibrating solutions (Fisher Scientific)	Solution bottles are inspected to verify factory seal; initial measurements are compared to prior standard measurement	Manufacturer's seal intact, measurements within ±0.5% or 1µS/cm	Upon opening a fresh standard solution	F. Wulff
Certified pre-cleaned glass bottles for toxicity (I-Chem/Fisher Scientific)	Carton custody seal is inspected	Carton custody seal intact	At receipt date of shipment	F. Wulff
Certified pre-cleaned bottles (from laboratory)	Individual bottles are inspected for physical integrity	Bottles and caps intact	At receipt date of shipment	F. Wulff
Pre-preserved containers (from laboratory)	Preservative volume is visually verified, individual bottles are inspected for physical integrity	Proper preservative volume present, bottles and caps intact	At receipt date of shipment	F. Wulff
Deionized water	Analysis for target constituent contamination	Detectable substance contamination < RL	Once annually	M. Turner
Nitrile Gloves (Fisher Scientific)	Carton seal is visually inspected for damage or tampering	Carton is intact and gloves within are clean and intact	At receipt date of shipment	F. Wulff

18. NON-DIRECT MEASUREMENTS (EXISTING DATA)

It may also be necessary to use preexisting data residing in the ILRP SWAMP Comparable Database housed at the Central Valley Regional Data Center (RDC), to which MLJ-LLC has access. Since this database receives data from a number of sources including MLJ-LLC, it is possible that relevant data may be produced by another project working within the Coalition region. It is assumed that all data within this database has passed SWAMP Comparability QA/QC requirements; however, all third party data considered for use will be reviewed against the data quality objectives stated in Element 7 and only those data meeting all criteria will be used in this project. Third party data may be used to extend the monitoring history of specific locations or more completely characterize zones within the Coalition region.

19. DATA MANAGEMENT

As established in Element 9 above, MLJ-LLC will maintain an inventory of data and will periodically check the inventory against the records in their possession.

All field data is entered into the ILRP SWAMP comparable database after being reviewed and qualified. All data transcribed or transformed, electronically and otherwise, is double checked for accuracy by MLJ-LLC staff and records of this double-checking are maintained at the MLJ-LLC office. After entry into the database, field sheets are scanned and an electronic copy is filed on the MLJ-LLC server. An additional hard copy is printed and archived in the MLJ-LLC office in a separate location from the original. All completed COCs are archived in the same manner.

Transfer of data from laboratories to MLJ-LLC is accomplished by a combination of overnight mail, hand delivery, and electronic submittal. Lab reports are received as electronic PDFs and in SWAMP comparable EDD format, both of which are filed on the MLJ-LLC server and simultaneously copied to CD-ROM format. Hard copies of the reports are filed in the MLJ-LLC office. EDDs are uploaded according to the procedures outlined in Appendices XXXV, XXXVI, and XXXVII.

All data residing on the MLJ-LLC server is automatically backed up onto magnetic tape media. Complete backup takes place once per week, with incremental backups every night. Digital tape backups are kept for seven days before being completely written over by the next complete backup. MLJ-LLC adds data to a replica of the ILRP SWAMP Comparable Microsoft Access database housed at the Central Valley Regional Data Center; the MLJ-LLC replica is periodically synchronized with the Design Master. The Design Master is automatically backed up to magnetic tape according to the same schedule as the MLJ-LLC server. The MLJ-LLC Database Management Team (DMT), consisting of Melissa Turner, project QA Officer and the MLJ-LLC database manager, is responsible for database maintenance, synchronization and backup. In the event of hardware failure MLJ-LLC server data is restored from the tape backup and the ILRP Design Master is restored from the Central Valley RDC tape backup.

A copy of the database is delivered to the CVRWQCB staff quarterly. Monitoring reports which summarize the monitoring data are submitted to the CVRWQCB following the schedule outlined in section 21.

GROUP C: ASSESSMENT AND OVERSIGHT

20. ASSESSMENTS & RESPONSE ACTIONS

All reviews of QA data will be made by the MLJ-LLC QA Officer and may include the CVRWQCB QA Officer. Reviews of the sampling procedures will be made bimonthly. Reviews involve comparing observed sampling procedures against those established in the MLJ-LLC SOPs. Additional reviews will be made as SOPs are updated and refined. Contract laboratories are responsible for self assessment and oversight, although each data report is audited for compliance with MLJ-LLC's QA/QC program. The MLJ-LLC QA Officer Melissa Turner is responsible for flagging all data that does not meet established QA/QC criteria.

If a review discovers any discrepancy, MLJ-LLC's QA Officer Melissa Turner will discuss the observed discrepancy with the personnel responsible for the activity. The discussion will include the accuracy of the information, potential cause(s) leading to the deviation, how the deviation might impact data quality and the corrective actions that might be considered.

The MLJ-LLC QA Officer Melissa Turner has the power to halt all sampling and analytical work by both MLJ-LLC and the contract laboratories if the deviation(s) noted are considered detrimental to data quality.

Assessments will be oral; if no discrepancies are noted and corrective action is not required additional records are neither maintained nor reported. If discrepancies are observed the details of the discrepancy and any corrective action will be reported in the quarterly and annual monitoring report.

Corrective action will be determined from Monitoring and Reporting Program Order No. R5-2008-0005 Appendix F Attachment C based on analysis of the type of discrepancy. Corrective action may correct an unauthorized deviation from the QA/QC procedures or SOPs, or it may remedy a systematic failure in the established QA/QC procedures or SOPs. The MLJ-LLC QA Officer will be responsible for addressing all corrective action. All correspondence will be documented in print, and all correspondence will be filed at the MLJ-LLC office which is available upon request.

21. REPORTS TO MANAGEMENT

Data summary and other reports will be written by MLJ-LLC according to the following table. The table provides dates for the first year this QAPP is active. In subsequent years if the deliverable due date is not a weekday, the deliverable will be provided on the first business day following the due date.

Table 20. (Element 21) QA management reports.

Type of Report	Frequency	Projected Delivery Dates(s)	Person(s) Responsible for Report Preparation	Report Recipients
Monitoring Report	Quarterly	June 1, 2009 September 1, 2009 December 1, 2009	Michael Johnson	Dania Huggins Parry Klassen
Monitoring Report	Annually	March 1, 2009	Michael Johnson	Dania Huggins Parry Klassen
Management Plan Report	Annually	March 1, 2009	Michael Johnson	Dania Huggins Parry Klassen

GROUP D: DATA VALIDATION AND USABILITY

22. DATA REVIEW, VERIFICATION, AND VALIDATION REQUIREMENTS

Data generated by project activities will be reviewed against the data quality objectives cited in Element 7 and the QA/QC practices cited in Elements 14, 15, 16, and 17. The MLJ-LLC QA Officer will review any data that fails any stated quality objectives to decide whether to accept or reject the data. The decision to accept or reject the data will be based on an assessment of the impact of the data quality failure and will be made according to the following process.

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

Data falling in the first category is considered usable by the project. Data falling in the last category is considered not usable. Data falling in the second category will have all aspects assessed. If sufficient evidence is found supporting data quality for use in this project, the data will be moved to the first category, but will be flagged with the appropriate SWAMP data qualifier code by the MLJ-LLC QA Officer.

23. VERIFICATION AND VALIDATION METHODS

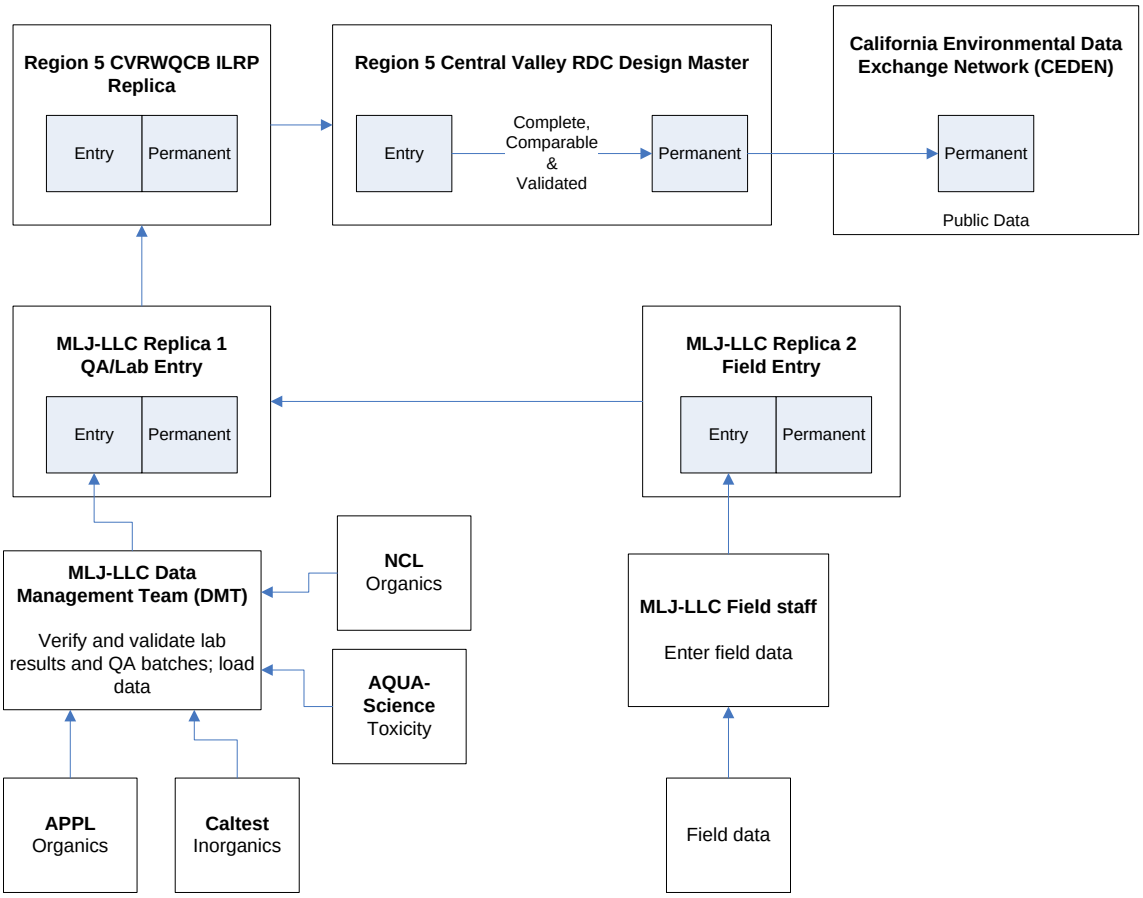
Data will be QC'd visually and recorded as checked by initials and dates directly on the record or on a specialized record tracking document. MLJ-LLC's QA Officer or a delegate of the QA Officer will do all reviews of 100% of the reports. Each contract laboratory's QA Officer will perform checks of all of its records at a frequency that the lab determines sufficient.

The contract laboratories will be responsible for the reduction of the raw data generated at the laboratory bench to a format determined by agreement between the laboratory and the MLJ-LLC QA Officer. The analytical process includes verification or a quality assurance review of the data, which includes:

- Verifying the calibration samples for compliance with the laboratory and project criteria;
- Verifying that the batch QCs were analyzed at a proper frequency and the results were within specifications;
- Comparing the raw data (e.g. chromatogram) with reported concentration for accuracy and consistency;
- Verifying that the holding times were met and that the reporting units and quantitation limits are correct;
- Determining whether corrective action was performed and control was re-established and documented prior to reanalysis of QC or project samples;
- Verifying that all project and QC sample results were properly reported and flagged; and
- Preparing batch narratives that adequately identify and discuss any problems encountered.

All QA issues will be noted. Reconciliation and correction of these issues will be done by a committee composed of MLJ-LLC's QA Officer, Field Supervisor, and Project Manager, and the contracting laboratory's QA Officer and Laboratory Director. Any corrections require a unanimous agreement that the correction is appropriate. Contract laboratories submit in their data report the batch narrative that identifies and discusses any problems encountered. If the report is accepted with or without correction pertinent portions of this narrative will be transferred to the ILRP SWAMP Comparable database as the MLJ-LLC QA Officer deems necessary.

Figure 4. Flowchart of MLJ-LLC Data Progression



24. Reconciliation with User Requirements

Procedures to review, verify and validate data are included in Appendix XXXV (SOP for Data Verification, Validation and Loading to the ILRP SWAMP Comparable Database) and Appendix XXXVII (SOP for Toxicity Data Verification, Validation and Loading to the ILRP SWAMP Comparable Database). This process ensures that all data uploaded into the ILRP SWAMP Comparable database has been qualified on a result, batch and project level with each deviation being coded and comments provided.

Data is reported to the CVRWQCB in a variety of formats including raw data, narrative data summaries including data compiled into tables and charts, and data contained within the ILRP SWAMP Comparable database. Limitations in data use will be reported to the CVRWQCB in the Annual Monitoring Report as well as through codes and comments in the database. Non-primary data users beyond the CVRWQCB will be able to access the data generated by this project deposited in the ILRP SWAMP Comparable database and should heed the qualifier flags applied to the data by the MLJ-LLC QA Officer to alert them of limitations to the data. Non-primary data users will be able to access the narrative reports by request to the CVRWQCB, the Coalition, or MLJ-LLC.

Quality Assurance Project Plan

ILRP Amendment Forms for the ESJWQC QAPP

QAPP AMENDMENT FORM
IRRIGATED LANDS REGULATORY PROGRAM

COALITION NAME: EAST SAN JOAQUIN WATER QUALITY COALITION

WDR ORDER #: R5-2012-0116_R3

QAPP VERSION: 3.0

PREPARED BY: MICHAEL L. JOHNSON, LLC

DATE PREPARED: FEBRUARY 13, 2017

AMENDMENT #1

TITLE: Amendment to update Sampling Procedures and replace Appendices I through X with a single appendix (Appendix I— Standard Operating Procedures (SOP) for Surface Water and Sediment Sampling).

SECTION OF QAPP AFFECTED: This amendment affects Appendices I through X, and the numbering of any subsequent appendices.

JUSTIFICATION: Michael L. Johnson, LLC (MLJ-LLC) recently gained approval from the Central Valley Regional Water Quality Control Board (Regional Board) to update their sampling protocols. These updated protocols mostly pertain to the treatment of low flow, no flow, and dry waterbodies. The Regional Board agreed that language could be added to MLJ-LLC's sampling procedures to stipulate that samples should not be collected in conditions where the water present at the sample location is unrepresentative of the waterbody as a whole, such as in non-contiguous pools. Samples should only be collected if the depth of the water is such that the sample can be collected without bias (e.g. deep enough to collect without disturbing any sediment). It is the responsibility of the sampler to assess the potential bias at a given site and determine whether or not to collect samples based on the descriptions and definitions included in the SOP for Surface Water and Sediment Sampling.

In addition to these changes, the SOP for Surface Water and Sediment Sampling contains a revised version of the existing MLJ-LLC sampling procedures to be incorporated into this QAPP. The procedures that were previously outlined in Appendices I through X were consolidated into a single SOP, and several other minute changes have been made so that the new version is up to date with current practices. Such changes include updated calibration procedures to include both YSI 556 MPS and YSI Professional Plus model, updated procedures for filling pre-preserved sample bottles, clarified procedures for collection of quality control samples, and combined sections for documenting and locating sampling sites.

DETAIL OF CHANGES: See attached SOP.

QAPP AMENDMENT FORM
IRRIGATED LANDS REGULATORY PROGRAM

COALITION NAME: EAST SAN JOAQUIN WATER QUALITY COALITION

WDR ORDER #: R5-2012-0116_R3

QAPP VERSION: 3.0

PREPARED BY: MICHAEL L. JOHNSON, LLC

Date Prepared: September 19, 2017

TITLE: Request for Modification to Field Quality Control Sample Frequency Requirements

SECTION OF QAPP AFFECTED: This amendment applies to Table 10 (Core site names, site IDs, and number of water samples collected each month, page 33) and Table 15 (Field Sampling QC, page 47).

JUSTIFICATION: Field Quality Control (QC) samples include both field blanks and field duplicates. Field blanks assess contamination that can occur during sample collection while field duplicates assess the variability that can occur while collecting an environmental sample. Currently, the Coalition collects field duplicate and field blank samples at the frequency required in the Irrigated Lands Regulatory Program Quality Assurance Project Plan Guidelines (Attachment C to the Monitoring and Reporting Program).

Attachment C dictates that at a minimum, one full "QC Set", which includes one field blank and one field duplicate sample, must be included per analytical method batch per sampling event (page 18). Furthermore, field duplicate samples must be collected at a rate of 5% for each analysis or one set per sampling event, whichever is more frequent (page 23). The intent of this added language to the 2008 QAPP Guidelines was to ensure consistency in sampling procedures regardless of who collected the samples for the Central Valley ILRP coalitions. Some coalitions have multiple agencies/consultants collecting their samples and the language was implemented to ensure that adequate QC was being collected and analyzed per event to address variability between sampling crews.

During the 2018 Water Year (October 2017 – September 2018), The East San Joaquin Water Quality Coalition (ESJWQC or Coalition) will implement a revised pesticide monitoring strategy based on the Pesticide Evaluation Protocol (PEP) issued by the Central Valley Regional Water Quality Board (CVRWQB) in November of 2016. In accordance with the PEP, the Coalition has designed a monitoring schedule for the 2018 WY that focuses on monitoring for pesticides when they are likely to be used. The new monitoring strategy represents a significant

departure from the previous pesticide monitoring schedule which included monitoring for the same set of pesticides monthly regardless of use.

Under the previous strategy, the Coalition monitored for a consistent list of constituents at each of the six Core sites in addition to more focused monitoring that occurs at Represented and Management Plan sites. The Coalition was able to collect a single set of QC samples per analytical method from a Core site every event, which resulted in 10-25% of the samples collected being either field blanks or field duplicates (still above the required 5% QC requirement). With the implementation of the PEP, the list of constituents monitored will vary by month and by Core site. In order to meet the requirement of collecting a field duplicate and a field blank for each constituent each event, the Coalition could end up collecting twice as many field QC samples compared to environmental samples.

To illustrate this point, Table 1 includes the relative counts of environmental samples and associated field QC samples for the 2018 WY if the Coalition were to collect a field duplicate and a field blank every sampling event for each constituent. When taken as a percentage of total samples measured per analytical method, the field QC requirements can be as high as 70% of all samples collected by the Coalition (Table 1).

Not only do the field QC requirements increase the logistical efforts for each sampling event, they also represent a significant increase in the analytical costs to the Coalition. If a field blank and field duplicate were collected every event, the total analytical cost for the 2018 WY is projected to be $483,845; $181,854 (38%) of this total is field QC analytical costs.

Table 1. Projected sample counts and cost for 2018 WY given current field QC sample requirements

Analytical Method	Annual Environmental Sample Count	Annual Field Blank Count	Annual Field Duplicate Count	Total Annual Sample Count	Percent Field QC	Total Cost
EPA 8081A	46	27	27	100	54%	$13,500
EPA 8141A	66	39	39	144	54%	$25,200
EPA 8151	23	9	9	41	44%	$6,560
EPA 8290	20	7	7	34	41%	$20,400
EPA 8321A	49	49	49	147	67%	$33,075
EPA 821-R-02-012, 013 (*C. dubia*)	71	0	12	83	14%	$57,270
EPA 821-R-02-012, 013 (*P. promelas*)	65	0	12	77	16%	$53,130
EPA 821-R-02-012, 013 (*S. capricornutum*)	92	0	12	104	12%	$61,880
SM 9223	72	12	12	96	25%	$4,763
EPA 353.2	81	12	12	105	23%	$3,647
SM 4500NH3 C	76	12	12	100	24%	$3,473
SM 4500P E	72	12	12	96	25%	$5,257
EPA 200.8	56	18	18	92	39%	$2,291
EPA 180.1	66	12	12	87	28%	$1,994
SM 2340 C	52	15	15	82	37%	$2,392
SM 2540D	72	12	12	95	25%	$2,771

Analytical Method	Annual Environmental Sample Count	Annual Field Blank Count	Annual Field Duplicate Count	Total Annual Sample Count	Percent Field QC	Total Cost
SM 5310B (Total)	72	12	12	96	25%	$6,002
SM 5310B (Dissolved)	43	10	10	63	32%	$5,514
ASTM D-422-63, ASTM D4464M-85	16	0	2	18	11%	$2,363
Walkley Black	16	2	2	20	20%	$2,625
EPA 600/R-99-064	16	0	2	18	11%	$29,340
EPA 8270C (EI)	12	9	9	30	60%	$12,750
EPA 8270M (NCI)	42	49	49	140	70%	$50,400
EPA 547	12	7	7	26	54%	$3,900
EPA 549.1	12	6	6	24	50%	$3,600
EPA 630	18	6	6	30	40%	$4,500
EPA 633	1	1	1	3	67%	$450
EPA 8260 mod	14	9	9	32	56%	$4,800
USGS Mod	56	47	47	150	63%	$60,000
					Total	**$483,845**

The purpose of collecting and analyzing field QC samples is to monitor consistency between sampling teams and adherence to sampling protocols as described within the QAPP. MLJ-LLC has been monitoring for this Coalition since before the current WDR implementation (since 2006) and has demonstrated compliance with monitoring Standard Operating Procedures and compliance with Measurement Quality Objectives as outlined in the QAPP. As documented in Section 8 of this QAPP, field samplers must complete rigorous initial training courses, as well as yearly refresher courses. In addition, as outlined in Section 20, comprehensive review of all laboratory data, and an open dialogue with the sampling team regarding any field-related quality concerns, ensure that the samples collected by the sampling crew are representative of the waterbody and without contamination. In the past five years of sample collection, the overall acceptability of both field blank and field duplicate samples has remained well above the minimum annual threshold of 90% (Table 2). All samples collected by MLJ-LLC have been acceptable and any flagged sample has been investigated and explained with the Coalition's Annual Report.

Table 2. Percent acceptability of field QC sampling years 2012 through 2016

	Percent Acceptable	
Water Year	Field Blank Samples	Field Duplicate Samples
2012	99.6%	97.5%
2013	99.8%	95.6%
2014	99.8%	95.5%
2015	99.5%	96.3%
2016	99.8%	97%

Given the additional time and costs associated with collecting a field duplicate and a field blank for each analyte during each event, the Coalition requests to remove the requirement of collecting field QC every sampling event and retain the requirement that field QC will be collected at a minimum of 5% of the annual total of samples.

The total analysis cost for the 2018 WY is projected to be $330,694 when a minimum of 5% of the samples collected are field QC; $28,191 (9%) of the total reflects field QC analysis costs (Table 3). This reduces the percent field QC from 38% to 9% of the annual sample costs (cost savings of $153,663).

The Coalition requests minor changes to the current QAPP (Table 4 and 5) to reflect a minimum of 5% field duplicate and 5% field blank sample collection as an annual requirement. The 5% field QC requirement is sufficient for the Coalition and Regional Board staff to assess field sampling comparability and potential contamination and is comparable to other monitoring program field QC requirements.

Table 3. Proposed field QC frequency for the 2018 WY

Analytical Method	Annual Environmental Sample Count	Annual Field Blank Count	Annual Field Duplicate Count	Total Annual Sample Count	Percent Field QC	Total Cost
EPA 8081A	46	3	3	52	12%	$7,020
EPA 8141A	66	4	4	74	11%	$12,950
EPA 8151	23	2	2	27	15%	$4,320
EPA 8290	20	2	2	24	17%	$14,400
EPA 8321A	49	3	3	55	11%	$12,375
EPA 821-R-02-012, 013 (*C. dubia*)	71	0	4	75	5%	$51,750
EPA 821-R-02-012, 013 (*P. promelas*)	65	0	4	69	6%	$47,610
EPA 821-R-02-012, 013 (*S. capricornutum*)	92	0	5	97	5%	$57,715
SM 9223	72	4	4	80	10%	$3,969
EPA 353.2	81	5	5	91	11%	$3,160
SM 4500NH3 C	76	4	4	84	10%	$ 2,917
SM 4500P E	72	4	4	80	10%	$ 4,381
EPA 200.8	56	4	4	64	13%	$ 1,882
EPA 180.1	66	4	4	74	11%	$ 1,696
SM 2340 C	52	3	3	58	10%	$ 1,692
SM 2540D	72	4	4	80	10%	$ 2,334
SM 5310B (Total)	72	4	4	80	10%	$ 5,002
SM 5310B (Dissolved)	43	3	3	49	12%	$ 4,288
ASTM D-422-63, ASTM D4464M-85	16	0	1	17	6%	$ 2,231
Walkley Black	16	1	1	18	11%	$ 2,363
EPA 600/R-99-064	16	0	1	17	6%	$ 27,710
EPA 8270C (EI)	12	2	2	16	25%	$ 6,800
EPA 8270M (NCI)	42	3	3	48	13%	$ 17,280
EPA 547	12	1	1	14	14%	$ 2,100
EPA 549.1	12	1	1	14	14%	$ 2,100
EPA 630	18	1	1	20	10%	$ 3,000
EPA 633	1	1	1	3	67%	$ 450
EPA 8260 mod	14	1	1	16	13%	$ 2,400
USGS Mod	56	3	3	62	10%	$ 24,800
					Total	**$330,694**

DETAIL OF CHANGES:

Table 4. (Element 10) Core site names, site IDs, and number of water samples collected each month.

Site Name	Station Code	Lattitude	Longitude	Zone	Analytical Parameter	# Samples	Sampling SOP	Sample Volume	Containers
Cottonwood Creek @ Rd 20	545XCCART	36.8686	-120.1818	1	See Table 5	1	Appendix I	28 L (7.4 gallons)	See Table 12
Dry Creek @ Wellsford Rd	535XDCAWR	37.6602	-120.8743	2	See Table 5	1	Appendix I	28 L (7.4 gallons)	See Table 12
Duck Slough @ Gurr Rd	535XDSAGR	37.2142	-120.5596	3	See Table 5	1	Appendix I	28 L (7.4 gallons)	See Table 12
Highline Canal @ Hwy 99	535XHCHNN	37.4153	-120.7557	4	See Table 5	1	Appendix I	28 L (7.4 gallons)	See Table 12
Merced River @ Santa Fe	535XMRSFD	37.4271	-120.6721	5	See Table 5	1	Appendix I	28 L (7.4 gallons)	See Table 12
Prairie Flower Drain @ Crows Landing Rd	535XPFDCL	37.4422	-121.0024	6	See Table 5	1	Appendix I	28 L (7.4 gallons)	See Table 12
Field Duplicate Samples	Random				All parameters	~~1 per event~~ 5% of total annual project samples	Appendix I	28 L (7.4 gallons)	See Table 12
Field Blank Samples	Random				All parameters except toxicity	~~1 per event~~ 5% of total annual project samples	Appendix I	8 L (2.1 gallons)	See Table 12
Matrix Spike Samples	Random				Pesticides, nutrients, metals, TOC	1 per event	Appendix I	15.8 L (4.2 gallons)	See Table 12

Table 5. (Element 14) Field Sampling QC.

Sample Type	Frequency	Acceptable Limits	Corrective Action	Sampling SOP	Analytical SOP & Method
Water Column Toxicity					
Field Duplicate	5% annual total, ~~minimum 5% per event~~	RPD ≤25%	Determine cause, take appropriate corrective action.	Appendix I	Appendix XV; EPA821-R02-12
Organic and Inorganic Chemistry Parameters					
Field Blank	5% annual total	Detectable substance contamination <RL or < sample/5	Determine cause of problem, remove sources of contamination.	Appendix I	See Table 16
Field Duplicate	5% annual total	RPD ≤25%	Determine cause, take appropriate corrective action.		
Sediment Toxicity					
Field Duplicate	5% annual total, ~~minimum 5% per event~~	RPD ≤25%	Determine cause, take appropriate corrective action.	Appendix I	Appendix XVIII, EPA 600/R-99-064
Sediment Chemistry					
Field Blank	5% annual total	Detectable substance contamination <MDL	Determine cause of problem, remove sources of contamination.	Appendix I	Appendix XXXII; GCMS-NCI-SIM
Field Duplicate	5% annual total	RPD ≤25%	Determine cause, take appropriate corrective action.		
Sediment TOC					
Field Duplicate	5% annual total	RSD ≤20%	Determine cause, take appropriate corrective action.	Appendix I	Appendix XXXIV; Walkley Black Method
Sediment Grain Size					
Field Duplicate	5% annual total	RSD ≤20%	Determine cause, take appropriate corrective action.	Appendix I	Appendix XXXIII; ASTM D422-63

APPROVAL: The amendment(s) detailed within this document shall be effective upon signature completion of all parties listed below. By signing this amendment, all parties listed below acknowledge and accept these changes. A copy of this document shall be distributed to all parties within the QAPP distribution list and shall be included and/or attached to all distributed copies of the original QAPP. The amendment(s) will be incorporated into the full QAPP document when a formal QAPP revision takes place.

Project Manager and Technical Advisor Date:

_____

Michael L. Johnson:

Project Quality Assurance Officer Date:

_____

Melissa Turner:

ILRP Staff Liaison Date:

_____

Yared Kebede:

SWRCB QA Representative Date:

_____

Renee Spears:

ILRP Monitoring & Implementation Unit Chief Date:

_____

Susan Fregien, Senior Environmental Scientist.
CVRWQCB

QAPP AMENDMENT FORM
IRRIGATED LANDS REGULATORY PROGRAM

COALITION NAME: EAST SAN JOAQUIN WATER QUALITY COALITION

WDR ORDER #: R5-2012-0116_R3

QAPP VERSION: 3.0

PREPARED BY: MICHAEL L. JOHNSON, LLC

Date Prepared: October 4, 2017

TITLE: Updated eQAPP containing all constituents and associated Data Quality Objectives for the 2018 Water Year.

SECTION OF QAPP AFFECTED: The QAPP sections affected are all tables referencing pesticide analysis. The list of pesticides to be analyzed for are being updated per the Pesticide Evaluation Protocol (PEP) that was disseminated on November 29, 2016 and will be implemented with the 2018 Water Year (2018 WY). The results of the PEP (e.g. which pesticides will be monitored in which months) were included in the 2018 Monitoring Plan Update (MPU) and will be submitted with each MPU moving forward. The QAPP has not been updated to reference the current WDR, monitoring strategy or PEP process for determining which pesticides to be monitored. The Coalition is in the process of revising and submitting a completely revised QAPP. In the meantime, the Coalition has updated its electronic QAPP (eQAPP) to reflect the new analytes and methods referenced in the 2018 MPU. Included in the eQAPP are the analytes, methods, MDLs, RLs, and associated Data Quality Objectives for the 2018 WY. This information in the eQAPP affects the following tables in the QAPP: Table 2 (Constituents and parameters), Table 5 (Data quality objectives for field and laboratory accuracy, precision, and completeness measurements), Table 7 (Data quality objectives for field and laboratory contamination measurements), Table 12 (Sample handling and custody), Table 13 (Field and laboratory analytical methods), Table 15 (Field Sampling QC), and Table 16 (Analytical QC).

Table 1 is a summary of the new analytes and methods that have been added to the eQAPP. Within the eQAPP a column has been included to indicate which analytes were added based on the 2018 MPU and for which this amendment applies. Ten of the new constituents will be analyzed under NCL ME 321 (a modified form of the USGS Method for Determination of Pesticides in Water) and the method is still being developed further for these specific analytes. Therefore, the analytical measurement levels are not available and these analytes are not included in the eQAPP; they are noted in Table 1 as not included in this QAPP amendment

request. MLJ-LLC is working with the laboratory to develop reliable analytical methods for these constituents, and will provide measurement levels as they become available.

Table 1. New analytes added per the 2018 MPU for the 2018 WY as a result of the Pesticide Evaluation Protocol. Analytes with a "no" in the QAPP Amendment Request Column are not included in this request due to pending method development.

New Analyte Added for 2018 WY	Lab	AnalyteName (Tox=Organism)	MethodName	QAPP Amendment Request (yes/no)	Notes
2018 WY	NCL	Ziram	EPA 630	Yes	Mancozeb and thiram are reported as ziram, per method.
2018 WY	NCL	Bromacil	EPA 633	Yes	
2018 WY	APPL	Chlorothalonil	EPA 8081A	Yes	
2018 WY	APPL	Iprodione	EPA 8081A	Yes	
2018 WY	APPL	Norflurazon	EPA 8081A	Yes	
2018 WY	APPL	Oxyfluorfen	EPA 8081A	Yes	
2018 WY	APPL	Tebuconazole	EPA 8081A	Yes	
2018 WY	APPL	Hexazinone	EPA 8141A	Yes	
2018 WY	APPL	Pendimethalin	EPA 8141A	Yes	
2018 WY	APPL	Dicamba	EPA 8151A	Yes	
2018 WY	APPL	Dichlorophenoxyacetic Acid, 2,4-	EPA 8151A	Yes	
2018 WY	NCL	Chloropicrin	EPA 8260BM	Yes	
2018 WY	Caltest	Cinerin-1	EPA 8270C SIM	Yes	Pyrethrin pesticides
2018 WY	Caltest	Cinerin-2	EPA 8270C SIM	Yes	Pyrethrin pesticides
2018 WY	Caltest	Jasmolin-1	EPA 8270C SIM	Yes	Pyrethrin pesticides
2018 WY	Caltest	Jasmolin-2	EPA 8270C SIM	Yes	Pyrethrin pesticides
2018 WY	Caltest	Piperonyl Butoxide	EPA 8270C SIM	Yes	
2018 WY	Caltest	Pyrethrin-1	EPA 8270C SIM	Yes	Pyrethrin pesticides
2018 WY	Caltest	Pyrethrin-2	EPA 8270C SIM	Yes	Pyrethrin pesticides
2018 WY	Caltest	Resmethrin	EPA 8270C SIM	Yes	
2018 WY	Caltest	Bifenthrin	EPA 8270M_NCI	Yes	
2018 WY	Caltest	Cyfluthrin, total	EPA 8270M_NCI	Yes	
2018 WY	Caltest	Cyhalothrin, Total lambda-	EPA 8270M_NCI	Yes	
2018 WY	Caltest	Cypermethrin, Total	EPA 8270M_NCI	Yes	
2018 WY	Caltest	Esfenvalerate/Fenvalerate, Total	EPA 8270M_NCI	Yes	
2018 WY	Caltest	Fenpropathrin	EPA 8270M_NCI	Yes	
2018 WY	Caltest	Permethrin, Total	EPA 8270M_NCI	Yes	
2018 WY	APPL	HpCDD, 1,2,3,4,6,7,8-	EPA 8290A	Yes	Dioxins
2018 WY	APPL	HxCDD, 1,2,3,4,7,8-	EPA 8290A	Yes	Dioxins
2018 WY	APPL	HxCDD, 1,2,3,6,7,8-	EPA 8290A	Yes	Dioxins
2018 WY	APPL	HxCDD, 1,2,3,7,8,9-	EPA 8290A	Yes	Dioxins
2018 WY	APPL	OCDD, 1,2,3,4,6,7,8,9-	EPA 8290A	Yes	Dioxins
2018 WY	APPL	PeCDD, 1,2,3,7,8-	EPA 8290A	Yes	Dioxins
2018 WY	APPL	TCDD, 2,3,7,8-	EPA 8290A	Yes	Dioxins

New Analyte Added for 2018 WY	Lab	AnalyteName (Tox=Organism)	MethodName	QAPP Amendment Request (yes/no)	Notes
2018 WY	APPL	Azoxystrobin	EPA 8321A	Yes	
2018 WY	APPL	Imidacloprid	EPA 8321A	Yes	
2018 WY	APPL	Isoxaben	EPA 8321A	Yes	
2018 WY	APPL	Rimsulfuron	EPA 8321A	Yes	
2018 WY	APPL	Sethoxydim	EPA 8321A	Yes	
2018 WY	APPL	Thiamethoxam	EPA 8321A	Yes	
2018 WY	Caltest	Dissolved Organic Carbon	SM 5310 B	Yes	
2018 WY	NCL	Acetamiprid	NCL ME 321	No	Not included in this request; method development still in progress.
2018 WY	NCL	Boscalid	NCL ME 321	No	Not included in this request; method development still in progress.
2018 WY	NCL	Clothianidin	NCL ME 321	No	Not included in this request; method development still in progress.
2018 WY	NCL	Cyprodinil	NCL ME 321	No	Not included in this request; method development still in progress.
2018 WY	NCL	Dodine	NCL ME 321	No	Not included in this request; method development still in progress.
2018 WY	NCL	Ethalfluralin	NCL ME 321	No	Not included in this request; method development still in progress.
2018 WY	NCL	Flumioxazin	NCL ME 321	No	Not included in this request; method development still in progress.
2018 WY	NCL	Propiconazole	NCL ME 321	No	Not included in this request; method development still in progress.
2018 WY	NCL	Pyraclostrobin	NCL ME 321	No	Not included in this request; method development still in progress.
2018 WY	NCL	Triflumizole	NCL ME 321	No	Not included in this request; method development still in progress.

JUSTIFICATION: Due to the revised pesticide monitoring strategy being implemented during the 2018 Water Year, The Coalition will be testing for a number of new constituents. This amendment is to compile all constituents scheduled for 2018 and their associated analytical methods and Data Quality Objectives and Criteria for the 2018 Water Year. The Coalition is developing an updated QAPP with updated laboratory SOPs. Due to the time frame of the first sampling event occurring in October 2017, the Coalition was unable to complete the revised QAPP prior to sampling for the 2018 WY.

DETAIL OF CHANGES: See attached eQAPP Excel file.

APPROVAL:

The amendment(s) detailed within this document shall be effective upon signature completion of all parties listed below. By signing this amendment, all parties listed below acknowledge and accept these changes. A copy of this document shall be distributed to all parties within the QAPP distribution list and shall be included and/or attached to all distributed copies of the original QAPP. The amendment(s) will be incorporated into the full QAPP document when a formal QAPP revision takes place.

Project Manager and Technical Advisor: Date:

_____

Michael L. Johnson

Project Quality Assurance Officer: Date:

_____

Melissa Turner

Executive Director, ESJWQC: Date:

_____

Parry Klassen

Lab QA Officer, Caltest Laboratories: Date:

_____

Emily Volkmar

Lab QA Officer, AQUA-Science Laboratories: Date:

_____

Kimberley Miller

Lab QA Officer, APPL Inc.: Date:

_____

Sharon Dehmlow

Lab QA Officer, North Coast Laboratories, Ltd.: Date:

_____

Jeff Schindler

ILRP Staff Liaison: Date:

_____

Yared Kebede

SWRCB or CVRWQCB QA Representative: Date:

_____

Renee Spears

ILRP Monitoring & Implementation Unit Chief: Date:

_____

Susan Fregien

QAPP AMENDMENT FORM
IRRIGATED LANDS REGULATORY PROGRAM

COALITION NAME: EAST SAN JOAQUIN WATER QUALITY COALITION

WDR ORDER #: R5-2012-0116_R3

QAPP VERSION: 3.0

PREPARED BY: MICHAEL L. JOHNSON, LLC

Date Prepared: March 28, 2018

TITLE: Change in Subcontracted Sediment Laboratory for Grain Size and TOC

SECTION OF QAPP AFFECTED The QAPP sections affected are the tables referencing the analysis of sediment total organic carbon (TOC) and grain size including QAPP Tables 2, 13, 15 and 16. Caltest Laboratory analyzes the Coalition's sediment samples for pyrethroids, piperonyl butoxide (PBO) and chlorpyrifos and subcontracts to another laboratory for grain size and total organic carbon (TOC). Caltest is changing the subcontracted laboratory from PTS Laboratories to Soil Control Laboratories (SCL).

JUSTIFICATION: Caltest will be subcontracting the analysis of sediment TOC and grain size to SCL, located in Watsonville, California. SCL is an accredited laboratory that can meet the requirements outlined within the ILRP QAPP Guidelines document.

DETAIL OF CHANGES: Tables 1-4 include the QAPP updates with changes highlighted yellow; changes will affect QAPP Tables 2, 13, 15, and 16. Main changes include an update to the subcontracted laboratory from PTS to SCL and updates to the TOC and Grain Size methods.

Appendix XXIII and XXIV have also been updated to include SCL's Standard Operating Procedure (SOP) for the methods used to analyze sediment TOC and grain size.

Table 1. Updates to the constituents and parameters table (Table 2).

CONSTITUENT	MATRIX	ANALYZING LAB	METHOD	ANALYSIS TYPE
Sediment				
Total Organic Carbon	Sediment	Caltest[3]	EPA 9060	Automatic Combustion Analyzer
Grain Size	Sediment	Caltest[3]	Plumb 1981	Sieves and Pipettes

[3]Subconracted to SCL.

Table 2. Updates to the Field and laboratory analytical methods table (Table 13).

Constituent	Matrix	Analyzing Lab	WQTL	RL	MDL	Analytical Method		
						Method	SOP/Appendix	Modified for Method
Sediment								
Total Organic Carbon	Sediment	Caltest[5]	NA[1]	200 mg/kg	100 mg/kg	EPA 9060	Appendix XXIV	No
Grain Size	Sediment	Caltest[5]	NA[1]	0.01%	0.01%	Plumb 1981	Appendix XXIII	No

[5] Subcontracted to SCL.

Table 3. Updates to the Field Sampling QC (Table 15).

Sample Type	Frequency	Acceptable Limits	Corrective Action	Sampling SOP	Analytical SOP & Method
Sediment TOC					
Field Duplicate	5% annual total	RPD ≤25%	Determine cause, take appropriate corrective action.	Appendix I	Appendix XXIV; EPA 9060
Sediment Grain Size					
Field Duplicate	5% annual total	RPD ≤25%	Determine cause, take appropriate corrective action.	Appendix I	Appendix XXIII; Plumb 1981

Table 4. Updates to the Analytical QC (Table 16).

Sample Type	Frequency	Acceptable Limits	Corrective Action	Sampling SOP	Analytical SOP & Method
Sediment TOC					
Lab Blanks (method, reagent, instrument)	1 per 20 samples, minimum 1 per batch	Detectable substance contamination <RL or <30% of lowest sample	Identify and eliminate contamination source. Reanalyze all samples in batch. Qualify data as needed.	Appendix I	Appendix XXIV; EPA 9060
Lab Control Spike, CRM, or SRM	1 per 15 samples,	Within 95% confidence interval of the certified value; if not certified within 20-25% consensus value	Review raw data quantification reports. Check instrument response using calibration standard. Recalibrate and reanalyze CRM and samples. Repeat until control limits are met.		
Lab Duplicates	1 per 20 samples, minimum 1 per batch	RPD ≤20%	Check calculations and instruments. Recalibrate and reanalyze. If problem persists, then identify and eliminate source of imprecision and reanalyze.		
Sediment Grain Size					
Lab Duplicates	1 per 12 samples,	RPD ≤20%	Check calculations and instruments. Recalibrate and reanalyze. If problem persists, then identify and eliminate source of imprecision and reanalyze.	Appendix I	Appendix XXIII; Plumb 1981
Lab Control Spike, CRM, or SRM	1 per 20 samples, minimum 1 per batch	NIST SRM 1003b glass spheres and a narrow-sized garnet standard supplied by the instrument mfr. used as SRM	Review raw data quantification reports. Check instrument response using calibration standard. Recalibrate and reanalyze CRM and samples. Repeat until control limits are met.		

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