Comprehensive Quality Assurance Plan

For Groundwater Monitoring By The
Central Valley Groundwater Monitoring Collaborative

(Version 1.0)

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

Submitted On
May 16, 2018

Prepared By:

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MLJ ENVIRONMENTAL

50 CELEBRATING YEARS
PROVOST& PRITCHARD CONSULTING GROUP

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

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Laboratory QA Officer	Nell Arguelles	Caltest Laboratories	DocuSigned by: Nell Arguelles	6/2/2020
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2.4 LIST OF ACRONYMS

AOAC	Association of Official Analytical Chemist	**MDL**	Method Detection Limit
ASTM	American Society of Testing Materials	**MLJ-LLC**	Michael L. Johnson, LLC
COC	Chain Of Custody	**MOA**	Memorandum of Agreement
CRM	Certified Reference Material	**MQO**	Measurement Quality Objective
CVGMC	Central Valley Groundwater Monitoring Collaborative	**MS**	Matrix Spike
CVRWQCB	Central Valley Regional Water Quality Control Board	**MSD**	Matrix Spike Duplicate
CQAP	Comprehensive Quality Assurance Plan		
DDW	Division of Drinking Water	**ORP**	Oxidation Reduction Potential
DMS	Data Management System	**PR**	Percent Recovery
DO	Dissolved Oxygen	**QA**	Quality Assurance
DQI	Data Quality Indicators	**QC**	Quality Control
E	Environmental sample	**RL**	Reporting Limit
EC	Specific Conductance	**RPD**	Relative Percent Difference
FB	Field Blank	**RS**	Resample
FD	Field Duplicate	**SOP**	Standard Operating Procedure
GAR	Groundwater Quality Assessment Report	**TDS**	Total Dissolved Solids
GQTM	Groundwater Trend Monitoring	**US EPA**	United States Environmental Protection Agency
HVA	High vulnerability area		
ILRP	Irrigated Land and Regulatory Program	**USGS**	United States Geological Survey
LCS	Laboratory Control Spike		
LCSD	Laboratory Control Spike Duplicate		

2.5 LIST OF UNITS

cm	centimeter
L	liter
mg	milligram
mV	millivolts
NTU	Nephelometric Turbidity Units
pH	Power of Hydrogen
µg	microgram
µS	micro Siemen

GROUP A. PROJECT MANAGEMENT

3 DISTRIBUTION LIST

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4 PROJECT TASK/ORGANIZATION

4.1 INVOLVED PARTIES AND ROLES

The Central Valley Groundwater Monitoring Collaborative (CVGMC) is a monitoring program developed by various stakeholders across the Central Valley with the goal of characterizing groundwater quality and the potential impact of waste discharges on groundwater quality. The CVGMC has developed a Technical Workplan for long-term trend monitoring that will be implemented by the participating entities.

Ten Central Valley third-party groups comprise the initial group of Irrigated Lands Regulatory Program (ILRP) Coalitions taking part in the Collaborative. The participating agricultural Coalitions are:

- Buena Vista Coalition
- Cawelo Water District Coalition
- East San Joaquin Water Quality Coalition
- Grassland Drainage Area Coalition
- Kaweah Basin Water Quality Association
- Kern River Watershed Coalition Authority
- Kings River Water Quality Coalition
- Westlands Water Quality Coalition
- Westside San Joaquin River Watershed
- Westside Water Quality Coalition

Each of the participating agricultural Coalitions must meet their own groundwater monitoring requirements, outlined in their individual General Orders. However, each Order allows for the Coalitions to collaborate with other Central Valley third parties to monitor and report on groundwater quality trends on a regional basis.

Table 1. CVGMC coalition General Orders

ILRP COALITION	CURRENT WASTE DISCHARGE REQUIREMENT
East San Joaquin Water Quality Coalition	Order No. R5-2012-0116-08
Grassland Drainage Area Coalition	Order No. R5-2015-0095-03
Tulare Lake Basin Area coalitions	Order No. R5-2013-0120-07
Western San Joaquin River Coalition	Order No. R5-2014-0002-08
Western Tulare Lake Basin (Westlands Water Quality Coalition)	Order No. R5-2014-0001-06

The role of the CVGMC is to establish common monitoring and reporting structure as it applies to the individual groundwater trend monitoring requirements established by each third-party group under their individual General Orders. The third-party groups will participate in a regional effort to collect and share groundwater monitoring data to be used for a broad geographical characterization of the potential effects of agricultural lands on groundwater aquifers, for regulatory compliance and decision making throughout the Central Valley.

The Comprehensive Quality Assurance Plan (CQAP) establishes the quality assurance and quality control standards and requirements for useable data for individual projects contributing to this

regional collaboration. It also establishes the requirements for a regional data management system, through which all useable data generated under the CVGMC can be stored and accessed by the participants and regulators. The CQAP uses the required elements of a Quality Assurance Project Plan (QAPP) as outlined by EPA; however, the CQAP adds an additional programmatic layer of program administration, project management and coordination.

4.2 PROGRAM ADMINISTRATION

The CVGMC participating Coalitions work collaboratively under a Memorandum of Agreement (MOA) signed on October 27, 2017. The MOA outlines the purpose, organization, roles and responsibilities of the member Coalitions, administrative procedures, length of time the terms of the MOA remain in force, termination procedures, and rules of operation. In addition, there is a cost allocation schedule agreed upon by all member Coalitions.

4.3 PROJECT MANAGEMENT AND COORDINATION

The CVGMC activities are managed by a Coordination Committee which consists of a member from each of the Coalitions including a Chair and Vice Chair. The Coordination Committee is responsible for approving scope of work documents for any contractor and provides oversight for any work performed by outside contractors. The Chair serves as the Program Manager for the purpose of this CQAP and works directly with the Program QA Officer and the Senior Hydrogeologist to assess data received from the individual Coalitions, compile and assess data, and evaluate data for inclusion in CVGMC analysis and reporting.

4.3.1 Project Lead Role

The Project Leads will oversee the Coalition-specific groundwater monitoring program and budget. The Project Leads for each Coalition will work with the Project Managers to ensure all protocols as outlined in this CQAP are followed. The Project Leads will be informed regarding any deviations from protocols and/or analytical issues. The Project Leads are responsible for ensuring that the Groundwater Quality Trend Monitoring (GQTM) Workplan is implemented and any deviations to the Workplan are documented. Individual Coalition Project Leads and Project Managers are identified in the organizational charts in **Section 4.8**.

4.3.2 Project Manager Role

The Project Managers facilitate the implementation of the GQTM Workplan under the guidance of the Coalition Project Lead. Each Project Manager is responsible for the coordination of well sampling, laboratory analysis and data reporting for their Coalition project. Prior to monitoring, the Project Manager is responsible for ensuring that all parties involved with collecting and analyzing groundwater samples are aware of both field and laboratory roles and responsibilities. The Project Manager is responsible for ensuring communication with Laboratory and Project QA Officers to resolve analytical issues and maintain communication between all parties in regard to laboratory and/or sampling changes.

4.4 QUALITY ASSURANCE OFFICER ROLE

The Program QA Officer is responsible for developing the minimum guidelines for all projects within the CVGMC. This includes programmatic procedures and QA/QC guidelines for field sampling and analytical procedures conducted as part of the CVGMC Technical Workplan. The Program QA Officer will oversee and manage the assessment of accuracy, completeness and precision for samples collected as part of the CVGMC.

The Project QA Officers are responsible for developing the QA/QC guidelines for field sampling and analytical procedures conducted as part of the individual project groundwater trend monitoring. The Project QA Officers will oversee and manage the assessment of accuracy, completeness and precision for samples collected as part of the individual Groundwater Quality Trend Monitoring Work Plan.

Both the Program and Project QA Officers will remain independent of any direct data generation of data such as sample collection, field parameter recording or laboratory analysis.

4.5 PERSONS RESPONSIBLE FOR CQAP MAINTENANCE

The **Program QA Officer** in coordination with the Program Manager and Senior Hydrogeologist will be responsible for creating, maintaining and updating the CQAP including the submission of addendums to reflect updates based on project specific requirements. The Program QA Officer will be responsible for making changes to the CQAP, submitting drafts for review, preparing a final copy and submitting the final version for signature.

The **Project QA Officer** in coordination with the Project Manager will be responsible for creating, maintaining and updating the project specific quality assurance information including the submission of addendums to reflect updates. The Project QA Officer will be responsible for making changes to project specific requirements, submitting drafts for review to the Program QA Officer, and ensuring that the most recent project specific requirements are updated within the CQAP.

4.6 FIELD, LABORATORY, AND TECHNICAL SERVICES

Well sampling will be conducted by the member Coalitions as described in the **Sampling Methods** section and following the quality assurance (QA) requirements outlined in this CQAP. The individual entities will maintain and store records of data, field sheets, chain of custody (COC) forms, as well as all other forms of documentation.

The laboratories contracted to analyze samples collected for the individual projects will provide analytical services in accordance with the **Analytical Methods** section and QA requirements found in this CQAP. Individual contracts will be maintained by the third-party entities coordinating sampling efforts. All data deliverables generated by contract laboratories will be submitted to the Program Data Management System outlined the **Data Management** section of this CQAP.

All analytical issues will be resolved between the contract entities. The laboratories will maintain contact with the individual Project Managers to resolve analytical issues or for notification of laboratory changes.

Programmatic technical services are overseen by the Senior Hydrogeologist, who is responsible for overseeing the implementation of the Programmatic Workplan and development of five-year trend reports to the CVRWQCB. The Senior Hydrogeologist will review updates to the Programmatic Workplan and assess how changes to individual workplans meet the technical requirements of the program.

4.6.1 Project Field Lead Role

The Project Field Leads are responsible for performing the sample collection and field measurement activities for each project within the CVGMC. The Project Field Leads are also responsible for all communications with the analytical laboratory regarding sample shipment, schedule and ensuring that COCs and Field Sheets are completed accurately.

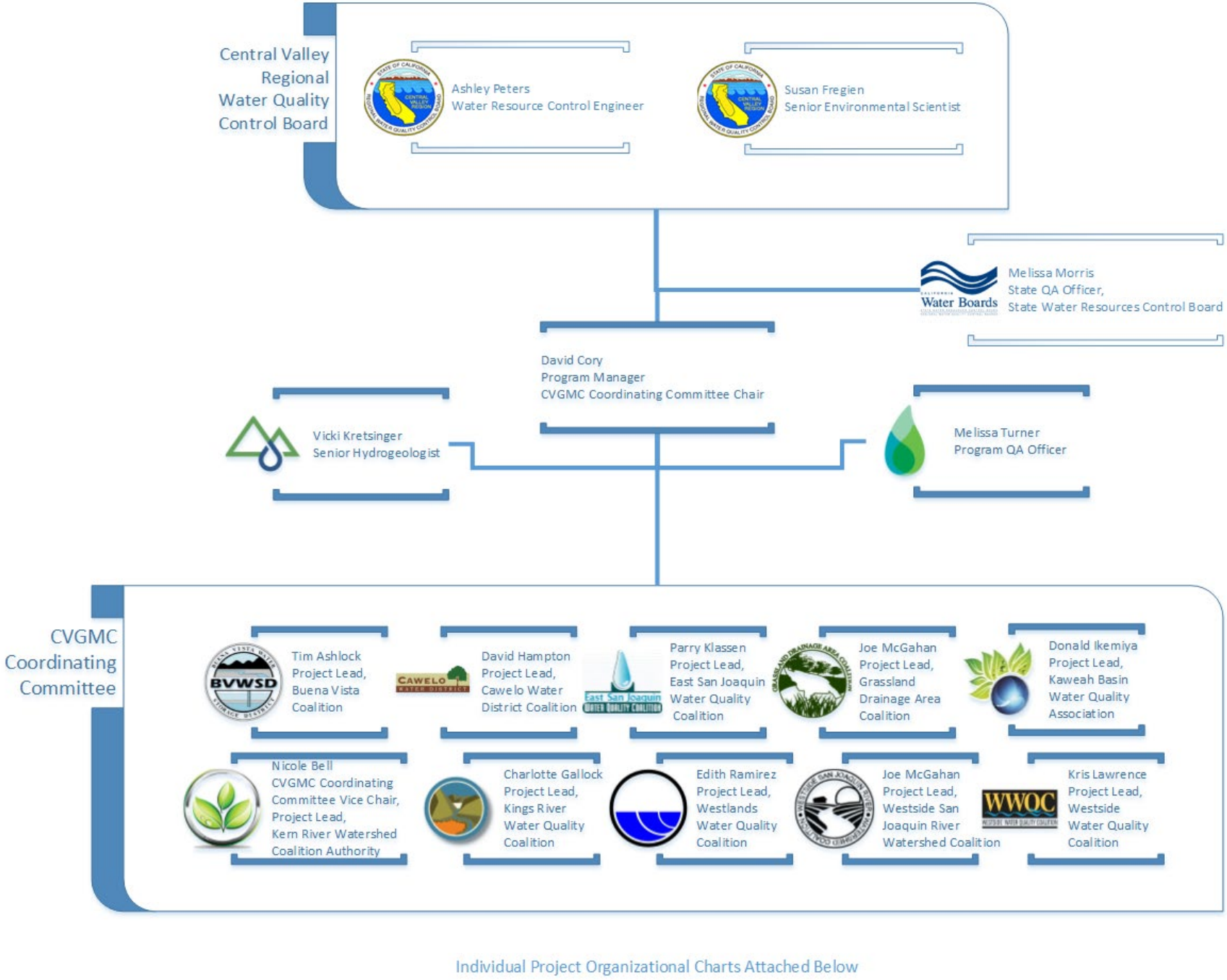
4.7 PROJECT TEAM MEMBERS AND PROJECT ADVISORS

No individuals outside of the Program Team contributes to the CVGMC in an advisory role.

4.8 ORGANIZATIONAL CHART AND RESPONSIBILITIES

Programmatic organization is outlined below in **Figure 1**. Individual project organizational charts are located in **Appendix I** and referenced below.

Figure 1. CVGMC Programmatic organizational chart. Individual Project-specific organizational charts are included in Appendix I.



5 PROJECT DEFINITION/BACKGROUND

5.1 PROBLEM STATEMENT

The CVGMC was created to comply with the various Waste Discharge Requirements of the participating Central Valley ILRP Coalitions. Given the nature of groundwater trend monitoring and the challenges presented by accurately characterizing groundwater quality on a small geographical scale, groundwater quality trends can be more effectively and efficiently evaluated on a regional level. Furthermore, given the number of state and local regulatory programs with groundwater monitoring requirements, a regional collaboration allows for the individual stakeholders to avoid duplicating costs and effort for the use of the same data.

The Central Valley Regional Water Quality Control Board (CVRWQCB or Regional Board) has allowed the individual Coalitions to opt into a regional effort across the Central Valley to characterize groundwater quality trends and share resources to meet the groundwater monitoring requirements of each third party's individual General Orders. Ten ILRP Coalitions have founded the CVGMC in an effort to meet these requirements. Additionally, the program was created with the understanding that other state and regional programs with groundwater monitoring requirements may also participate in the Collaborative in the future, allowing shared resources across multiple dischargers and stakeholders throughout the Central Valley.

5.2 DECISIONS AND OUTCOMES

In compliance with the individual orders of each participating ILRP Coalition, project-specific workplans were developed and submitted to the Regional Board for approval. Each Workplan details the proposed well networks and the rationale for their selection and has been developed in adherence with the CVGMC Technical Workplan submitted to the Regional Board on May 16, 2018. The data generated by each Coalition will contribute to periodic, large-scale, coordinated analyses aimed at establishing long-term groundwater quality trends across the Central Valley.

5.3 REGULATORY CRITERIA

The regulatory criteria for each individual coalition participating in the CVGMC are outlined in the coalition General Orders (**Table 1**). No specific project action limits exist that pertain to the long-term trend analysis conducted by the CVGMC.

Some results generated under the CVGMC program may be subject to action limits under other criteria, such as the exceedance of an MCL in a domestic well used for drinking water. Water quality-based assessment thresholds from the State Water Resources Control Board 's Water Quality Goals Staff Report are listed in **Table 2** for groundwater beneficial uses.

Table 2. Water quality - based assessment thresholds.

Derived using the Assessment Threshold Algorithms in the Water Quality Goals Staff Report, on the web at http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/docs/wq_goals_text.pdf.

Constituent / Parameter (synonyms)	Water Quality Objective or Promulgated Criterion	Numeric Thresholds Recommended to Implement Objective or Criterion			G=Groundwater IS=Inland SW	Assessment Thresholds Recommended to Protect Designated Beneficial Uses in the Water Body			CAS Number
						Groundwater			
		Source of Numeric Threshold	Numeric Threshold	Units		MUN-MCL	MUN-Toxicity	AGR	
Boron	Chemical Constituents	Water Quality for Agriculture (Ayers & Westcot)	700	µg/L	G & IS			X	7440-42-8
	Toxicity - humans	California DPH Notification Level for drinking water	1,000	µg/L	G & IS	X	X		
Chloride	Chemical Constituents	California Secondary MCL, recommended level	250,000	µg/L	G & IS	X	X		16887-00-6
		California Secondary MCL, upper level	500,000	µg/L	G & IS				
		Water Quality for Agriculture (Ayers & Westcot)	106,000	µg/L	G & IS			X	
	Tastes and Odors	California Secondary MCL	250,000	µg/L	G & IS				
Nitrate (expressed as nitrogen)	Chemical Constituents	California Primary MCL	10,000	µg/L	G & IS	X	X		14797-55-8
	Toxicity - humans	California Public Health Goal for Drinking Water	10,000	µg/L	G & IS				
pH - minimum	Chemical Constituents	USEPA Secondary MCL	6.5	units	G & IS	X	X		--
		Water Quality for Agriculture (Ayers & Westcot)	6.5	units	G & IS			X	
	Tastes and Odors	USEPA National Recomm. WQ Criteria, taste & odor	5	units	G & IS				
pH - maximum	Chemical Constituents	USEPA Secondary MCL	8.5	units	G & IS	X	X		--
		Water Quality for Agriculture (Ayers & Westcot)	8.4	units	G & IS			X	
	Tastes and Odors	USEPA National Recomm. WQ Criteria, taste & odor	9	units	G & IS				
Specific conductance	Chemical Constituents	California Secondary MCL, recommended level	900	µS/cm	G & IS	X	X		--

Constituent / Parameter (synonyms)	Water Quality Objective or Promulgated Criterion	Numeric Thresholds Recommended to Implement Objective or Criterion			G=Groundwater IS=Inland SW	Assessment Thresholds Recommended to Protect Designated Beneficial Uses in the Water Body			CAS Number
						Groundwater			
		Source of Numeric Threshold	Numeric Threshold	Units		MUN-MCL	MUN-Toxicity	AGR	
(Electrical conductivity) (EC)		California Secondary MCL, upper level	1,600	µS/cm	G & IS				
		Water Quality for Agriculture (Ayers & Westcot)	700	µS/cm	G & IS			X	
	Tastes and Odors	California Secondary MCL, recommended level	900	µmhos/cm	G & IS				
Sodium	Chemical Constituents	Water Quality for Agriculture (Ayers & Westcot)	69,000	µg/L	G & IS			X	7440-23-5
	Tastes and Odors	Taste threshold (USEPA Drinking Water Advisory)	30,000	µg/L	G & IS				
	Toxicity - humans	USEPA Drinking Water Advisory for persons on restricted sodium diet	20,000	µg/L	G & IS	X	X		
Sulfate	Chemical Constituents	California Secondary MCL, recommended level	250,000	µg/L	G & IS	X	X		14808-79-8
		California Secondary MCL, upper level	500,000	µg/L	G & IS				
	Tastes and Odors	California Secondary MCL, recommended level	250,000	µg/L	G & IS				
	Toxicity - humans	USEPA Drinking Water Advisory	500,000	µg/L	G & IS				
Total Dissolved Solids (TDS)	Chemical Constituents	California Secondary MCL, recommended level	500,000	µg/L	G & IS	X	X		--
		California Secondary MCL, upper level	1,000,000	µg/L	G & IS				
		Water Quality for Agriculture (Ayers & Westcot)	450,000	µg/L	G & IS			X	

6 PROGRAM DESCRIPTION

6.1 WORK STATEMENT AND DELIVERABLES

The CVGMC program will be implemented in three phases:

Phase 1. ILRP Technical Workplan;

Phase 2. Coordination Among Existing Groundwater Monitoring Programs;

Phase 3. Future Groundwater Monitoring Coordination

Phase 1 was completed and submitted to the CVRWQCB on May 16, 2018. Upon Executive Officer approval of the Phase 1 Technical Workplan, monitoring of the well network established in the Workplan by the individual participating third parties will begin in Fall 2018.

Individual ILRP Coalitions will report on the data developed in their respective areas annually, in accordance with their individual Orders. All ILRP participants will contribute to a CVGMC 5-Year Report with additional methods to characterize groundwater quality conditions and trends.

Phase 2 and Phase 3 of the program will be implemented once the ILRP Technical Workplan and Data Management System are established.

6.2 MONITORING PROJECTS

Each of the Central Valley ILRP Coalitions have developed a Groundwater Quality Assessment Report (GAR) that characterizes the existing state of groundwater quality within each region. Based on these characterizations, the individual Coalitions have developed, or are currently developing Groundwater Trend Monitoring Workplans (GQTMs), with the goal of long-term characterization and overall protection and improvement of the groundwater conditions provided by each individual GAR.

By opting into the CVGMC, participating Coalitions agree to the common approach to monitoring and reporting elements under the Technical Workplan to meet their individual GQTM requirements. The conclusions and existing data developed by each individual GQTM will inform and feed into the regional collaborative Technical Workplan.

Each participating Coalition is responsible for certain Coalition-specific responsibilities. These responsibilities include developing their own individual GQTM to meet specific Order requirements, conducting sampling within their own GQTM network, and preparing Annual Reports in accordance with the CVGMC format.

6.3 CONSTITUENTS TO BE MONITORED

Table 3 lists the required constituents associated with CVGMC Technical Workplan and is consistent with the constituents to be monitored by each Coalition. The testing frequency reflects how often a constituent is measured at each well location. The table summarizes the parameter type (whether the result is derived from the field or the laboratory) for each constituent measured at each monitored well.

Table 3. CVGMC Program constituents and parameters.

CONSTITUENT	REPORTING UNITS	TESTING FREQUENCY	REQUIRED OR OPTIONAL	PARAMETER TYPE
Nitrate as Nitrogen (NO3-N) or Nitrate + Nitrite as Nitrogen (NO3-N)	mg/L (as N)	Annual	Required	Analytical
Dissolved Oxygen (DO)	mg/L	Annual	Required	Field Measure
Electrical Conductivity (EC) at 25 °C	µS/cm	Annual	Required	Field Measure
pH	pH units	Annual	Required	Field Measure
Temperature	°C	Annual	Required	Field Measure
Depth to standing water (static water level)	ft	Annual	Required[1]	Field Measure
Oxidation-reduction potential (ORP)	mV	Annual	Optional	Field Measure
Turbidity	NTU	Annual	Optional	Field Measure
Anions				
Carbonate	mg/L	Five Years	Required	Analytical
Chloride	mg/L	Five Years	Required	Analytical
Bicarbonate	mg/L	Five Years	Required	Analytical
Sulfate (SO4)	mg/L	Five Years	Required	Analytical
Cations				
Boron	mg/L	Five Years	Required	Analytical
Calcium	mg/L	Five Years	Required	Analytical
Magnesium	mg/L	Five Years	Required	Analytical
Potassium	mg/L	Five Years	Required	Analytical
Sodium	mg/L	Five Years	Required	Analytical
Total Dissolved Solids (TDS)	mg/L	Five Years	Required	Analytical

[1] Collected annually if available/accessible.

6.4 PROJECT SCHEDULE

The program will advance with the deliverable date outlined in **Table 4** below. Wells within the CVGMC network will be monitored starting in Fall 2018, pending Executive Officer approval of the Technical Workplan. Monitoring results will be reported on annually with the expectation that the Workplan will be approved prior to Fall 2018. Annual analysis and reporting of results related to the individual Coalition GQTMs will focus on visual and tabular presentation of data with limited representation of data interpretation. Additional interpretations and conclusions relating to trends and relationships in trends will be conducted as part of reporting every five years.

Table 4. Program deliverable schedule timeline.

DELIVERABLE	DESCRIPTION	DELIVERABLE DUE DATE
Individual Coalitions Annual Monitoring Reports	Coalition-specific analysis and reporting of previous years monitoring results.	May1 (Annually)
Individual Coalitions Data Finalization	Coalition-specific monitoring results finalized and loaded to the CVGMC DMS.	December 1 (Annually)[1]
Individual Coalitions Annual Data Submittal	Coalition-specific monitoring results published to the public GeoTracker database.	May 1 (Annually)
Individual Coalition Annual CQAP Updates Submittal	Submittal of quality assurance and project information updates to the CVGMC Program QA Officer.	December 1 (Annually)[1]
CVGMC Annual CQAP Update	Submittal of amendments to the CVGMC CQAP to Regional Board for approval.	February 1 (Annually)[1]
CVGMC 5-Year Report[2]	Reporting on all CVGMC network monitoring results from the previous 5 years including trends and interpretations.	November 30, 2021 (Every Five Years)

[1]These are internal goal dates determined within the CVGMC in order to ensure timely updates to the Comprehensive QAP.
[2]First CVGMC 5-Year Report is shifted to 2023 to have the Coalitions align in their reporting periods coinciding with Groundwater Assessment Reports.

The CVGMC area is made up the groundwater monitoring networks developed by each of the member Coalitions. The area includes the geographic regions of the following Coalitions as part of Phase 1 of the CVGMC: Buena Vista Coalition, Cawelo Water District Coalition, East San Joaquin Water Quality Coalition, Grassland Drainage Area Coalition, Kaweah Basin Water Quality Association, Kern River Watershed Coalition Authority, Kings River Water Quality Coalition, , Westlands Water Quality Coalition, Westside San Joaquin River Watershed Coalition, and Westside Water Quality Coalition (**Figure 2**).

Each Coalition has developed its own network of wells for groundwater quality trend monitoring as described in the individual Coalition GQTMs. These networks include wells spatially distributed across high and low vulnerability areas of each Coalition region in accordance with Project-specified prioritization criteria. These well networks will be monitored by each Project and incorporated into the CVGMC network for regional analysis and reporting. Individual Project well networks are provided in **Appendix I** and referenced below.

Figure 2-1. Buena Vista Coalition well network map.
Figure 2-2. Cawelo Water District Coalition well network map.
Figure 2-3. East San Joaquin Water Quality Coalition well network map.
Figure 2-4. Grassland Drainage Area Coalition well network map.
Figure 2-5. Kaweah Basin Water Quality Association well network map.
Figure 2-6. Kern River Watershed Coalition Authority well network map.
Figure 2-7. Kings River Water Quality Coalition well network map.
Figure 2-8. Westlands Water Quality Coalition well network map.
Figure 2-9. Westside San Joaquin River Watershed Coalition well network map.
Figure 2-10. Westside Water Quality Coalition well network map.

6.5 CONSTRAINTS

Any constraints that may disrupt the overall goals of the CVGMC are addressed in the Technical Workplan. Constraints associated with individual third-party sampling and data generation should be addressed in individual GQMPs and reported to the CVGMC. It is not anticipated that there will be any constraints that cannot be resolved, or which will result in a compliance violation.

Figure 2. Geographical area covered by the CVGMC. Project-specific maps included in Appendix I.

7 QUALITY OBJECTIVES AND CRITERIA

7.1 DATA QUALITY INDICATORS

In order to account for the inherent level of uncertainty that can occur from the sampling design process through the result documentation, it is important for the program to have set limits of allowable error to ensure data are useable and supportive of the project goals.

Data Quality Indicators (DQIs) are the quantitative statistics and qualitative descriptors used to interpret the degree of acceptability or utility of data to the user (US EPA QA/G-5, 2002). The principal data quality indicators are precision, accuracy (bias), comparability, completeness, representativeness, and sensitivity.

Limits for error must be established for all applicable DQIs for every measurement conducted under the CVGMC program. Program definitions for each DQI are provided below. Minimum targets associated with each of the following DQIs are outlined below in **Section 7.3 Performance Criteria**.

7.1.1 Precision

Precision measures the agreement among repeated measurements of the same property under identical, or substantially similar, conditions. The closer two values that result from the same measurement under the same conditions are, the higher the degree of precision. The degree of precision can be a result of error and or the limits of the measurement system. A measurement quality objective (MQO) can be set for the allowable amount of variation between multiple measurements to account for limits of the measurement system and the inherent amount of user error associated with the measurement system. Program precision is monitored using duplicate quality control samples, including but not limited to field duplicates, laboratory duplicates, and matrix spike duplicates.

7.1.2 Accuracy (Bias)

Accuracy is a measure of the overall agreement of a measurement to a known value. Accuracy includes a combination of random error (precision) and systematic error (bias) components that are due to sampling and analytical operations.

MQOs can be set to limit bias and to set an amount of error as compared to a true value achieved for a measurement. Contamination, measurement error, and matrix interference are all examples of causes of reduction in accuracy of a measurement.

Contamination that may be introduced during sample handling, preparation, or analysis can be monitored with the use of field blanks and laboratory blanks. If contamination is introduced, blank sample results can provide the degree of bias resulting from the error.

Measurement errors can be monitored through the analysis of a known concentration range and compared to measured results. This can be done using certified reference materials and laboratory control spike samples.

Bias introduced through interfering conditions present in the sample matrix can be monitored by duplicate environmental samples with a known concentration of target analytes prior to analytical process, known as matrix spike samples.

7.1.3 Sensitivity and Resolution

Analytical sensitivity is commonly defined as the lowest value an instrument or method can measure with reasonable degree of certainty. Resolution is the capability of a method or instrument to discriminate between measurement responses representing different levels of a variable of interest. These limits are important to know when evaluating the appropriateness of a method or instrument for the requirements of a given study. Reporting limits represent the level at which a method or instrument can accurately measure a target compound. Reporting limits must be lower than the required project action limit to be appropriate for the project. At a minimum, the data collected under this CQAP should meet the reporting limits outlined within **Section 13.**

7.1.4 Representativeness

Representativeness is the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness addresses the degree to which the samples collected represent the study and address the program objectives. Though not directly measurable, representativeness depends on appropriate study design and adherence to appropriate standard operating procedures.

Various spatial considerations exist in designing the individual Coalition GQTM well networks and the CVGMC network. These considerations focus on where and how to representatively monitor groundwater quality relative to agricultural activities. Spatial factors relating to the CVGMC and GQTM network design include delineation of areas to monitor and specific sites (wells) suitable for use in monitoring. The approaches used in developing the Coalition GQTM well networks are based on consideration of the GQTM requirements in the WDRs and include consideration of agricultural commodities, conditions discussed/identified in the GARs related to vulnerability prioritization, and areas identified in the GAR as contributing significant recharge to urban and rural communities.

7.1.5 Comparability

Comparability is a measure of the confidence with which one data set or method can be compared to another. Project data are comparable when evaluated against similar quality objectives and when utilizing similar methodology and reporting requirements. Given the nature of the CVGMC requiring data generated from a wide geographical region being used in aggregate to make long term trend evaluations and broad regulatory decisions, comparability of contributing projects is crucial to the efficacy of the Collaborative. All projects contributing to the CVGMC Program must maintain comparability by following the provisions outlined in this CQAP.

7.1.6 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system. This assessment is typically expressed as a percentage of measurements reported within the prescribed limits associated with the respective DQOs, compared to those initially planned.

Completeness evaluations ensure program requirements for data generation and reporting are met by contributing projects. Program completeness is assessed on three levels: field and transport, analytical, and batch completeness. Field and transport completeness is based on the number of samples successfully collected and transported to the appropriate laboratories. Analytical completeness is based on the number of samples successfully analyzed by the laboratory. Batch completeness is based on whether batches were processed with the appropriate QC samples, as prescribed by the method or defined by the laboratory. Minimum QC sample frequency requirements can be found in **Section 13** of this CQAP.

7.2 DATA QUALITY OBJECTIVES

In order to account for the inherent level of uncertainty that can occur from the sampling design process through the result documentation, it is important for the project to have set limits of allowable error to ensure data are useable and supportive of the project goals.

Data quality objectives (DQOs) are the qualitative and quantitative statements that define the appropriate metrics that will be used to establish the level of quality for project data for each DQI. Data will be considered valid if DQOs for each indicator are achieved. The effectiveness of the QA/QC program will be assessed by the quality of the data generated by the analytical laboratory and determination of field parameters.

The objectives of the groundwater trend monitoring program under the ILRP are to determine current water quality conditions of groundwater relevant to irrigated agriculture and develop long-term groundwater quality information that can be used to evaluate the regional effects of irrigated agricultural practices. The Orders require that at a minimum trend monitoring must include annual monitoring for electrical conductivity, pH, dissolved oxygen, temperature, nitrate as nitrogen (N), and once every five year monitoring for total dissolved solids, carbonate, bicarbonate, chloride, sulfate, boron, calcium, sodium, magnesium, and potassium. The data are limited to groundwater relevant to irrigated agriculture and wells determined to be adequate for understanding trend monitoring.

Regional trends in groundwater quality relevant to irrigated agriculture are not likely to change rapidly. Therefore, analysis of groundwater quality trends will be conducted every five years and reported accordingly. Trends in all wells for which data are available (GQTM network well data and other publicly available well data) will be analyzed using statistical methods to evaluate the presence and magnitude of groundwater quality trends and investigate relationships with land use conditions and practices. Nonparametric statistical analyses of temporal trends in concentrations (e.g., Mann-Kendall test) and parametric statistical analyses of temporal trends (e.g., linear regression) will be considered as statistical methods to evaluate groundwater quality trends. Non-parametric and parametric statistical analyses utilize different data assumptions and can yield different trend results. The results from these statistical trend analyses will be presented spatially in the form of maps and will be evaluated for regional spatial patterns in trends.

7.3 PERFORMANCE CRITERIA

Measurement quality objectives (MQOs) are specific performance criteria against which a measurement is compared to ensure the measurement uncertainty is within the prescribed DQO.

Measurement 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. Measurement quality objectives are listed below and in **Table 5** and **Table 6** and are the performance criteria utilized to evaluate whether the data quality objectives were met.

Field measurements are taken with multi-parameter systems (e.g., YSI 556 MPS); 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 laboratory spikes and matrix spikes to assess accuracy and recovery, and laboratory and field duplicates to assess precision.

Table 5. Program measurement quality objectives for field accuracy, precision, and completeness measurements.

Measurement quality objectives in measurements of accuracy, precision, and completeness. Testing frequency is annual for all field measurements.

CONSTITUENT	ACCURACY/PRECISION	COMPLETENESS
Dissolved Oxygen	±0.5 mg/L	90%
Electrical Conductivity (EC) at 25°C	±5%	90%
Oxidation-reduction potential (ORP)	±10 mV	90%
pH	±0.5 units	90%
Temperature	±0.5°C	90%
Turbidity	±2% plus 0.02 NTU	90%

Table 6. Program measurement quality objectives for laboratory accuracy, precision, and completeness measurements.

CONSTITUENT	TESTING FREQUENCY	MATRIX SPIKE/LAB CONTROL SPIKE FREQUENCY	MATRIX SPIKE ACCURACY/ RECOVERY	LAB CONTROL SPIKE ACCURACY/ RECOVERY	LAB DUPLICATE FREQUENCY	PRECISION	COMPLETENESS
Nitrate as Nitrogen (NO3-N)	Annual	1 per 20 samples, minimum 1 per batch	PR 80-120	PR 90-110	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%
Bicarbonate	Five Years	NA	NA	NA	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%
Carbonate	Five Years	NA	NA	NA	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%

Constituent	Testing Frequency	Matrix Spike/Lab Control Spike Frequency	Matrix Spike Accuracy/ Recovery	Lab Control Spike Accuracy/ Recovery	Lab Duplicate Frequency	Precision	Completeness
Chloride	Five Years	1 per 20 samples, minimum 1 per batch	PR 75-125	PR 75-125	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%
Sulfate (SO4)	Five Years	1 per 20 samples, minimum 1 per batch	PR 75-125	PR 75-125	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%
Boron	Five Years	1 per 20 samples, minimum 1 per batch	PR 75-125	PR 75-125	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%
Calcium	Five Years	1 per 20 samples, minimum 1 per batch	PR 75-125	PR 75-125	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%
Magnesium	Five Years	1 per 20 samples, minimum 1 per batch	PR 75-125	PR 75-125	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%
Potassium	Five Years	1 per 20 samples, minimum 1 per batch	PR 75-125	PR 75-125	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%
Sodium	Five Years	1 per 20 samples, minimum 1 per batch	PR 75-125	PR 75-125	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%
Total Dissolved Solids	Five Years	1 per 20 samples, minimum 1 per batch	--	PR 80-120	1 per 20 samples, minimum 1 per batch	RPD ≤ 25%	90%

7.4 PROJECT ACTION LIMITS

Nitrate concentrations detected above the MCL of 10 mg/L in domestic wells may require additional notifications to members to ensure compliance with drinking water regulations. Chloride concentrations above the agricultural limit of 106 mg/L in irrigation wells, as well as concentrations of other salts listed in **Table 2**, may be dealt with through other programs such as the Central Valley Salinity Alternatives Long Term Solutions (CV SALTS) program as a component of the salinity management zones.

7.5 ACCEPTANCE CRITERIA

Previously collected information or data collected by other monitoring entities will undergo a more general QA/QC review to identify potentially erroneous data. **Section 18** within the CQAP describes the non-direct measurements that will be utilized for this project and provides general

steps for evaluating the data for QA/QC. Non-direct measurements will need to go through the general steps outlined within **Section 18** before being accepted for use.

7.6 PRECISION AND ACCURACY

For each project data quality will be attained by maximizing the accuracy and precision of the methods used by individual project field staff and laboratories. Any changes in procedures due to equipment changes or to improved precision and accuracy will be documented by the Project QA Officer and submitted to the Program QA Officer. All analyses and determinations must be performed by qualified personnel in conformance with all current Environmental Protection Agency (EPA) standards and procedures. Project laboratories 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.

7.7 REPRESENTATIVENESS AND COMPLETENESS

Samples will be collected from wells that should provide a representative indication of groundwater conditions within monitoring subareas. Requirements for selecting wells that meet this objective are discussed in more detail in the individual project GQTMs. Only approved/documented sample collection methods, sample transport/holding methods, and analytical methods will be used. Wells will be purged for a sufficient time to evacuate water held in casing storage before collecting the water sample. This is important to ensure that water collected from a well is representative of groundwater in the aquifer formation outside the well bore. **Section 10** of the CQAP provides details of the sampling process design and **Section 11** details how wells will be purged to ensure the sample is representative of the groundwater conditions.

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 **Sections 10, 11, and 12**. In addition, the samples must be successfully transported to the laboratories.

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

7.8 MINIMIZING BIAS

The primary field bias in groundwater sampling is the collection of samples that are not representative of the aquifer chemical conditions. Processes that occur when water is stagnant in casings can change the chemical composition of groundwater. Bias in field collection will be minimized due to sampling methods and well design of each project. To ensure that a representative groundwater sample is collected from the well, wells will be appropriately purged

in accordance with their type and operational history. Wells will be purged for a sufficient time to evacuate water held in casing storage before collecting the water sample. This is important to ensure that water collected from a well is representative of groundwater in the aquifer formation outside the well bore. If possible, three casing volumes will be purged from the well prior to sample collection. Larger-capacity wells may not need purging depending on their operational history. For smaller-capacity wells, such as domestic wells, achieving a three-casing volume purge may not be practical because of operational constraints relating to the well and water distribution system. For domestic wells currently in operation, lengthy purging may not be necessary because wells used for domestic supply typically experience frequent and short pumping cycles that serve the same purpose as purging. In cases where a three-casing volume purge is not achievable, field parameters (EC, pH, temperature, etc.) of the water will be monitored during pumping/purging and a sample will not be collected until the field parameters have sufficiently stabilized in accordance with the project specific sampling SOPs. **Sections 10, 11, and 12** discuss the sampling design and procedures used to ensure representative groundwater samples are collected. Individual SOPs for each project define specific purging and sample collection procedures used by each sampling agency and are provided in **Appendix III**.

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.

8 SPECIAL TRAINING/CERTIFICATIONS

8.1 SPECIALIZED TRAINING OR CERTIFICATIONS

8.1.1 Field Crews

Specific training and certifications for field crews are the responsibility of the individual Project Managers and are addressed in **Table 7.** of **Appendix I**. All field staff participating in the program must be properly trained on field collection protocols prior to sample collection. Training includes a review of all sampling SOPs and detailed information regarding procedures for collecting groundwater samples and associated QC samples. All personnel will also be trained in proper calibration and deployment of equipment, sample handling and hold time requirements, and chain of custody procedures. To further safeguard against sampling error, all sampling by recently trained personnel should be done under the supervision of more experienced personnel who accompany sampling crews at least for the first time that they conduct sampling within the study fields. In addition to training for sampling, all sampling personnel should attend a field safety course.

Table 7. Individual project specialized training or certifications are included in Appendix I.

Table 7-1. Buena Vista Coalition specialized training or certifications.
Table 7-2. Cawelo Water District Coalition specialized training or certifications.
Table 7-3. East San Joaquin Water Quality Coalition specialized training or certifications.
Table 7-4. Grassland Drainage Area Coalition specialized training or certifications.
Table 7-5. Kaweah Basin Water Quality Association specialized training or certifications.
Table 7-6. Kern River Watershed Coalition Authority specialized training or certifications.
Table 7-7. Kings River Water Quality Coalition specialized training or certifications.
Table 7-8. Westlands Water Quality Coalition specialized training or certifications.
Table 7-9. Westside San Joaquin River Watershed Coalition specialized training or certifications.
Table 7-10. Westside Water Quality Coalition specialized training or certifications.

8.1.2 Laboratories

All CVGMC laboratories must have an internal Quality Assurance Manual that is maintained and actively implemented in the day-to-day operations of the laboratory. Laboratory personnel should maintain current training in all relevant aspects of their role in the sample processing and data generation. Training records will be maintained by the laboratory Quality Assurance Officer and are available upon request. All laboratories processing program data will possess and maintain current Environmental Laboratory Accreditation Program (ELAP) certifications.

Participating laboratories will use the methodology specified by the individual projects and performed by qualified personnel in accordance with that accreditation.

8.2 TRAINING OF PERSONNEL

All training of sampling personnel is overseen by the Field Lead. Training courses and refresher courses are presented annually. Laboratory training takes place at the appropriate laboratory. Laboratory training procedures are outlined in the laboratory Quality Assurance Manual (QAM).

8.3 TRAINING AND CERTIFICATION DOCUMENTATION

Attendance at each field sampling training event is documented with the date and trainer noted. This documentation is kept at the Field Lead's office. Laboratory training records and documentation of demonstrations of capability are kept by the laboratory QA Officer.

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 Project QA Officer and the QA Officer of the contract laboratories. Laboratory and field training is done under the supervision of a qualified senior staff.

8.5 OBTAINING TRAINING AND CERTIFICATION RECORDS.

To obtain copies of sampler training materials and documentation contact the Project QA Officer. Contract laboratory training and certification records can be obtained from the contract laboratory QA Officer identified in **Section 3** of this CQAP.

9 DOCUMENTATION AND RECORDS

9.1 CVGMC PLANNING DOCUMENTS

9.1.1 ILRP Technical Workplan

The CVGMC has developed a Technical Workplan that identifies consistent approach(es) for monitoring and reporting among the Coalitions to meet requirements of the General Orders. This document outlines how monitoring and reporting will occur, and how quality assurance will be maintained as part of the CVGMC.

9.2 REPORT FORMAT

Hardcopies of all field records, sample records, and data records are stored at the respective Project Managers' offices. Digital copies are uploaded to the local servers. The laboratory will provide electronic data to the Project Manager for analysis; the Project Manager will provide all required data to the contractor managing the CVGMC Data Management System (DMS) for review by the Program QA Officer and uploading into the DMS.

Analytical results are received from laboratories as both PDF reports and as GeoTracker electronic data format (EDF) files, which are uploaded to the GeoTracker database by either the contract laboratory or Project Manager.

Data are also reported to the CVRWQCB as electronic data submittals in accordance with annual reporting requirements.

9.3 ADDITIONAL DOCUMENTS AND RECORDS

Additional documents may include photographic documentation, summary reports, meeting notes, presentations, and reports. All forms of documentation must be held on file where they are readily available if ever requested.

9.4 RETENTION OF DOCUMENTS AND RECORDS

Analytical results produced by the laboratory will be transmitted electronically to the contractor managing the CVGMC DMS and loaded into the DMS following the procedures outline in the Data Management SOP (**Appendix II**).

All data and/or other products created by the program will be retained by the participating entities and contract laboratories for a minimum of 10 years. The documents may be held for 10 years as electronic copies. Servers where the files reside will be backed up nightly.

Table 8. Document and record retention, archival, and disposition information.

RECORD TYPE	RECORD NEEDED	RETENTION	ARCHIVAL	DISPOSITION
Sample Collection Records	COCs	Original at Laboratory or Project Manager's Office	Project Manager's Office	Stored at least 10 years
	Field Sheets	Project Manager's Office	Project Manager's Office	Stored at least 10 years
Analytical Records	PDF Lab Results	Project Manager's Office	Project Manager's Office	Stored at least 10 years
	EDF Files	Project Manager's Office	Project Manager's Office	Stored at least 10 years
Data Records	CVGMC DMS	Secure Cloud Server	Secure Cloud Server	Permanent storage on cloud server and on GeoTracker
Assessment Records	Annual Trend Monitoring Reports	Project Manager's Office	Project Manager's Office and CVRWQCB	Permanent storage at CVRWQCB

9.5 ELECTRONIC RECORD BACKUPS

Electronic Data Format files must be uploaded to GeoTracker and to the CVGMC DMS. The CVGMC DMS database is housed on a third-party server with automatic backups performed nightly, at a minimum. Nightly backups are replicated to at least one independent server to create redundancy and allow for instant replication if a failure occurs. All electronic files will be maintained for a minimum of 10 years. The data management process is described in **Section 19** and the Data Management SOP (**Appendix II**).

9.6 CQAP DISTRIBUTION

Copies of this CQAP will be distributed to all personnel and/parties involved in the program and individual projects as outlined in the **Distribution List**. If any parties associated with CVGMC data generation wish to update parts of the CQAP pertaining to project-specific information, the necessary updates should be submitted to the Program QA Officer for review and approval. Any amendments that affect SOPs will require updated SOPs to be submitted. A signed amendment form must be submitted to the Program QA Officer for review. Once approved, the Program QA Officer will submit the amendment information to the CVRWQCB and SWRCB for final approval.

If the there are revisions to the CQAP pertaining to the CVGMC Program, the CQAP will be revised and submitted to both the CVRWQCB and SWRCB for approval. Once approved, the revised CQAP will be distributed to all parties and personnel involved in the program. Copies will be sent to all labs for review and reference. Any future amended CQAPs will be held and distributed in the same fashion. All originals and subsequent amended CQAPs will be held at the CVRWQCB.

GROUP B. DATA GENERATION AND ACQUISITION

10 SAMPLING PROCESS DESIGN

10.1 DESIGN STRATEGY

An overview of the considerations and criteria for the design of the CVGMC trend monitoring network is detailed in the Technical Workplan focusing on the objectives of the program and requirements of the General Orders, including rationale for appropriate monitoring well distribution, encompassing agricultural regions of the Central Valley.

The primary objectives of the CVGMC GQTM are:

1) *Determine current water quality conditions of groundwater relevant to irrigated agriculture;*
2) *Develop long-term groundwater quality information that can be used to evaluate the regional effects of irrigated agricultural practices and changes in agricultural practices;*
3) *Understand long-term temporal trends in regional groundwater quality, particularly as they relate to effects from irrigated agriculture on potential sources of drinking water for communities;*
4) *Evaluate regional groundwater quality conditions in the CVGMC region, particularly in HVAs, and identify differences in groundwater quality laterally and vertically within the CVGMC region;*
5) *Distinguish groundwater quality changes associated with irrigated agriculture compared to other non-agricultural factors.*

Implementation of the CVGMC Technical Workplan will further the understanding of long-term temporal trends in regional groundwater quality. The regional-scale and long-term trend regional monitoring program involves establishing a system through which the groundwater quality within the CVGMC region will be monitored on a long-term basis to evaluate temporal trends and their relationship with irrigated agriculture. The approach to monitoring for long-term regional groundwater quality trends in the GQTM emphasizes evaluation of trends in wells that are believed to provide a representation of regional trends in areas dominated by irrigated agriculture. The spatial distribution of the monitoring network across the CVGMC region will be variable based on the prioritization of monitoring applied by individual Coalitions. Areas of generally higher priority, most commonly in the high vulnerability areas (HVAs) identified in the Coalition GARs, are a greater emphasis for long-term trend monitoring locations than areas of relatively lower priority. Lower vulnerability areas are characterized by hydrogeologic conditions that suggest these areas are less vulnerable to contamination.

10.2 SAMPLE COLLECTION

For purposes of characterizing the relatively shallower part of the groundwater system, the CVGMC emphasizes monitoring in the Upper Zone within the upper part of the groundwater system. Wells selected for trend monitoring will be sampled and tested at an annual frequency for water quality parameters including nitrate as nitrogen (as N), electrical conductivity at 25 °C (EC), pH, dissolved oxygen (DO), and temperature. Electrical conductivity, pH, DO, and temperature will be measured in the field whereas nitrate concentration will be analyzed by a certified laboratory. In some Coalition regions, public water supply wells represent additional ongoing monitoring wells that are regularly tested. Well types any associated external sampling agencies are identified in **Table 10**. Non-direct measurements and analytical data collected by external agencies are processed according to **Section 18** of the CQAP. During the first monitoring event, wells selected for inclusion in the CVGMC GQTM will be sampled and tested for additional water quality constituents, including total dissolved solids (TDS), major anions (carbonate, bicarbonate, chloride, sulfate), and major cations (boron, calcium, sodium, magnesium, potassium). Wells will be tested for these additional constituents every 5 years.

Sample collection will occur during the seasonal window specified in the Workplan. Seasonal sampling reduces variability in groundwater aquifers across the wet and irrigation seasons. Attempts will be made to sample every well within the network during this time. Inaccessible wells should be re-sampled whenever possible. If inaccessibility is permanent or resampling cannot occur during the specified sampling period, then the well may need to be removed from the well network. The Project Manager and Project Lead must be notified so that a suitable replacement well can be located and submitted to Regional Board staff for approval.

All samples collected will be submitted to the contract laboratory with enough time for analysis to occur within the holding times prescribed in **Table 12.** Sample submittals shall occur according to the procedures outlined in the Project Field Sampling SOPs (**Appendix III**).

10.3 TOTAL NUMBER OF SAMPLES

Table 9 includes a list of wells to be monitored as part of the CVGMC GQTM Workplan; all samples will be groundwater samples and collected annually.

Table 9. Individual Project well information is included in Appendix I.

Table 9-1. Buena Vista Coalition well information.
Table 9-2. Cawelo Water District Coalition well information.
Table 9-3. East San Joaquin Water Quality Coalition well information.
Table 9-4. Grassland Drainage Area Coalition well information.
Table 9-5. Kaweah Basin Water Quality Association well information.
Table 9-6. Kern River Watershed Coalition Authority well information.
Table 9-7. Kings River Water Quality Coalition well information.
Table 9-8. Westlands Water Quality Coalition well information.
Table 9-9. Westside San Joaquin River Watershed Coalition well information.
Table 9-10. Westside Water Quality Coalition well information.

Table 10. Individual Project well ownership and sampling agency information is included in Appendix I.

Table 10-1. Buena Vista Coalition well ownership type and sampling agency.
Table 10-2. Cawelo Water District Coalition well ownership type and sampling agency.
Table 10-3. East San Joaquin Water Quality Coalition well ownership type and sampling agency.
Table 10-4. Grassland Drainage Area Coalition well ownership type and sampling agency.
Table 10-5. Kaweah Basin Water Quality Association well ownership type and sampling agency.
Table 10-6. Kern River Watershed Coalition Authority well ownership type and sampling agency.
Table 10-7. Kings River Water Quality Coalition well ownership type and sampling agency.
Table 10-8. Westlands Water Quality Coalition well ownership type and sampling agency.
Table 10-9. Westside San Joaquin River Watershed Coalition well ownership type and sampling agency.
Table 10-10. Westside Water Quality Coalition well ownership type and sampling agency.

11 SAMPLING METHODS

All samples collected for inclusion in the CVGMC GQTM analysis will be collected according to detailed SOPs included in **Appendix III**. Individual Coalition field sampling SOPs are referenced in **Table 11**. The SOPs contain instructions for collecting samples and cleaning equipment between samples. Below is a brief description of the minimal sampling method requirements.

Upon arrival at the well, an attempt will be made to measure the depth to water. Water levels can be measured using an electronic sounder or an air line; air lines have been installed on some agricultural supply wells and can be used to determine depth to water. When possible, it is preferred to use an electronic sounder and record the depth to water to the nearest 0.01 feet. Typically, all depth measurements should be made from the top (the highest point) of the inner well casing. The measuring point location is recorded on the field sheet and used in all subsequent measurements. If there is no measuring point or access to the inside of the well a note will be made on the field data sheet.

Field parameters (pH, water temperature, EC, ORP, and DO) are measured using field meters specified in **Table 18**. The meters will be calibrated for pH, ORP, and DO once in the morning prior to beginning sampling. For pH, a single 3-point calibration with be done using pH 4, 7, and 10 standards; exceptions are if the pH range is known and a calibration is conducted within that range. Conductivity will be calibrated in the morning prior to sampling, and then recalibrated to the nearest calibration solution whenever the conductivity of the well changes substantially. Calibration standards will be maintained at temperatures close to the temperature of the well water.

Except as noted below, purging should be performed for all groundwater monitoring wells prior to sample collection in order to remove stagnant water from within the well casing and ensure that a representative sample is obtained. In general, purging should be done to remove three casing volumes prior to sampling. The field sheet should include details for tracking the volume purged relative to the depth of the well and well casing diameter. It may not be possible to purge three casing volumes of water if purging such an amount of water would result in considerable time and effort. In addition, it may not be necessary to purge three casing volumes for wells that are used daily and are not likely to have stagnant water in the well casing. Other methods for ensuring that the water collected is an adequate representation of the water quality in the groundwater is to monitor field parameters with a flow through system and wait to collect a sample until the measurements are steady, or to use a no-purge sampler such as a Hydrasleeve.

After samples are collected, they must be kept away from sunlight and kept at ≤ 6°C until extraction or analysis. Field personnel collect ten percent of the total samples for quality assurance purposes (5% field duplicate and 5% blank samples). Duplicate field parameter measurements are not necessary. The duplicate samples are submitted to the laboratory as semi-blind samples. Field QC samples are stored at ≤ 6°C alongside environmental samples until extraction or analysis. Field blank samples are processed in the field identically to the other

samples using deionized water as sample water. The blank samples are submitted to the laboratory as semi-blind samples.

Any deviation from the written SOP requires notification of the Project QA Officer. All deviations or problems will be noted on the field sheet and corrective actions should be determined by the Project QA Officer. Deviations will also be reviewed by the CVGMC Program QA Officer to determine acceptability of data.

Table 11. Project field sampling Standard Operating Procedures.

Coalition	Responsible Agency	SOP Title	Revision	Revision Date
Buena Vista Coalition	Provost & Pritchard	Appendix III-A – Buena Vista Coalition Standard Operating Procedures for the Collection of Groundwater Quality Data	BVC 03-19	03/12/2019
Cawelo Water District Coalition	Provost & Pritchard	Appendix III-B – Cawelo Water District Coalition Standard Operating Procedures for the Collection of Groundwater Quality Data	CWDC 03-19	03/12/2019
East San Joaquin Water Quality Coalition	MLJ Environmental	Appendix III-G – MLJ Environmental Standard Operating Procedures for Groundwater Sampling	2.0	Mar-19
Grassland Drainage Area Coalition	LSCE	Appendix III-F – Luhdorff & Scalmanini Sample Collection and Quality Assurance Procedures for Groundwater and Surface Water Samples	1	3/2019
Kaweah Basin Water Quality Association	Provost & Pritchard	Appendix III-C – Kaweah Basin Water Quality Association Standard Operating Procedures for the Collection of Groundwater Quality Data	KBWQA 03-19	03/12/2019
Kern River Watershed Coalition Authority	Provost & Pritchard	Appendix III-D – Kern River Watershed Coalition Authority Standard Operating Procedures for the Collection of Groundwater Quality Data	KRWCA 03-19	03/12/2019
Kings River Water Quality Coalition	KRWQC	Appendix III-E – KRWQC Groundwater Trend Monitoring Standard Operating Procedures 2.0: Recommended Methods for Field Sample Collection	2.0	10/5/2018
Westlands Water Quality Coalition	MLJ Environmental	Appendix III-G – MLJ Environmental Standard Operating Procedures for Groundwater Sampling	2.0	Mar-19
Westside San Joaquin River Watershed Coalition	LSCE	Appendix III-F – Luhdorff & Scalmanini Sample Collection and Quality Assurance Procedures for Groundwater and Surface Water Samples	1	3/2019
Westside Water Quality Coalition	Wood	Appendix III-H – Wood Protocol for Sampling of Groundwater Monitoring Wells and Water Supply Wells	NA	February 2015

12 SAMPLING HANDLING AND CUSTODY

All sample containers should be clearly labeled with sample ID, collection date and time, collector, and requested analyses. All sampling SOPs must be followed while collecting samples. Custody of all samples must be documented and traceable from collection time to submittal for analysis on a Chain of Custody (COC) form. COCs must be with samples during transport to the laboratory. The samples are considered in custody if:

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

All samples and accompanying COCs are signed by the sampler in charge and submitted to analyzing laboratories by the samplers, by private overnight courier, or by overnight common parcel service. Once the laboratory has received the samples and COCs, they are responsible for maintaining custody logs sufficient to track each sample submitted and to analyze or preserve each sample within specified holding times.

Enough sample quantity should be collected to permit more than one analysis in case samples need to be re-analyzed. The contract laboratories may recommend sample quantities as well as types of containers for sample collection; most laboratories offer containers to use for analysis. All samples collected for use in the CVGMC GQTM must at a minimum follow program-defined QA requirements for sampling containers and holding times outlined **Table 12** below. Individual Coalition sample handling requirements are outlined in **Table 13** of **Appendix I**. Holding times refer to the maximum time limit at which a laboratory must analyze a sample for the constituent listed. Any sample handling and custody information that deviates from the program sampling handling requirements will be submitted to the Program QA Officer as an amendment to the CVGMC CQAP.

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

Table 12. Program sample handling and custody requirements.

ANALYTE	RECOMMENDED CONTAINER	INITIAL PRESERVATION/HOLDING REQUIREMENTS	MAXIMUM HOLDING TIME
Nitrate (as N)	Polyethylene	Cool to ≤ 6°C	48 hours
Nitrate + Nitrite (as N)	Polyethylene	Cool to ≤ 6°C; H_2SO_4 to pH ≤ 2	28 days
Carbonate	Polyethylene	Store at ≤ 6°C	14 days
Bicarbonate	Polyethylene	Store at ≤ 6°C	14 days
Chloride	Polyethylene	Store at ≤ 6°C	28 days
Sulfate (SO_4)	Polyethylene	Store at ≤ 6°C	28 days
Boron	Polyethylene	Preserve HNO_3 pH ≤2, store at ≤ 6°C	6 months
Calcium	Polyethylene	Preserve HNO_3 pH ≤2, store at ≤ 6°C	6 months

Analyte	Recommended Container	Initial Preservation/Holding Requirements	Maximum Holding Time
Magnesium	Polyethylene	Preserve HNO_3 pH ≤2, store at ≤ 6°C	6 months
Potassium	Polyethylene	Preserve HNO_3 pH ≤2, store at ≤ 6°C	6 months
Sodium	Polyethylene	Preserve HNO_3 pH ≤2, store at ≤ 6°C	6 months
Total Dissolved Solids	Polyethylene	Store at ≤ 6°C	7 days

12.1 STANDARDIZED FORMS

Figure 3 and **Figure 4** are examples of the standardized forms for field sheets and COC forms for each Coalition. Each form is referenced below.

Figure 3. Individual Project field sheets are included in Appendix I.

Figure 3-1. Buena Vista Coalition field sheet.
Figure 3-2. Cawelo Water District Coalition field sheet.
Figure 3-3. East San Joaquin Water Quality Coalition field sheet.
Figure 3-4. Grassland Drainage Area Coalition well purge field sheet.
Figure 3-5. Grassland Drainage Area Coalition well sampling field sheet.
Figure 3-6. Kaweah Basin Water Quality Association field sheet.
Figure 3-7. Kern River Watershed Coalition Authority field sheet.
Figure 3-8. Kings River Water Quality Coalition field sheet.
Figure 3-9. Westlands Water Quality Coalition field sheet.
Figure 3-10. Westside San Joaquin River Watershed Coalition well purge field sheet.
Figure 3-11. Westside San Joaquin River Watershed Coalition well sampling field sheet.
Figure 3-12. Westside Water Quality Coalition field sheet.

Figure 4. Individual Project COC forms are included in Appendix I.

Figure 4-1. Buena Vista Coalition Chain of Custody form.
Figure 4-2. Cawelo Water District Coalition Chain of Custody form.
Figure 4-3. East San Joaquin Water Quality Coalition Chain of Custody form.
Figure 4-4. Grassland Drainage Area Coalition Chain of Custody form.
Figure 4-5. Kaweah Basin Water Quality Association Chain of Custody form.
Figure 4-6. Kern River Watershed Coalition Authority Chain of Custody form.
Figure 4-7. Kings River Water Quality Coalition Chain of Custody form.
Figure 4-8. Westlands Water Quality Coalition Chain of Custody form.
Figure 4-9. Westside San Joaquin River Watershed Coalition Chain of Custody form.
Figure 4-10. Westside Water Quality Coalition Chain of Custody form.

13 ANALYTICAL METHODS

13.1 ANALYTICAL METHODS POLICY

Table 13 of **Appendix I**, referenced below, identifies the specific analytical methods and limits to be used by each contracted laboratory. All analytical methods employed by a project must be identified within this CQAP and will be subject to the programmatic method requirements outlined below.

Table 13. Individual Project sample handling and analytical information is included in Appendix I.

Table 13-1. Buena Vista Coalition sample handling and analytical information.
Table 13-2. Cawelo Water District Coalition sample handling and analytical information.
Table 13-3. East San Joaquin Water Quality Coalition sample handling and analytical information.
Table 13-4. Grassland Drainage Area Coalition sample handling and analytical information.
Table 13-5. Kaweah Basin Water Quality Association sample handling and analytical information.
Table 13-6. Kern River Watershed Coalition Authority sample handling and analytical information.
Table 13-7. Kings River Water Quality Coalition sample handling and analytical information.
Table 13-8. Westland Water Quality Coalition sample handling and analytical information.
Table 13-9. Westside San Joaquin River Watershed Coalition sample handling and analytical information.
Table 13-10. Westside Water Quality Coalition sample handling and analytical information.

13.2 PROGRAM-DEFINED ANALYTICAL METHOD REQUIREMENTS

13.2.1 Standard Methodology

For the purposes of this CQAP, standard methodology is defined as methods that follow a procedure approved by the US EPA or provided in *Standard Methods for the Examination of Water and Wastewater*. Additionally, methods developed or published by the US Geological Survey (USGS), American Society of Testing Materials (ASTM), and Association of Official Analytical Chemist (AOAC) may be used by accredited laboratories.

Approved methods for each analyte are identified in **Table 14**. If a field crew or laboratory uses a method that is not listed in **Table 14**, the Project QA Officer must review the validity and comparability of the data generated following that method. The sensitivity levels have been established based on the goals of the ILRP trend monitoring work plans as outlined within the individual orders (**Table 1**) and are low enough to assess trends in groundwater quality and assess whether beneficial uses are being met. The data validation process should consist of determining the sensitivity level (MDL and RL), accuracy of QC samples and standards, precision of duplicate data, and analytical bias associated with the new method. This information should be compared to

the same components associated with the method in this CQAP. If the Project QA Officer determines the achievability of the new method is comparable to the method listed in this CQAP, justification for the new method and a copy of the method should be submitted as an amendment to this document and approved by the State Board QA Officer.

The Project QA Officer should be in communication with the Laboratory Project Manager to resolve analytical issues, when they arise. It is the responsibility of the Project QA Officer to determine the most appropriate course of action to resolve any problems and/or accept data. All corrective actions are overseen by the Project QA Officer and should be reported in the annual reports.

Table 14. List of acceptable analytical methods for constituents and maximum sensitivity requirements.

Field equipment and laboratories must be able to achieve reporting limits that are equal to or less than those listed.

Constituent	Acceptable Methods	Reporting Limit	Reporting Unit
Field Parameters			
Dissolved Oxygen (DO)	EPA 360.1, EPA 360.2, SM 4500-O	0.1	mg/L
Electrical Conductivity (EC) at 25 °C	EPA 120.1, SM 2510B	2.5	µS/cm
pH	EPA 150.1, EPA 150.2, SM 4500-H+B	0.1	pH units
Temperature	SM 2550	0.1	°C
Turbidity	EPA 180.1, SM 2130B	1	NTU
Nutrients			
Nitrate (as N)	EPA 300.0, EPA 300.1, EPA 351.3, EPA 353.2, SM 4500-NO3, SM 4110 B,	0.1	mg/L (as N)
Nitrate + Nitrite (as N)		0.1	mg/L (as N)
Anions			
Carbonate	EPA 310.1. EPA 310.2, SM 2320B	10	mg/L
Bicarbonate		10	mg/L
Chloride	EPA 300.0, EPA 300.1, EPA 325.2, EPA 325.3, SM 4110B, SM 4110C, SM 4500-Cl	0.25	mg/L
Sulfate (SO4)	EPA 300.0, EPA 300.1, EPA 375.1, EPA 375.2, EPA 375.3, EPA 375.4, SM 4110B, SM 4110C, SM 4500-SO42-C	1	mg/L
Cations			
Boron	EPA 200.5, EPA 200.7, EPA 212.3, SM 3120 B, SM4500-B-B	0.1	mg/L
Calcium	EPA 200.5, EPA 200.7, EPA 215.1, EPA 215.2, SM 3111B, SM 3120 B, SM 3500-Ca B	0.5	mg/L
Magnesium	EPA 200.5, EPA 200.7, EPA 242.1, SM 3111B, SM 3120 B	0.06	mg/L
Potassium	EPA 200.7, EPA 258.1, SM 3111B, SM 3120 B, SM 3500-K B	1	mg/L
Sodium	EPA 200.5, EPA 200.7, EPA 273.1, SM 3111B, SM 3120 B, SM 3500-Na B	0.01	mg/L
Solids			
Total Dissolved Solids	EPA 160.1, SM 2540C	10	mg/L

13.2.1 Laboratory Turnaround Time

Laboratory reports and electronic deliverables will be submitted to the individual Project Managers within 60 days of samples being submitted to the laboratory. The Program QA Officer will be notified when all samples have been collected and if the laboratory turnaround time has been exceeded.

13.3 PROJECT-SPECIFIC ANALYTICAL METHOD REQUIREMENTS

Field and laboratory analyses will require the equipment listed in **Table 18**; project-specific analytical methods are listed in **Table 13** of **Appendix I**. Laboratory analyses will occur according to the procedures outlined in the laboratory SOPs in **Appendix IV,** outlined below in **Table 15**.

In the event of equipment failure, the laboratory QA officer or Project Manager should notify the Project QA Officer as soon as possible and appropriate documentation and corrective actions can be initiated. Corrective actions should be outlined in the appropriate report from the Coalition to the CVRWQCB. Corrective actions 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 15. Project analytical Standard Operating Procedures.

COALITION	RESPONSIBLE AGENCY	METHOD	SOP TITLE	REVISION	REVISION DATE
Buena Vista Coalition	BSK Associates Laboratory	SM 2540C	A.1 – Solids Testing by SM 2540B, C, D, E, G	IO-SP-0020-05	2/24/2016
	BSK Associates Laboratory	SM 2320B	A.2 – Automated Determination of Alkalinity, pH, EC and Fluoride by PC-Titrate	IO-SP-0061-09	8/17/2016
	BSK Associates Laboratory	EPA 300.0	A.3 – Determination of Inorganic Anions by Ion Chromatography Using Metrohm 930 Compact IC EPA Method 300.0	IO-SP-0085-03	12/18/2017
	BSK Associates Laboratory	EPA 200.7	A.4 – MT-SP-0007-01 ICP SOP	MT-SP-0007-01	11/6/2017
Cawelo Water District Coalition	FGL	SM 2540 C	D.1 – Total, Fixed and Volatile Dissolved Solids Dried at 180°C in Drinking Water and Wastewater by Gravimetric Analysis		4/12/2017
	FGL	SM 2320B	D.2 – Alkalinity in Drinking Water and Wastewater by Automated Titration		2/4/2016
	FGL	EPA 300.0	D.3 –Anions in Drinking Water, Wastewater and Solids by Ion Chromatography		2/8/2016
	FGL	SM 4500	D.4 –Nitrate, Nitrite, NO3+NO2 as N in Drinking Water and Wastewater		7/18/2016
	FGL	EPA 220.7	D.5 –Trace Metals in DW, WW, HW Liquids, Extracts and Solids by ICP-OES		1/6/2017
East San Joaquin Water Quality Coalition	Caltest	SM 2540 C & E / EPA 160.1, 160.4	B.1 –Total Dissolved Solids, Fixed & Volatile Dissolved Solids	W-TDS-rev10a	Nov-13
	Caltest	SM 2320B	B.2 – SM 2320 B (Titrametric, pH 2.4) (1997) Alkalinity	W-TitraSip-rev2b	Sep-13
	Caltest	EPA 300.0	B.3 –The Determination of Inorganic Anions by Ion Chromatography	W-Dioxex-rev10a	Nov-14
	Caltest	EPA Method 353.2 / SM 4500NO3F	B.4 –Nitrate + Nitrite as N	W-NNO3-rev9a	Sep-17

COALITION	RESPONSIBLE AGENCY	METHOD	SOP TITLE	REVISION	REVISION DATE
	Caltest	EPA 200.8	B.5 –Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry (3 Mode)	M-2008-3mode-rev3a	Sep-13
Grassland Drainage Area Coalition	Eurofins Eaton Analytical Lab	Total Dissolved Solids	C.1 – 2540C: Total Dissolved Solids (TDS) in water	20	5/2017
	Eurofins Eaton Analytical Lab	SM 2330B	C.2 – 310.1/ 2320B: Alkalinity	16	6/2017
	Eurofins Eaton Analytical Lab	EPA 300.0	C.3 – 300.0: Determination of Anions and Inorganic Disinfectant By-Products by Ion Chromatography	24	9/2017
	Eurofins Eaton Analytical Lab	EPA 200.7	C.4 – ICP EPA 200.7	25	9/2017
Kaweah Basin Water Quality Association	FGL	SM 2540 C	D.1 – Total, Fixed and Volatile Dissolved Solids Dried at 180°C in Drinking Water and Wastewater by Gravimetric Analysis		4/12/2017
	FGL	SM 2320B	D.2 – Alkalinity in Drinking Water and Wastewater by Automated Titration		2/4/2016
	FGL	EPA 300.0	D.3 –Anions in Drinking Water, Wastewater and Solids by Ion Chromatography		2/8/2016
	FGL	SM 4500	D.4 –Nitrate, Nitrite, NO3+NO2 as N in Drinking Water and Wastewater		7/18/2016
	FGL	EPA 220.7	D.5 –Trace Metals in DW, WW, HW Liquids, Extracts and Solids by ICP-OES		1/6/2017
Kern River Watershed Coalition Authority	BSK Associates Laboratory	SM 2540C	A.1 – Solids Testing by SM 2540B, C, D, E, G	IO-SP-0020-05	2/24/2016
	BSK Associates Laboratory	SM 2320B	A.2 – Automated Determination of Alkalinity, pH, EC and Fluoride by PC-Titrate	IO-SP-0061-09	8/17/2016
	BSK Associates Laboratory	EPA 300.0	A.3 – Determination of Inorganic Anions by Ion Chromatography Using Metrohm 930 Compact IC EPA Method 300.0	IO-SP-0085-03	12/18/2017
	BSK Associates Laboratory	EPA 200.7	A.4 – MT-SP-0007-01 ICP SOP	MT-SP-0007-01	11/6/2017
Westlands Water Quality Coalition	Caltest	SM 2540 C & E / EPA 160.1, 160.4	B.1 –Total Dissolved Solids, Fixed & Volatile Dissolved Solids	W-TDS-rev10a	Nov-13
	Caltest	SM 2320B	B.2 – SM 2320 B (Titrametric, pH 2.4) (1997) Alkalinity	W-TitraSip-rev2b	Sep-13
	Caltest	EPA 300.0	B.3 –The Determination of Inorganic Anions by Ion Chromatography	W-Dioxex-rev10a	Nov-14
	Caltest	EPA Method 353.2 / SM 4500NO3F	B.4 –Nitrate + Nitrite as N	W-NNO3-rev9a	Sep-17
	Caltest	EPA 200.8	B.5 –Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry (3 Mode)	M-2008-3mode-rev3a	Sep-13
Westside San Joaquin River	Eurofins Eaton Analytical Lab	Total Dissolved Solids	C.1 – 2540C: Total Dissolved Solids (TDS) in water	20	5/2017

Coalition	Responsible Agency	Method	SOP Title	Revision	Revision Date
Watershed Coalition	Eurofins Eaton Analytical Lab	SM 2330B	C.2 – 310.1/ 2320B: Alkalinity	16	6/2017
	Eurofins Eaton Analytical Lab	EPA 300.0	C.3 – 300.0: Determination of Anions and Inorganic Disinfectant By-Products by Ion Chromatography	24	9/2017
	Eurofins Eaton Analytical Lab	EPA 200.7	C.4 – ICP EPA 200.7	25	9/2017
Westside Water Quality Coalition	BSK Associates Laboratory	SM 2540C	A.1 – Solids Testing by SM 2540B, C, D, E, G	IO-SP-0020-05	2/24/2016
	BSK Associates Laboratory	SM 2320B	A.2 – Automated Determination of Alkalinity, pH, EC and Fluoride by PC-Titrate	IO-SP-0061-09	8/17/2016
	BSK Associates Laboratory	EPA 300.0	A.3 – Determination of Inorganic Anions by Ion Chromatography Using Metrohm 930 Compact IC EPA Method 300.0	IO-SP-0085-03	12/18/2017
	BSK Associates Laboratory	EPA 200.7	A.4 – MT-SP-0007-01 ICP SOP	MT-SP-0007-01	11/6/2017

14 QUALITY CONTROL

14.1 PROGRAM POLICY

Samples analyzed as part of the CVGMC will be subjected to laboratory and method-specific guidelines to maintain comparability across multiple projects. All projects must utilize the minimum analytical QC outlined below to address the DQIs outlined in this CQAP within **Section 7.1**

14.2 CVGMC PROGRAMMATIC MQOS

Measurement quality objectives are the individual performance or acceptance goals for the individual DQIs. All projects must adhere to the minimum CQAP MQOs; projects may evaluate data against more stringent MQOs.

14.2.1 Field Quality Control

Field QC results must adhere to the limits of error and frequency requirements detailed in **Table 16**. Field QC frequencies are calculated to ensure that a minimum of 5% of all analyses are for QC purposes (both field duplicate and field blanks).

Table 16. Field Sampling QC.

SAMPLE TYPE	FREQUENCY	ACCEPTABLE LIMITS	CORRECTIVE ACTION
Field Duplicate	5% annual total	RPD ≤ 25%	Determine cause, take appropriate corrective action.
Field Blank	5% annual total	Detectable substance contamination <RL or < sample/5	Determine cause of problem, remove sources of contamination.

14.2.2 Analytical Quality Control

Analytical QC results must adhere to the minimum limits of error and frequency requirements detailed in **Table 17**. All required analytical QC samples must be analyzed at a frequency of 1 every 20 samples, minimum of 1 per batch.

Table 17. Programmatic analytical measurement quality objective requirements.

SAMPLE TYPE	FREQUENCY	ACCEPTABLE LIMITS	CORRECTIVE ACTION
Nutrients			
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.
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	80-120%	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	90-110%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.

Sample Type	Frequency	Acceptable Limits	Corrective Action
Anions			
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.
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	75-125%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.
Cations			
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.
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	75-125%	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	75-125%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.
Total Dissolved Solids			
Lab Blanks (method, reagent, instrument)	1 per 20 samples, minimum 1 per batch	Detectable substance contamination <RL	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.
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	80-120%	Determine cause, take appropriate corrective action. Recalibrate and reanalyze all suspect samples or flag all suspect data.

*For the purposes of this program 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.

Precision will be 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:

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

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

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.

Accuracy 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 to 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., Total Dissolved Solids); therefore, a laboratory may choose to analyze a certified reference material (CRM). A CRM analysis may be used in place of an LCS analysis.

14.3 FIELD AND LABORATORY CORRECTIVE ACTIONS

Batches should be reanalyzed if a single QC sample did not meet an MQO due to an identifiable laboratory error and/or MQOs are not met for more than 50% of analytes analyzed in a QC sample. When batches are reanalyzed, the laboratory should provide both sets of results to the third party. If DQOs fail, but neither of the above scenarios is applicable, the laboratory should follow the corrective actions prescribed in **Table 16** and **Table 17**. Overall, all data failing to meet MQOs should be flagged; re-analysis may occur to confirm improvements in accuracy, precision or contamination measures. The laboratory Project Manager and the Project QA Officer may further discuss additional corrective actions on a case by case basis.

Field crews and contract laboratories are responsible for responding to failures in their measurement systems. If sampling or analytical equipment fails, personnel must record the problem according to their documentation protocols.

15 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Specific instrument and equipment testing, inspection, and maintenance requirements for each Coalition are outlined in **Table 18** of **Appendix I** and are referenced below. Laboratory and field equipment are maintained at the frequency listed in **Table 18**.

Table 18. Individual Project instrument and equipment testing, inspection, and maintenance information is included in Appendix I.

Table 18-1. Buena Vista Coalition instrument/equipment testing, inspection, and maintenance.
Table 18-2. Cawelo Water District Coalition instrument/equipment testing, inspection, and maintenance.
Table 18-3. East San Joaquin Water Quality Coalition instrument/equipment testing, inspection, and maintenance.
Table 18-4. Grassland Drainage Area Coalition instrument/equipment testing, inspection, and maintenance.
Table 18-5. Kaweah Basin Water Quality Association instrument/equipment testing, inspection, and maintenance.
Table 18-6. Kern River Watershed Coalition Authority instrument/equipment testing, inspection, and maintenance.
Table 18-7. Kings River Water Quality Coalition instrument/equipment testing, inspection, and maintenance.
Table 18-8. Westlands Water Quality Coalition instrument/equipment testing, inspection, and maintenance.
Table 18-9. Westside San Joaquin River Watershed Coalition instrument/equipment testing, inspection, and maintenance.
Table 18-10. Westside Water Quality Coalition instrument/equipment testing, inspection, and maintenance.

15.1 PROGRAMMATIC POLICIES

15.1.1 Field Equipment

All field equipment must be inspected and repaired as necessary prior to each sampling event. Routine maintenance and repair of field equipment should follow manufacturer instructions and guidelines. Records of field equipment maintenance and repairs should be maintained for each instrument and are summarized in **Table 18** and outlined in attached sampling SOPs. Project Field Leads are responsible for ensuring that inspection and maintenance activities are completed in accordance with project requirements. Project QA officers oversee all maintenance records generated by project personnel. These records will be available to the Program Manager upon request.

15.1.2 Laboratory Equipment

Routine laboratory instrument testing, inspection, and maintenance should be carried out by a qualified technician. Laboratories are responsible for testing, inspecting, and maintaining all laboratory equipment according to manufacturer specifications. Frequency and procedures for maintenance of analytical equipment used by each laboratory are documented in the Quality Assurance Manual for each laboratory, which will be available to Program Managers from any contract laboratory on request. Laboratory instrument inspection and maintenance activities are outlined in **Table 18**. Any instrument deficiencies that are not resolved prior to data generation will be reviewed by the Project QA Officer. Corrective actions for any deficiencies are the responsibility of the Project QA Officer.

16 INSTRUMENT/EQUIPMENT CALIBRATION

Specific instrument and equipment testing, inspection, and maintenance requirements for each Coalition are outlined in **Table 19** of **Appendix I** and are referenced below. Laboratory and field equipment are maintained at the frequency listed in **Table 19**.

Table 19. Individual Project instrument and equipment calibration information is included in Appendix I.

Table 19-1. Buena Vista Coalition instrument/equipment calibration and frequency.
Table 19-2. Cawelo Water District Coalition instrument/equipment calibration and frequency.
Table 19-3. East San Joaquin Water Quality Coalition instrument/equipment calibration and frequency.
Table 19-4. Grassland Drainage Area Coalition instrument/equipment calibration and frequency.
Table 19-5. Kaweah Basin Water Quality Association instrument/equipment calibration and frequency.
Table 19-6. Kern River Watershed Coalition Authority instrument/equipment calibration and frequency.
Table 19-7. Kings River Water Quality Coalition instrument/equipment calibration and frequency.
Table 19-8. Westlands Water Quality Coalition instrument/equipment calibration and frequency.
Table 19-9. Westside San Joaquin River Watershed Coalition instrument/equipment calibration and frequency.
Table 19-10. Westside Water Quality Coalition instrument/equipment calibration and frequency.

16.1 PROGRAMMATIC POLICIES

16.1.1 Field Equipment

Field probes and sensors used to measure field parameters are essential to data generated by the program. Sensors must be calibrated properly prior to any deployment to ensure precision and accuracy of measurement of field parameters. Calibration is performed by measuring the sensors' responses to known conditions and adjusting accordingly to ensure accurate measurements. Field calibration procedures will follow manufacturer specifications for the equipment used and are outlined within the attached field sampling SOPs (**Appendix III**).

Records of field equipment calibration will be maintained for each instrument. These records will be available to Program Managers upon request.

16.1.2 Laboratory Equipment

Routine laboratory instrument calibration should be carried out by a qualified technician. Laboratories are responsible for calibrating all laboratory equipment according to manufacturer

specifications. Frequency and procedures for calibration of analytical equipment used by each laboratory are documented in the Quality Assurance Manual for each laboratory, which will be available to Program Managers from any contract laboratory on request.

17 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Specific instrument and equipment testing, inspection, and maintenance requirements for each Coalition are outlined in **Table 20** of **Appendix I** and are referenced below. Laboratory and field equipment are maintained at the frequency listed in **Table 20.**

Table 20. Individual Project inspection and acceptance of supplies and consumables information is included in Appendix I.

Table 20-1. Buena Vista Coalition inspection/acceptance of supplies and consumables.
Table 20-2. Cawelo Water District Coalition inspection/acceptance of supplies and consumables.
Table 20-3. East San Joaquin Water Quality Coalition inspection/acceptance of supplies and consumables.
Table 20-4. Grassland Drainage Area Coalition inspection/acceptance of supplies and consumables.
Table 20-5. Kaweah Basin Water Quality Association inspection/acceptance of supplies and consumables.
Table 20-6. Kern River Watershed Coalition Authority inspection/acceptance of supplies and consumables.
Table 20-7. Kings River Water Quality Coalition inspection/acceptance of supplies and consumables.
Table 20-8. Westlands Water Quality Coalition inspection/acceptance of supplies and consumables.
Table 20-9. Westside San Joaquin River Watershed Coalition inspection/acceptance of supplies and consumables.
Table 20-10. Westside Water Quality Coalition inspection/acceptance of supplies and consumables.

17.1 PROGRAMMATIC POLICIES

Acceptance criteria for supplies and consumables are outlined in the Laboratory Quality Assurance Manual and in **Table 20**. Laboratory personnel and field crews are responsible for ensuring that all supplies and consumables meet these criteria prior to analysis of sample collection. Inspecting and testing records will be maintained by the laboratories and field crews, and available to Program Managers on request.

18 NON-DIRECT MEASUREMENTS (EXISTING DATA)

Public supply wells may be included in some CVGMC GQTM networks (see description in Technical Workplan); procedures described herein apply to these wells. Continued monitoring of these wells will also be performed by the water supply system operators in accordance with Division of Drinking Water (DDW) requirements. While the annual sampling of the GQTM network wells conducted by each Coalition will include collection of the field parameters identified above, monitoring of additional wells by other monitoring entities may not include testing of all the identified field parameters. Groundwater quality testing in additional wells monitored by others may not align exactly with the frequency of testing for all water quality parameters specified in the WDRs, although coordination efforts with cooperating monitoring entities will focus on establishing a testing program that is consistent and compatible with the monitoring objectives for the GQTM.

All pre-existing data will be assembled within the DMS to facilitate organization, analysis, and display of the acquired data. Well construction information will also be obtained and stored within the database.

Data collected by outside entities will be associated with their individual projects (e.g. PSW_DDS) and clearly identified in any reports or analysis as described in the CVGMC Data Management SOP.

18.1 EXISTING DATA – MEETS CVGMC REQUIREMENTS

If a public supply well is listed as a principal well within the monitoring network, existing data will be reviewed according to the procedures outlined within the CVGMC Data Management SOP (**Appendix II**) and flagged accordingly within the CVGMC DMS. Existing data for principal wells may come directly from the laboratory and/or the agency collecting the samples. The Coalition is responsible for ensuring that these data are loaded to GeoTracker as well as to the CVGMC DMS.

18.2 EXISTING DATA – DOES NOT MEET CVGMC REQUIREMENTS

Existing data collected by other entities that do not adhere to the minimum CQAP requirements may be used for general basin characterization. At a minimum this information must include the location of the well, date of sampling, identification of the agency who collected the sample, original source, method, analyte, concentration, units and reporting limit. Sources of existing data may include GeoTracker and water supply system operators.

19 DATA MANAGEMENT

The CVGMC will use a coordinated Data Management System (DMS) that will be centrally maintained for the purpose of implementing the CVGMC. Each Coalition may elect to maintain their own data separately in their own database, if desired, but a DMS will be used to facilitate analyses and reporting of regional groundwater quality data across the CVGMC area and submittal of CVGMC data.

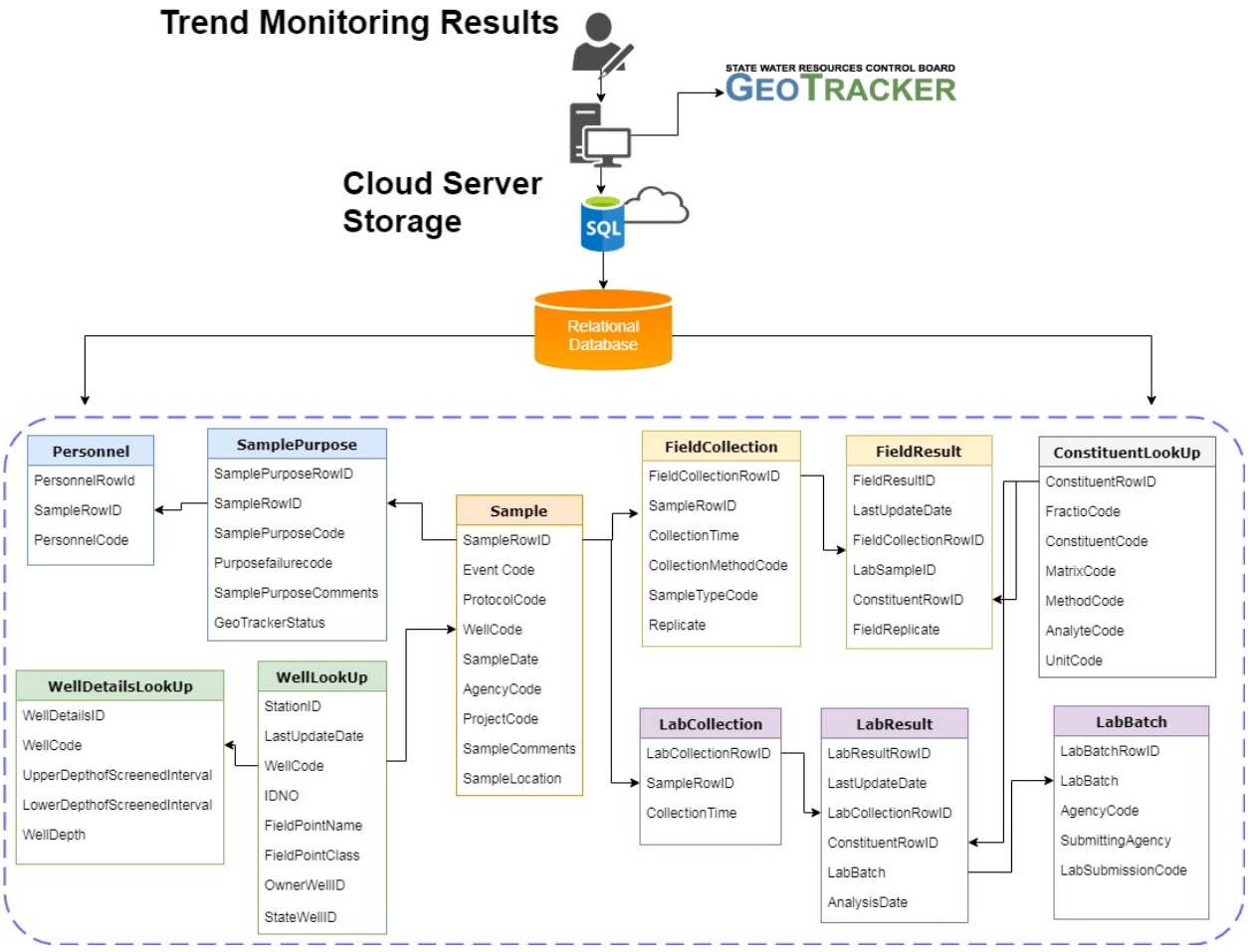
The CVGMC DMS will be a relational database allowing for efficient storage of well monitoring information, including project information (Coalition-specific project codes and protocols), sample collection information (sample date, time, and location of sample collection), well-related information and monitoring results and associated information. The relational database structure will ensure the integrity of the database with one to many relationships facilitating the analysis of water quality results used for trend analysis, graphing, and visualization. The database will house well location, well construction information, environmental results and quality control data.

Figure 5 includes a conceptual diagram of how data will be collected by individual Coalitions, submitted to GeoTracker and the CVGMC, and stored within the CVGMC DMS. The depiction of the relational database design is not meant to capture all components of the CVGMC DMS but highlights the critical elements of the database and required information. Additional tables not shown include valid value requirements for the various tables to ensure comparability of data sets and assignment of quality assurance codes.

All field data is entered into the CVGMC DMS after it has been reviewed and qualified. All data transcribed or transformed, electronically and otherwise, is double checked for accuracy by project staff; records of this double check are maintained by each Coalition. All field sheets and COCs are scanned and an electronic copy is saved on a secure server which can be accessed by the Program QA Officer upon request.

Transfer of data from laboratories to the Coalitions is done through electronic submittals. Laboratory reports are received as PDFs and in a GeoTracker EDF; both types of files are stored on the Coalition's secure server and can be accessed by the Program QA Officer upon request. EDFs are loaded into the CVGMC DMS as outlined within the Data Management SOP (**Appendix II**).

Figure 5. CVGMC DMS Relational Database Design Conceptual Diagram.



GROUP C. ASSESSMENT AND OVERSIGHT

20 ASSESSMENTS AND RESPONSE ACTIONS

All reviews of QA data will be made by the Project QA Officer according to the data verification and validation procedures outlined in the CVGMC Data Management SOP (**Appendix II**). Reviews may include the Program QA Officer, if necessary. Contract laboratories are responsible for self-assessment and oversight of finalized data submitted in laboratory reports and GeoTracker files, although data are audited for compliance with each Coalition's QA/QC program. Well data may be loaded directly to GeoTracker by the laboratory or the coalitions representatives. Once data are received by the CVGMC, the data will be reviewed, flagged as necessary and uploaded to the DMS. Individual Project Managers are responsible for notifying the Program QA Officer once data have been reviewed and uploaded into the DMS. The Program QA Officer is responsible for flagging all data that does not meet established QA/QC criteria.

If a discrepancy is discovered during a review, the Program QA Officer will discuss the discrepancy with the Coalition 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. Should impacts on data quality be determined to be of substantial concern, the Program QA Officer may issue a stop work order to an individual project, effective until data quality can be assessed and brought within program requirements.

The quality of data will be routinely reviewed to determine if procedural (field and analytical) changes are necessary for improved data quality. The Program or Project QA officer may request to visit the laboratory to discuss the review and data quality. Laboratory visits may occur as frequently as once a year or less depending on the need. Other assessments that occur periodically will be oral or electronic via email correspondences; 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 final monitoring report.

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 Project QA Officer will be responsible for addressing all corrective actions.

21 REPORTS TO MANAGEMENT

The Project Manager is responsible for notifying the Program QA Officer that sampling has been completed and that results are reviewed and loaded into the DMS.

Personnel involved in project tasks may encounter unforeseen issues/concerns at any time. It is important that staff report issues/concerns to managers when they are identified. Individual Project Managers are responsible for project resolutions. If the resolution requires changes to approved workplans or project requirements outlined within this CQAP, the ILRP CVRWQCB will be contacted and the appropriate actions will be taken to have changes approved.

Project results and an assessment of data quality will be submitted annually to the CVRWQCB. Programmatic data quality assessments will be reported to the CVRWQCB with programmatic trend reports, submitted every five years according to the reporting requirements in the MRP. The outline for the Five-Year Assessment Report will be developed in coordination with the CVRWQCB in 2021. At a minimum, the data quality assessment will include an evaluation of samples not meeting MQOs, any deviations from the CQAP and description of corrective actions.

GROUP D. DATA VALIDATION AND USABILITY

22 DATA REVIEW, VERIFICATION, AND VALIDATION REQUIREMENTS

Project QA Officers will review data collected under a Coalition specific GQTM according to the DQOs of this CQAP and QA/QC practices outlined within the Data Management SOP (**Appendix II**). The Data Management SOP includes sections for well information, sample collection, field and habitat data, laboratory results and final submittal of trend monitoring data to GeoTracker, CVGMC and Regional Board. For each data type, the Data Management SOP describes the process for review and minimum requirements for compliance with the CQAP including data flagging rules and data codes to be utilized to ensure comparability between projects.

Data utilized by the CVGMC will be reviewed against the data quality objectives cited in **Section 7** of this document, as well as the QA/QC practices cited in **Sections 14, 15, 16 and 17**. The Program QA Officer will review any data that fails any stated quality objectives to decide whether to accept or reject the data for use in the CVGMC. The decision to accept or reject the data will be based on an assessment of the impact of the data quality failure. Data collected by other monitoring agencies will go through a more general review as stated within **Section 18.**

23 VERIFICATION AND VALIDATION METHODS

Data will be QC'd by each Coalition according to the data review procedures outlined in the Data Management SOP (**Appendix II**). The Project's QA Officer or a delegate of the Project 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 Program QA Officer is responsible for conducting programmatic reviews of all data for consistency and comparability. Data utilized for the CVGMC will undergo review and checks based on the CVGMC Data Management SOP.

24 RECONCILIATION WITH USER REQUIREMENTS

Procedures to review, verify and validate project data are included in the Data Management SOP (**Appendix II**). The **Quality Objectives and Criteria** section describes the role of the DQO process and identifies the program's objectives. Reconciliation with the DQOs involves reviewing the data to determine whether the DQOs have been attained and that the data are adequate for their intended use. At the project level, reconciliation occurs during the data quality assessment.

Limitations in data use will be reported to the CVRWQCB in the Annual Reports and CVGMC Five-Year Assessment Reports.

APPENDIX I – INDIVIDUAL PROJECT TABLES AND FIGURES

FIGURE 1. PROJECT ORGANIZATIONAL CHART

Figure 1-1.Buena Vista Coalition Organizational Chart.

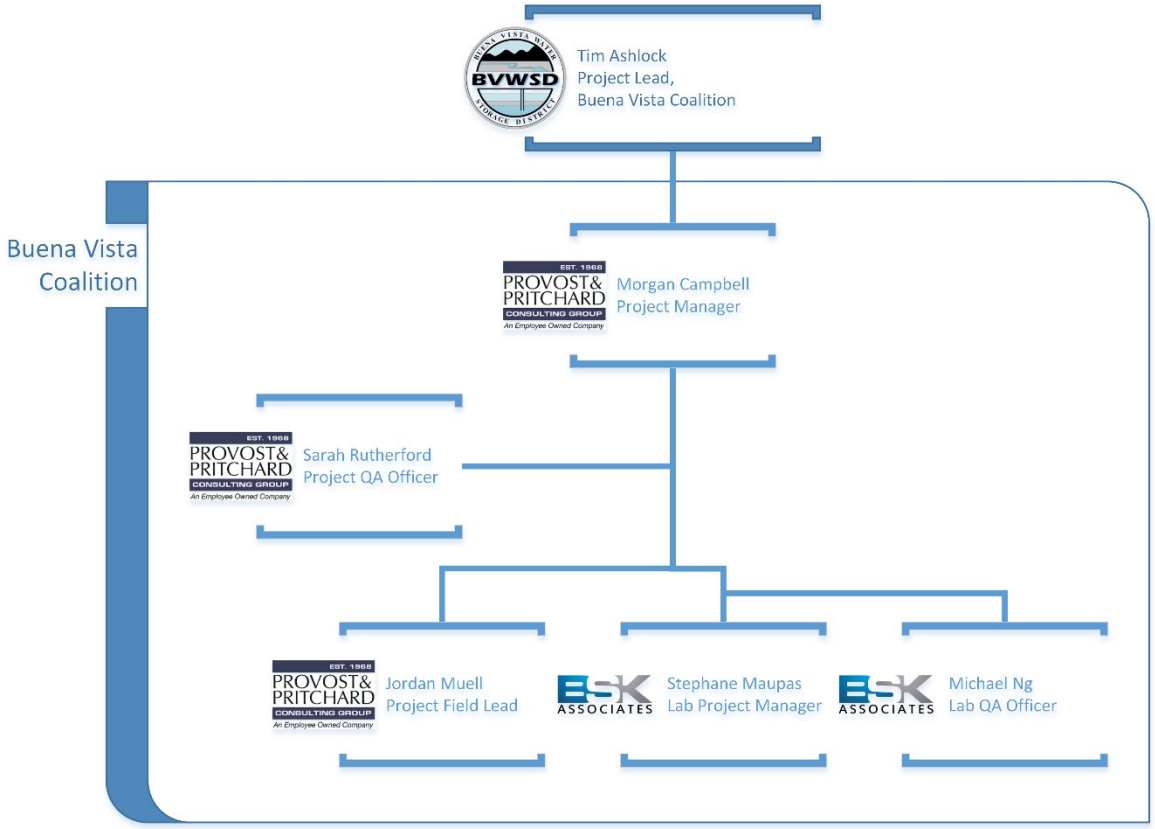


Figure 1-2. Cawelo Water District Coalition Organizational Chart.

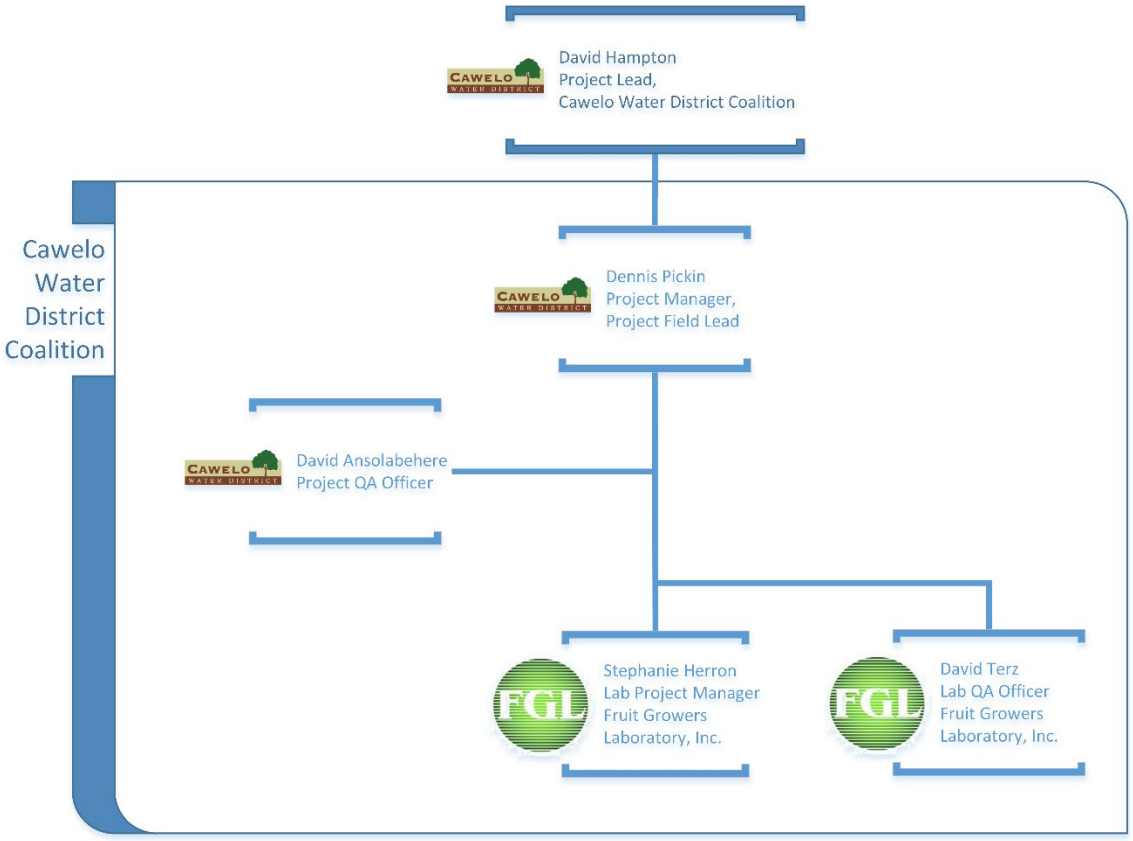


Figure 1-3. East San Joaquin Water Quality Coalition Organizational Chart.

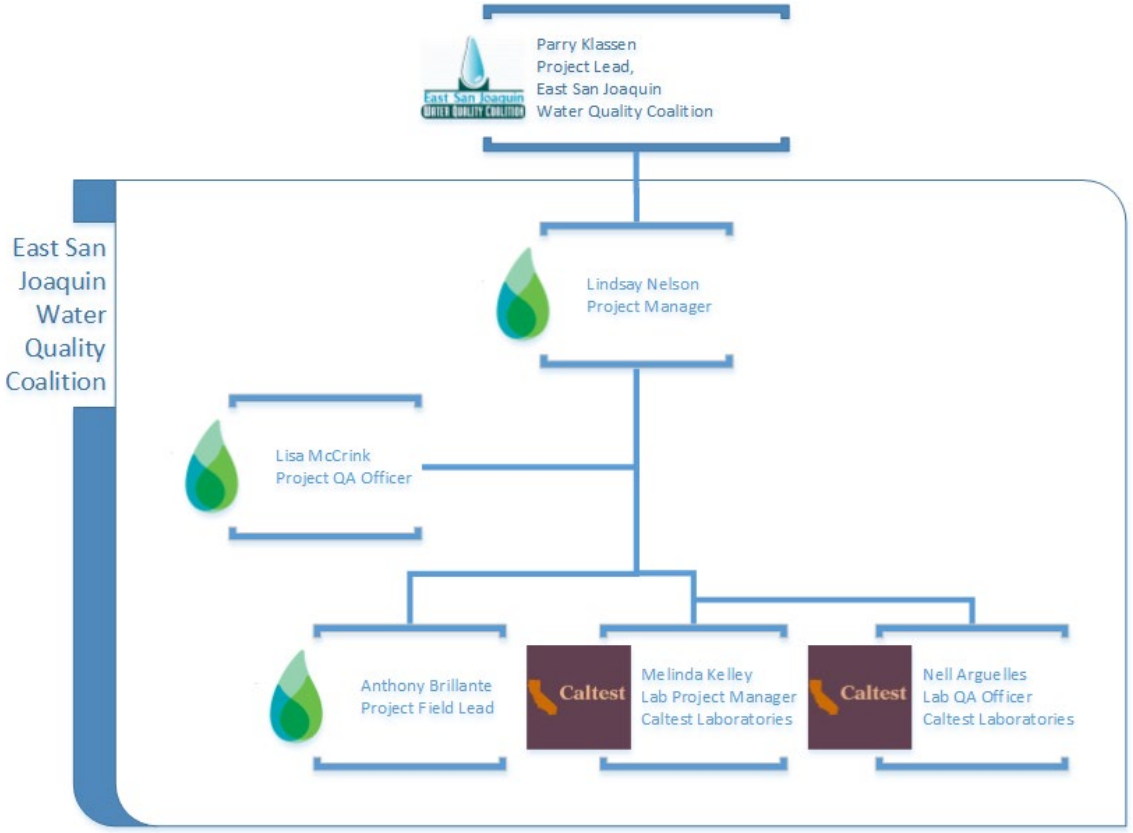


Figure 1-4. Grassland Drainage Area Coalition Organizational Chart.

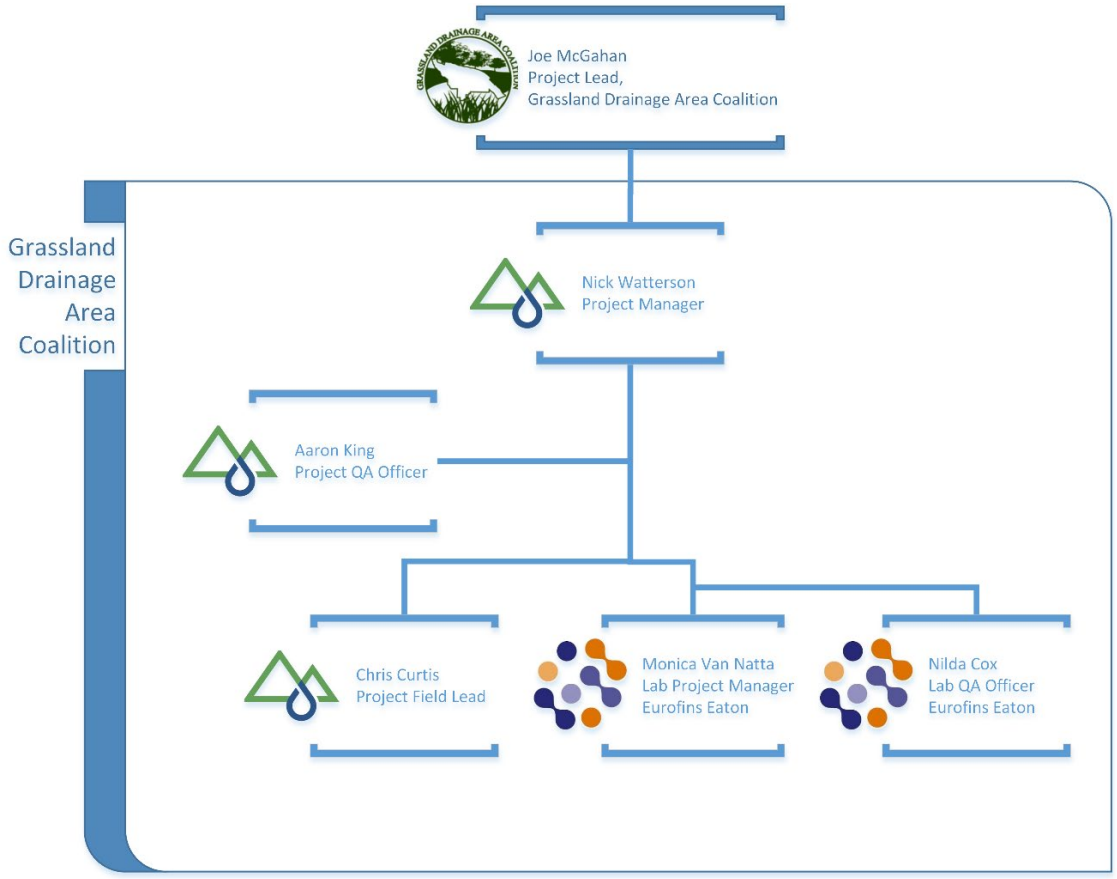


Figure 1-5. Kaweah Basin Water Quality Coalition Organizational Chart.

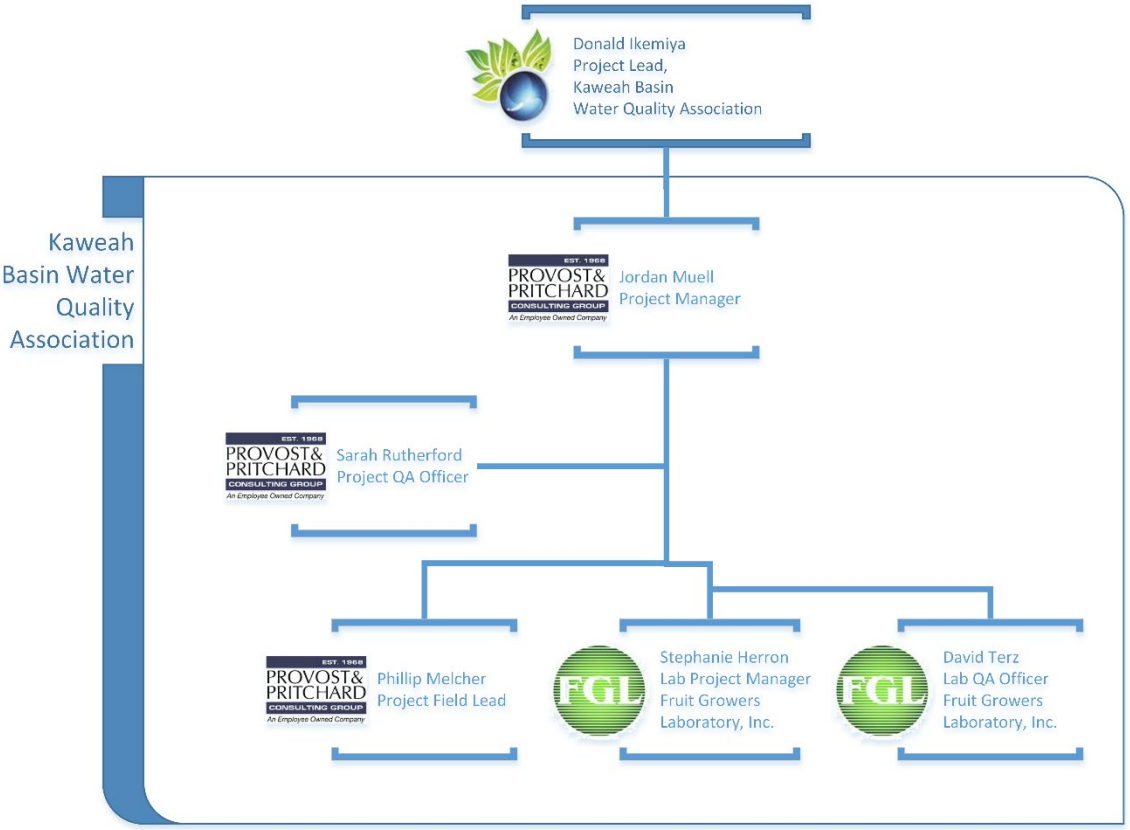


Figure 1-6. Kern River Watershed Coalition Authority Organizational Chart.

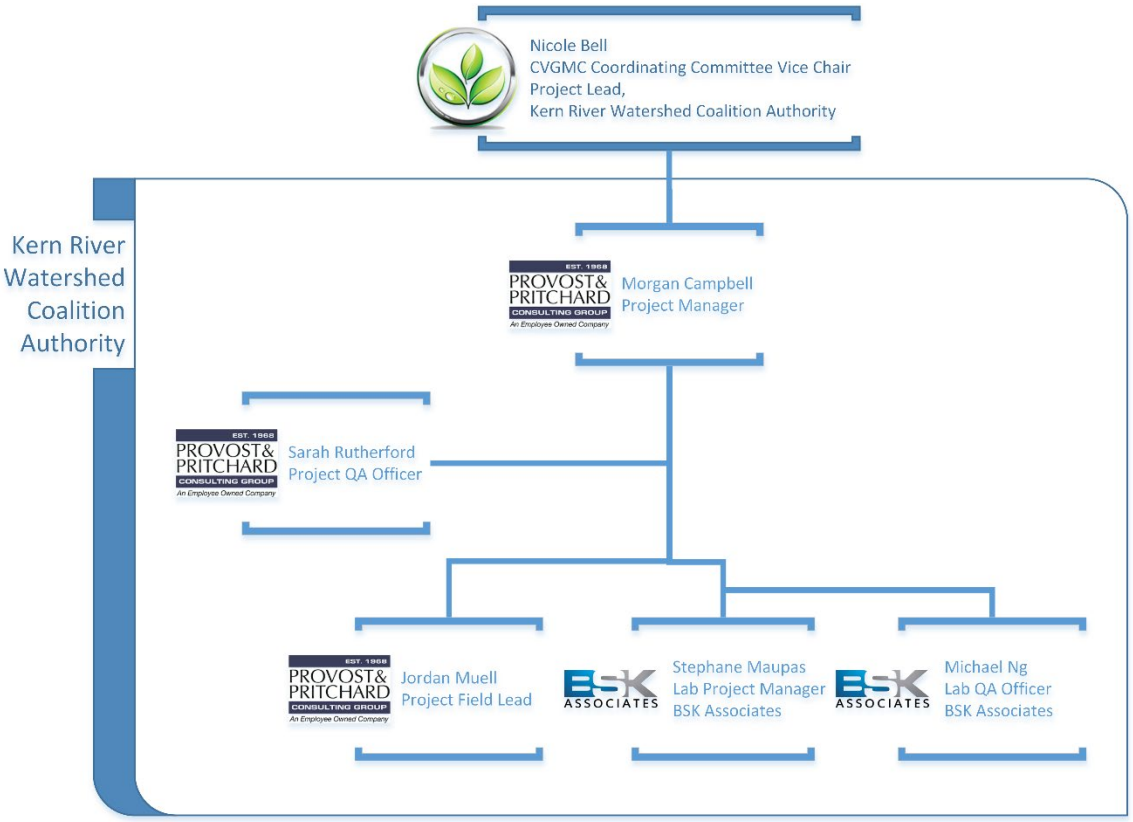


Figure 1-7. Kings River Water Quality Coalition Organizational Chart.

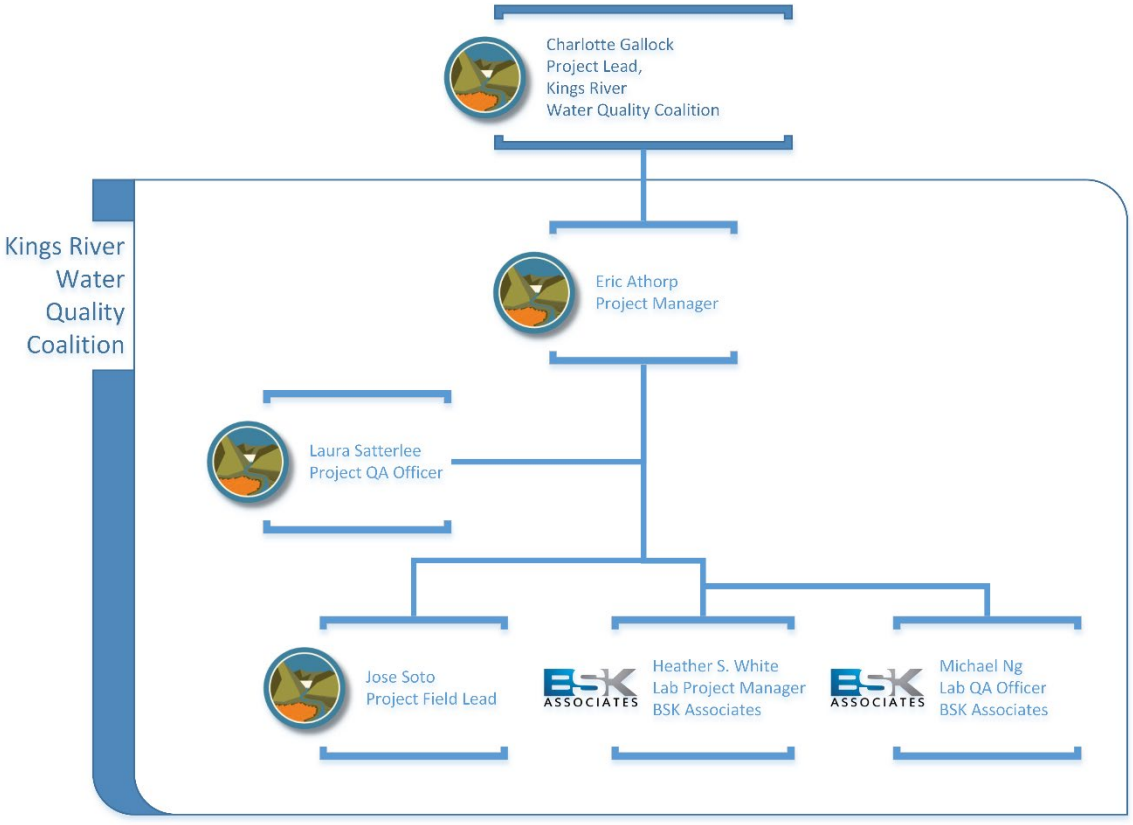


Figure 1-8. Westlands Water Quality Coalition Organizational Chart.

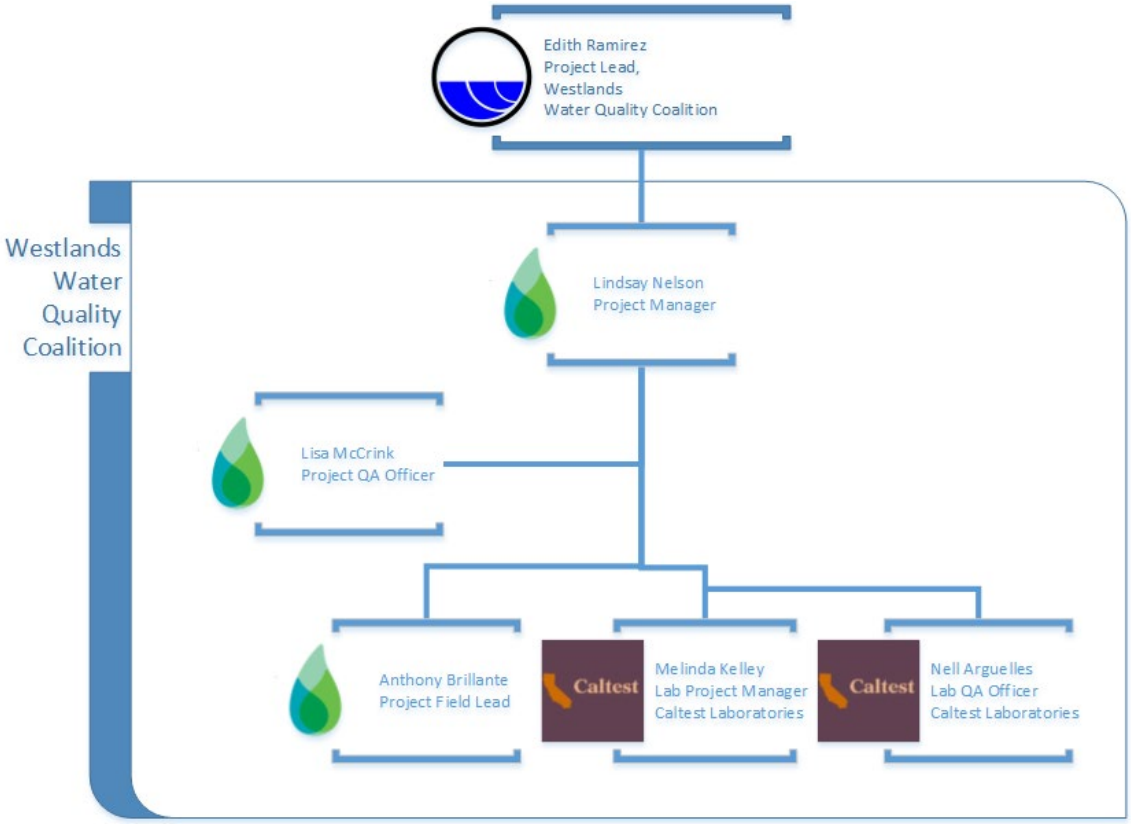


Figure 1-9. Westside San Joaquin River Watershed Coalition Organizational Chart.

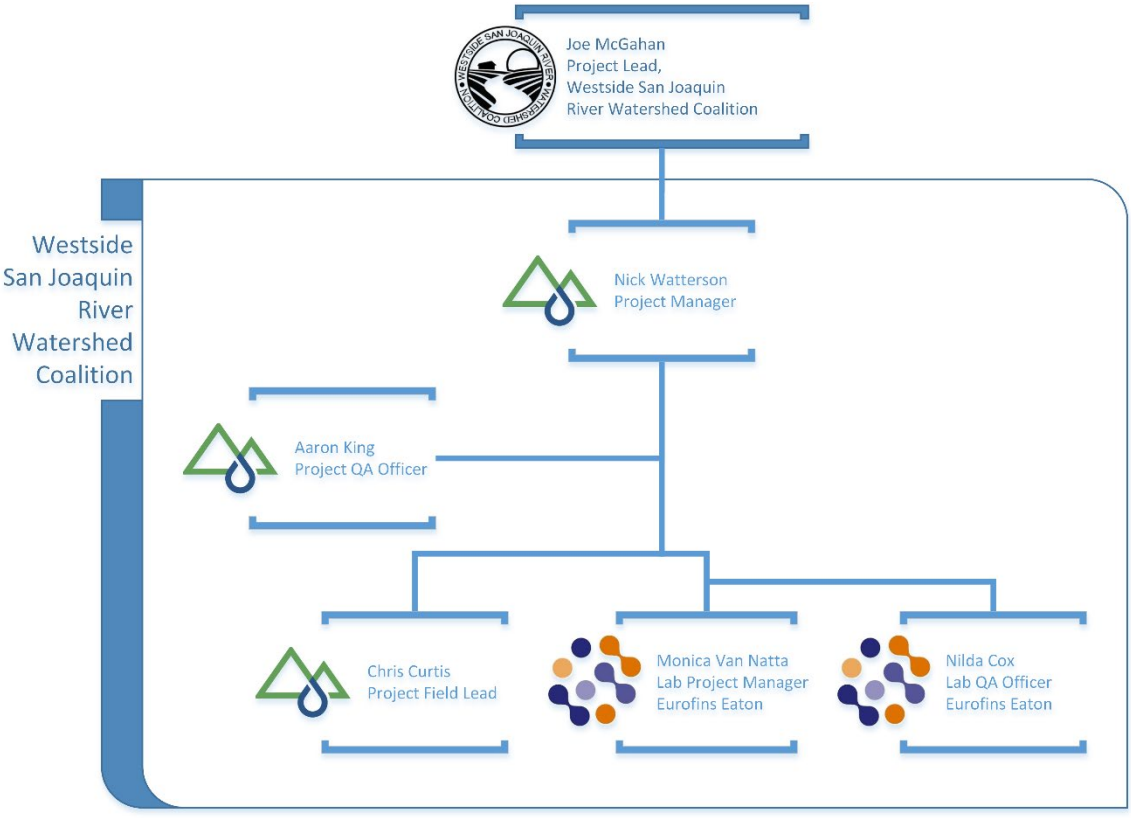


Figure 1-10. Westside Water Quality Coalition Organizational Chart.

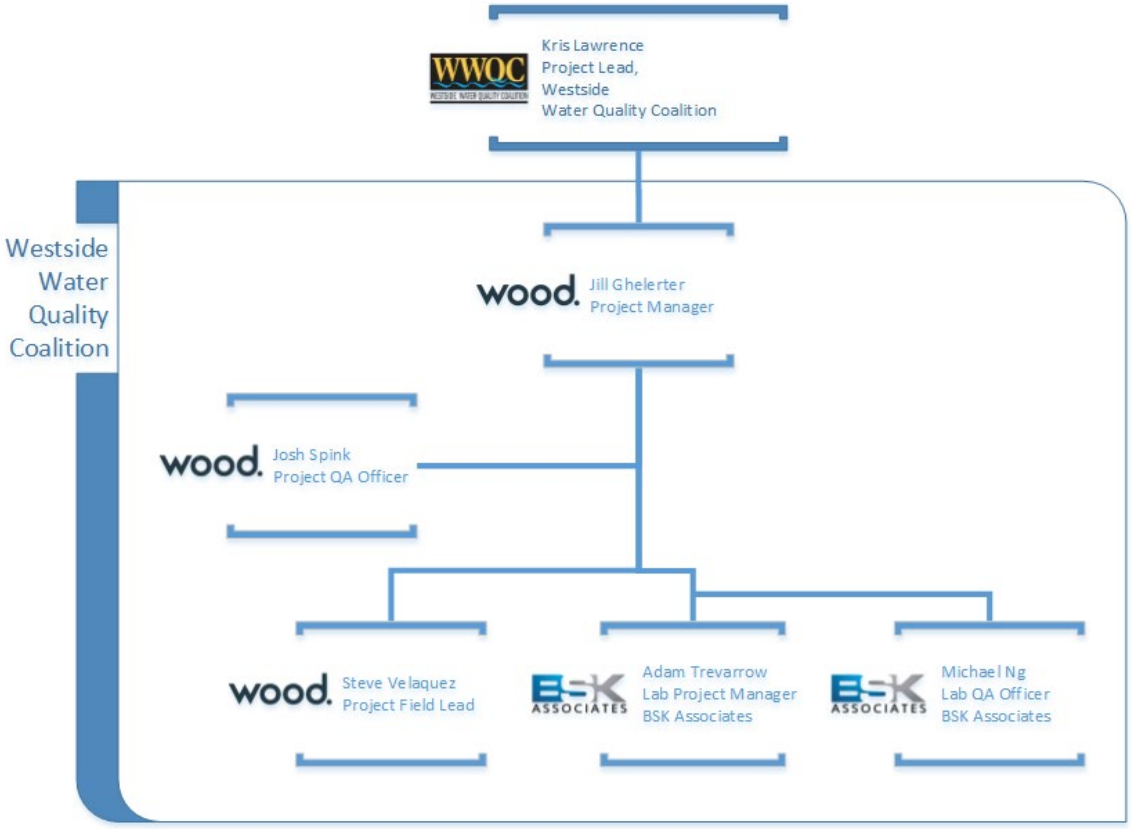


FIGURE 2. COALITION WELL NETWORK MAPS

Figure 2-1. Buena Vista Coalition well network map.

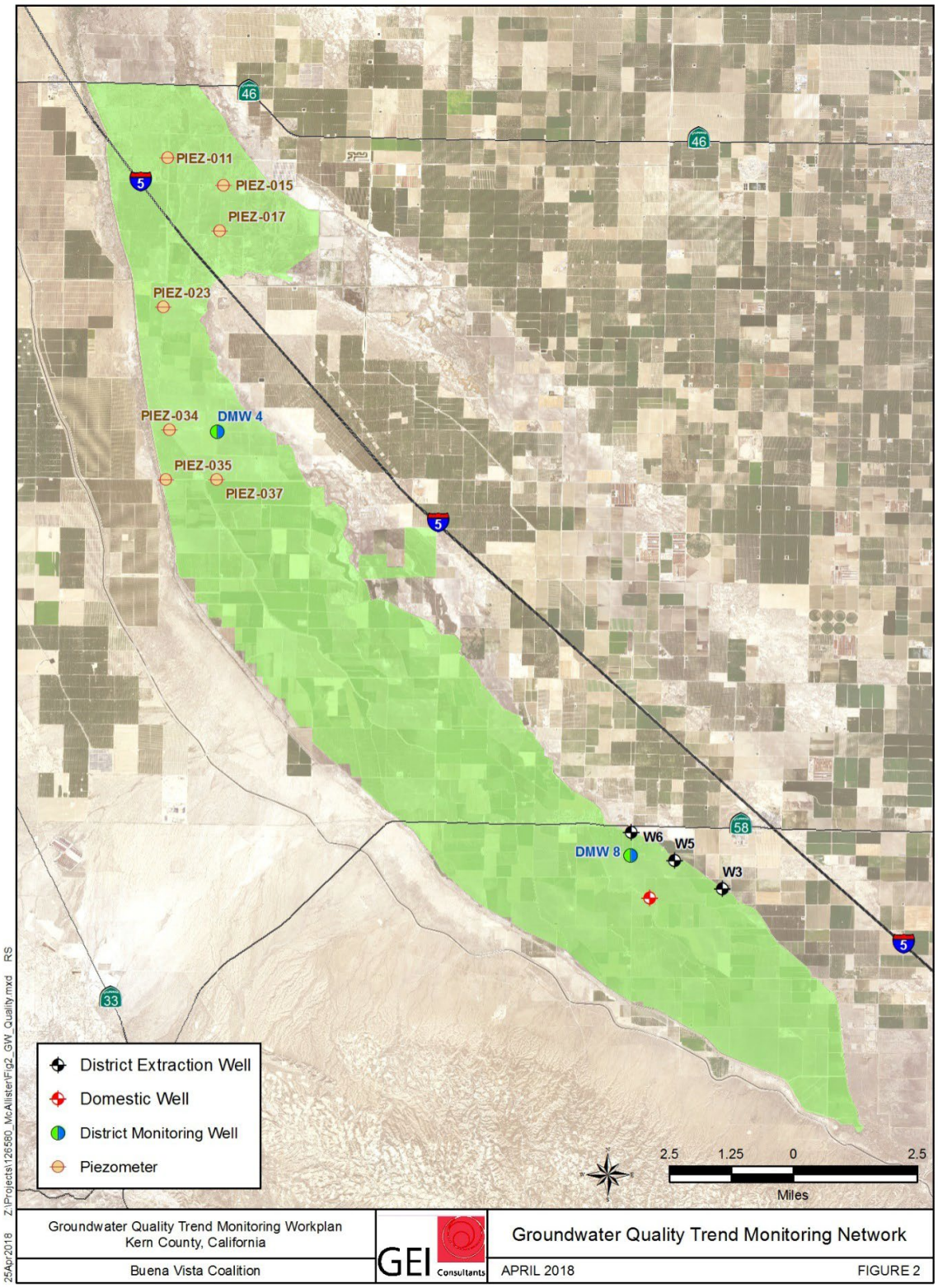


Figure 2-2. Cawelo Water District Coalition well network map.

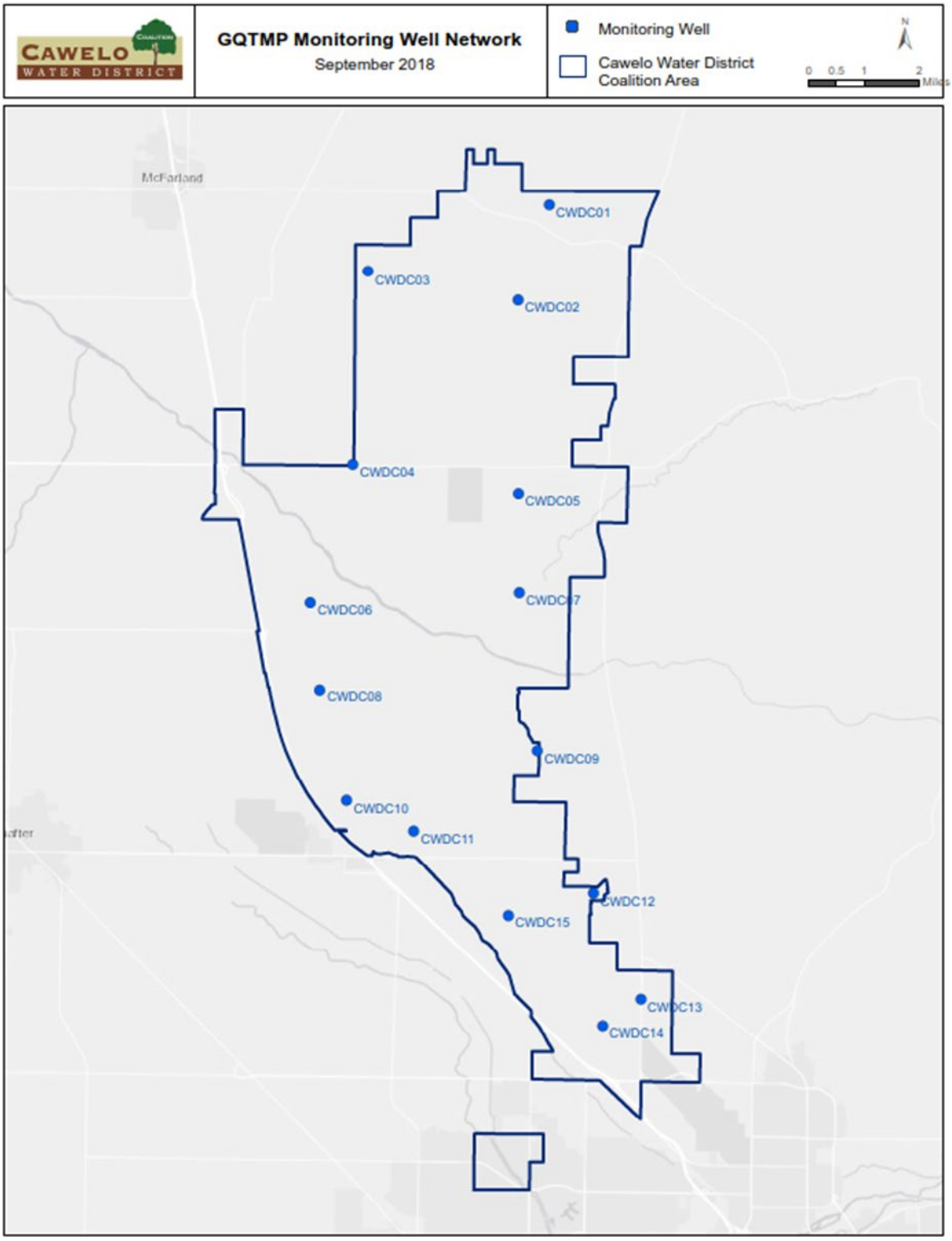


Figure 2-3. East San Joaquin Water Quality Coalition well network map.

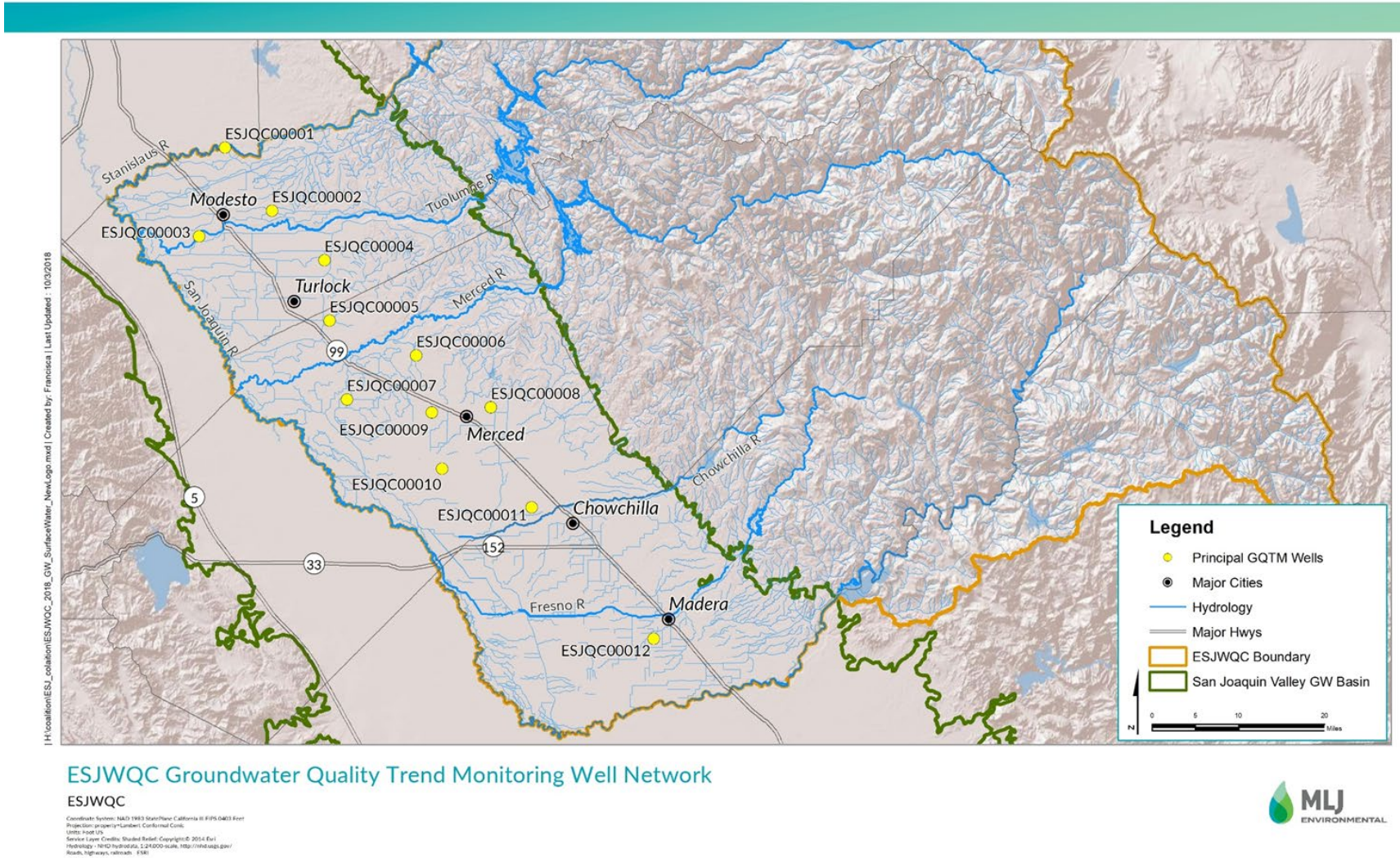


Figure 2-4. Grassland Drainage Area Coalition well network map.

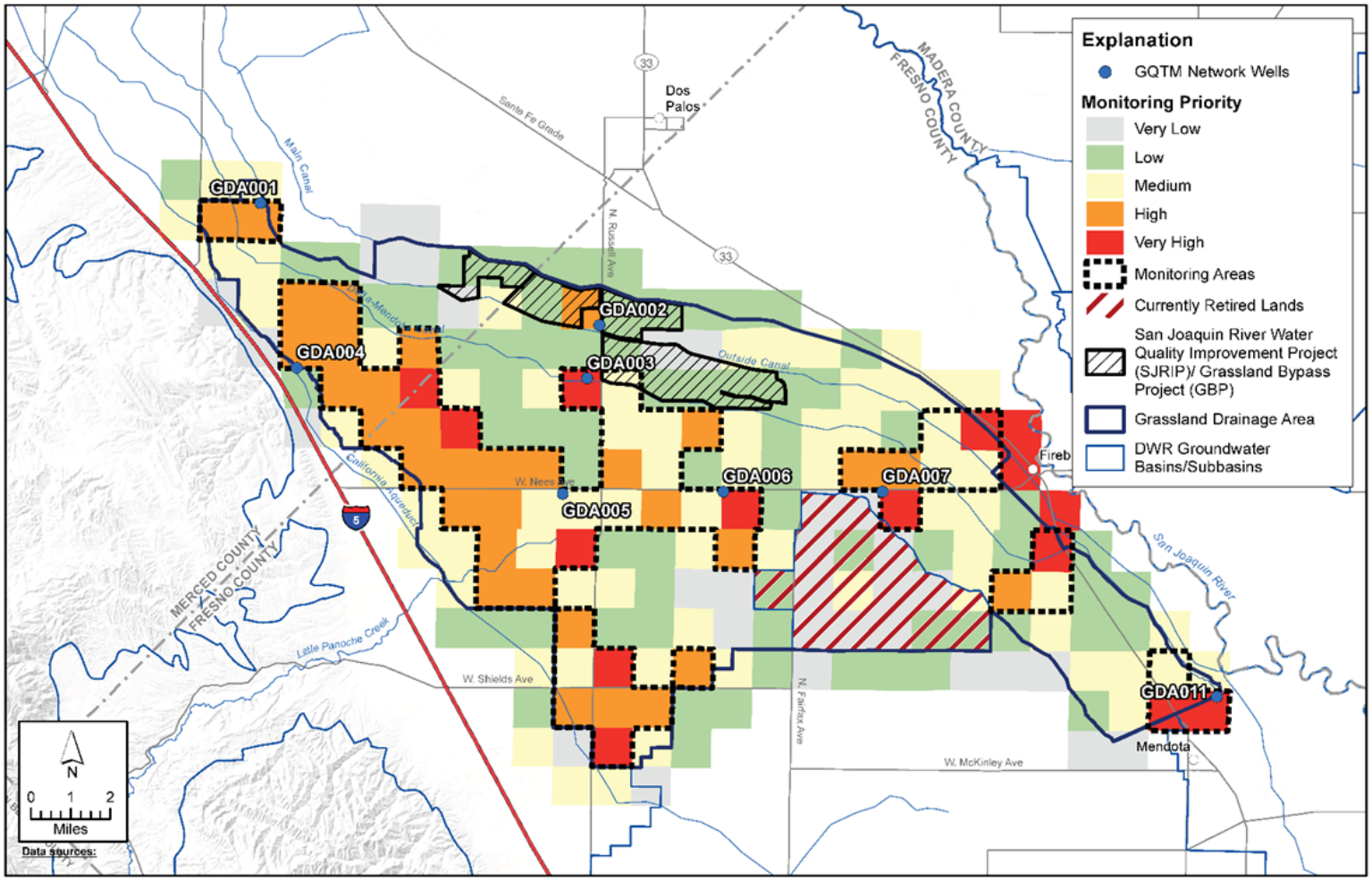


Figure 2-5. Kaweah Basin Water Quality Association well network map.

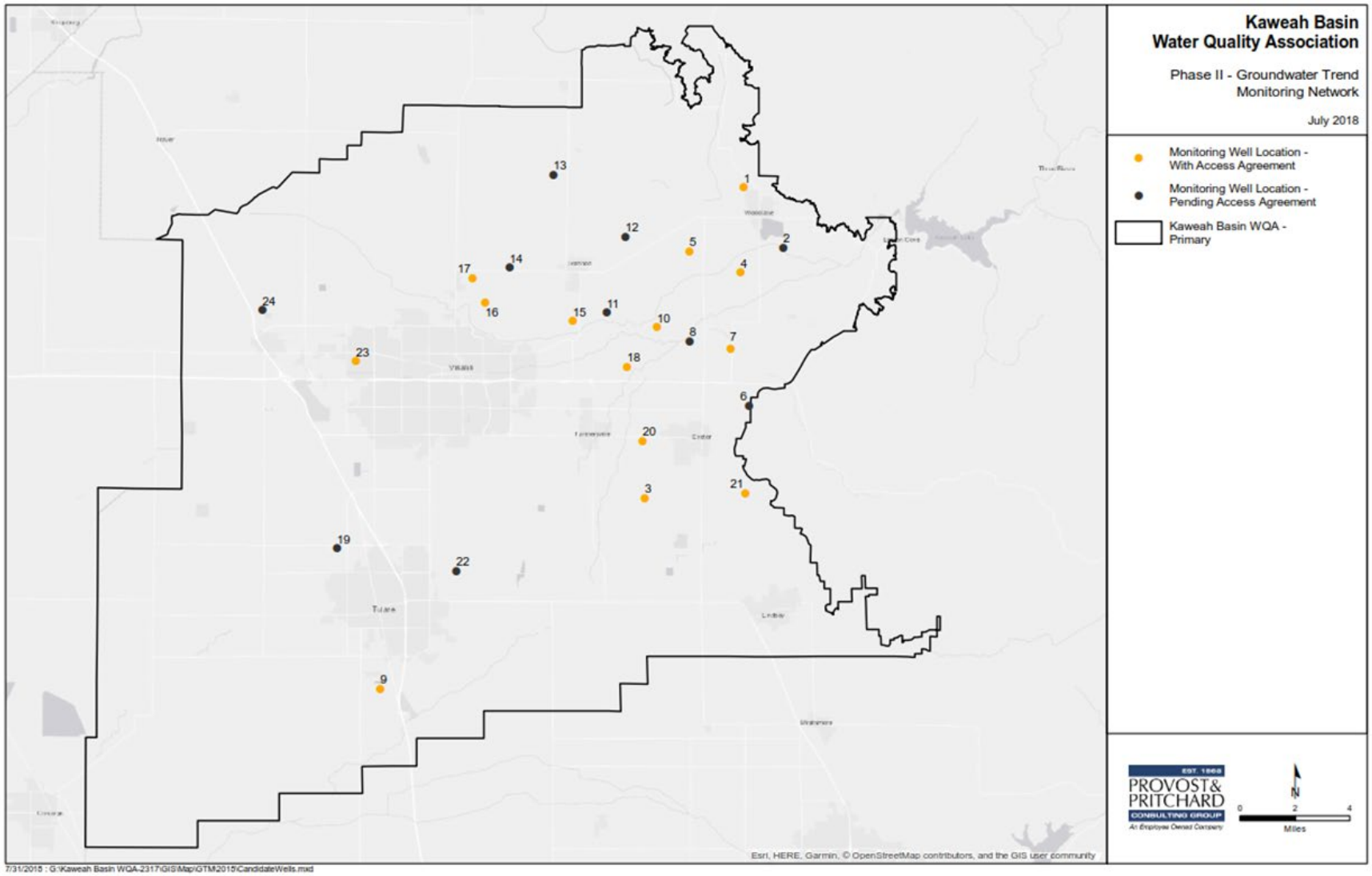


Figure 2-6. Kern River Watershed Coalition Authority well network map.

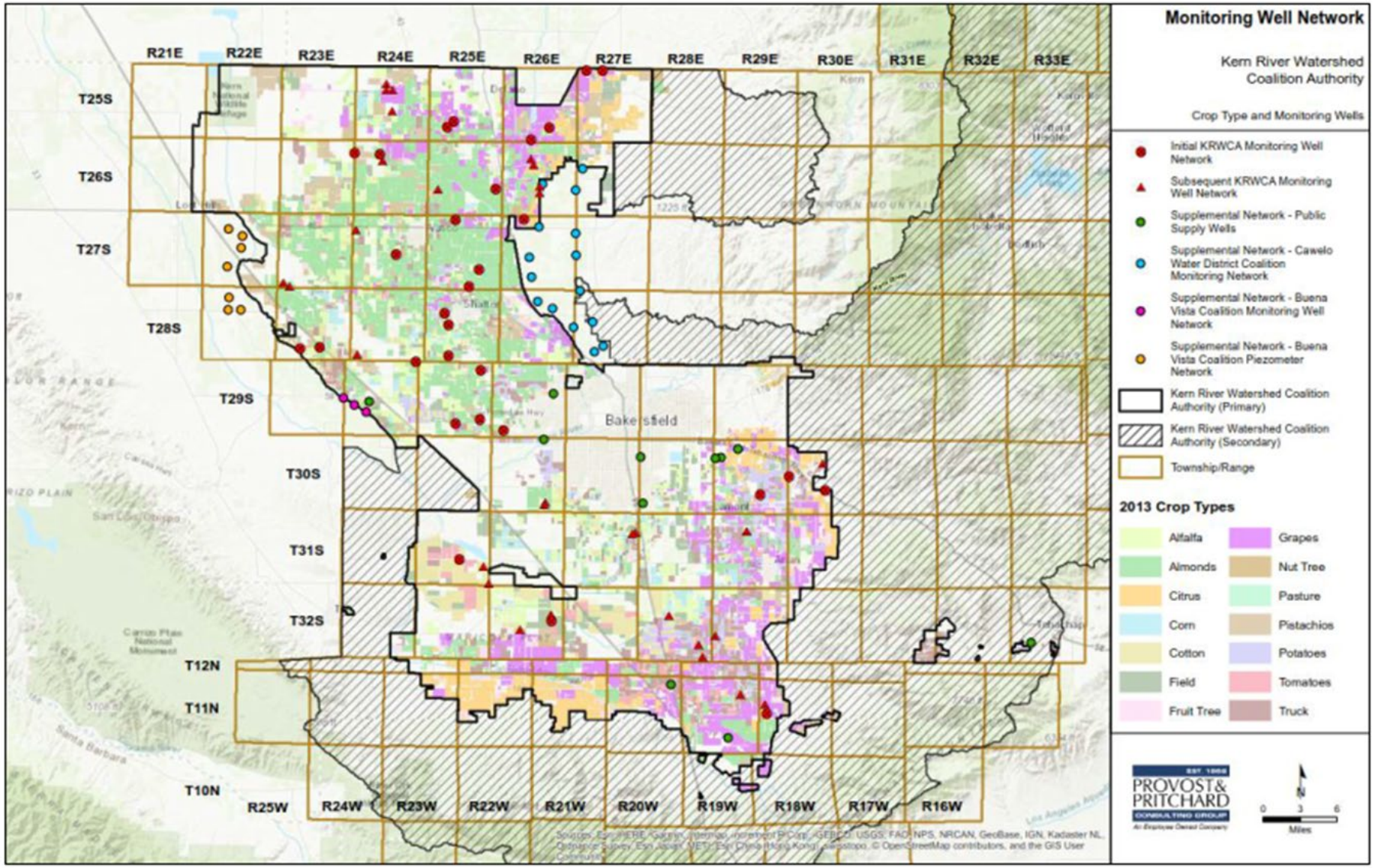


Figure 2-7. Kings River Water Quality Coalition well network map.

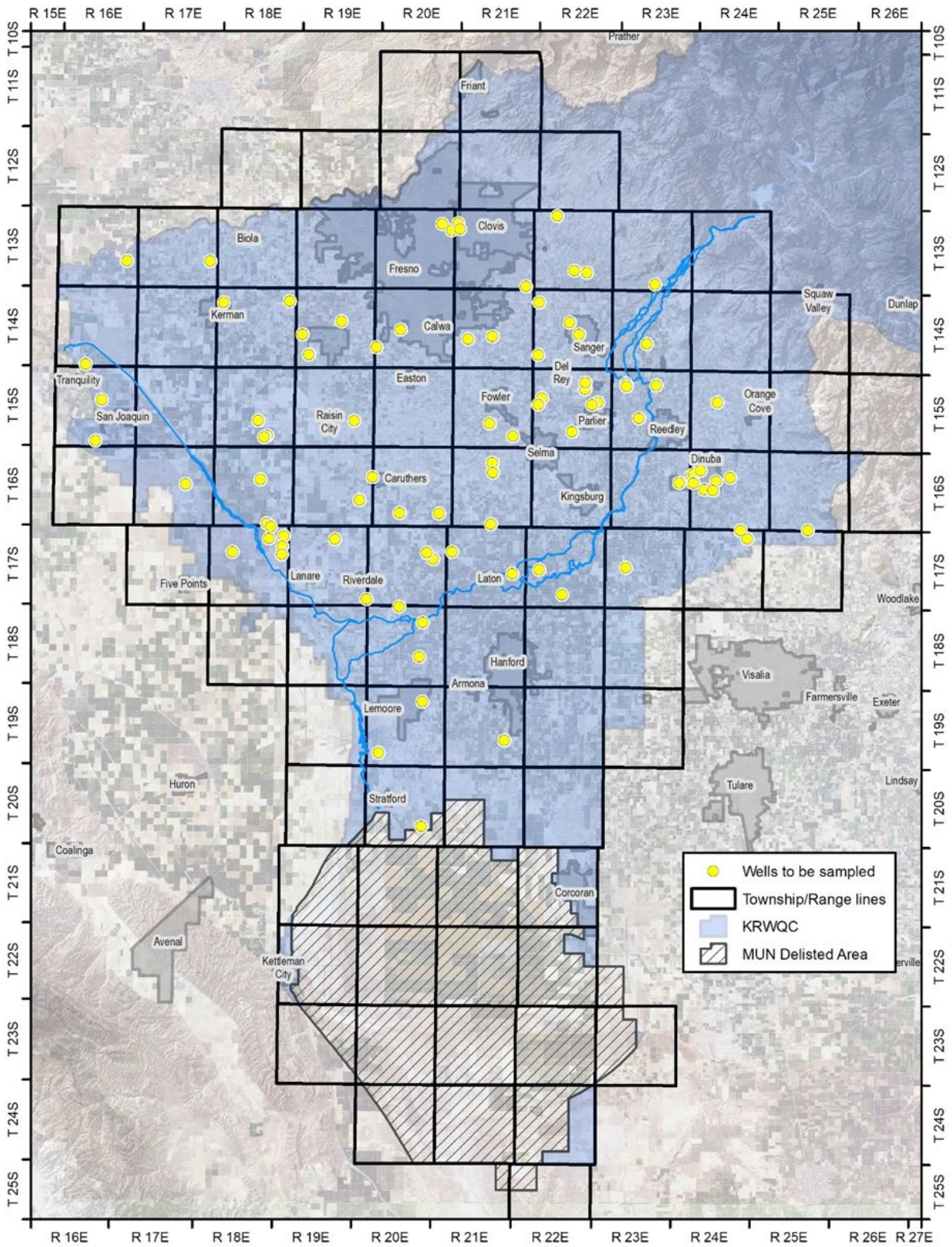


Figure 2-8. Westlands Water Quality Coalition well network map.

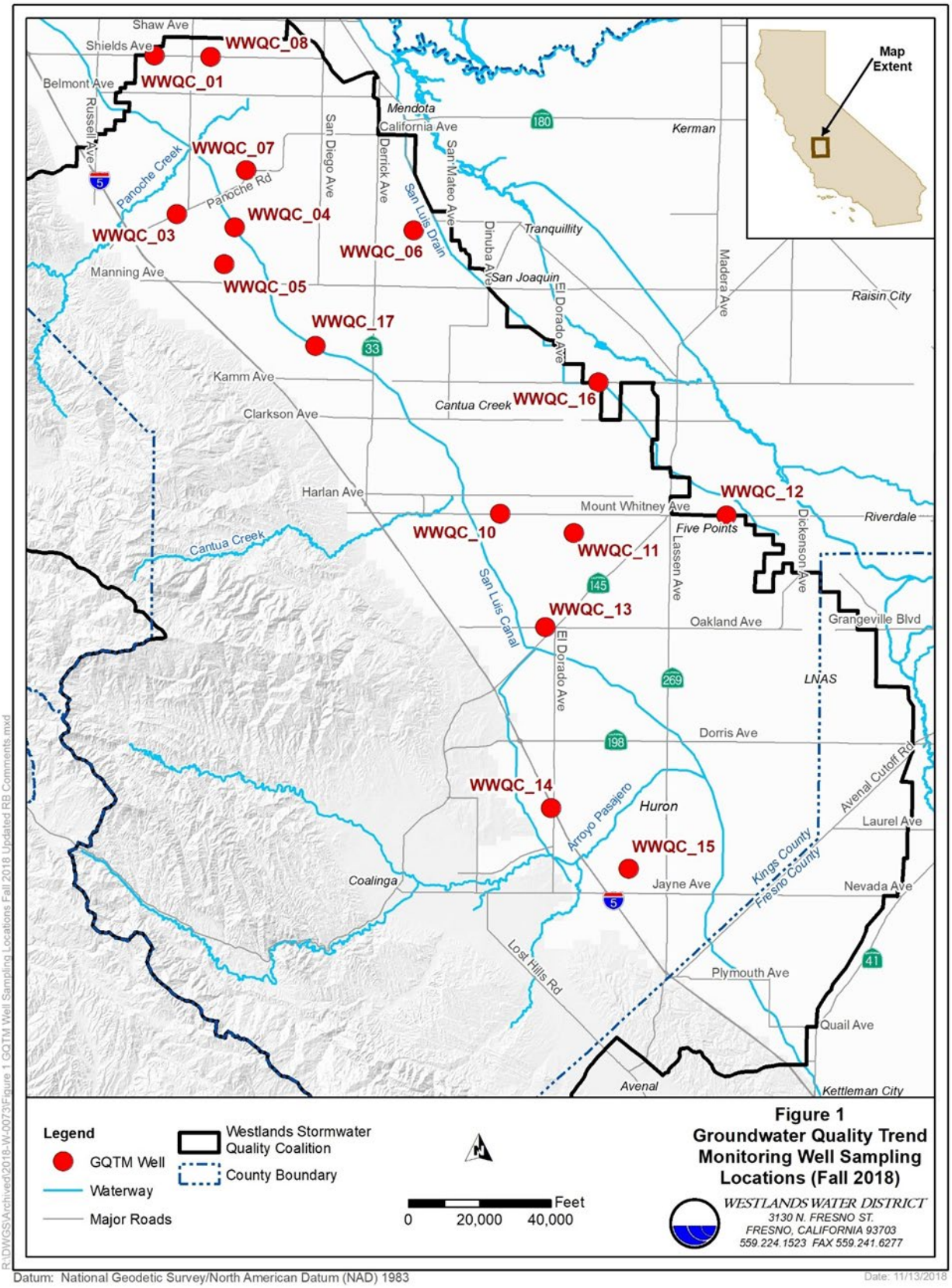
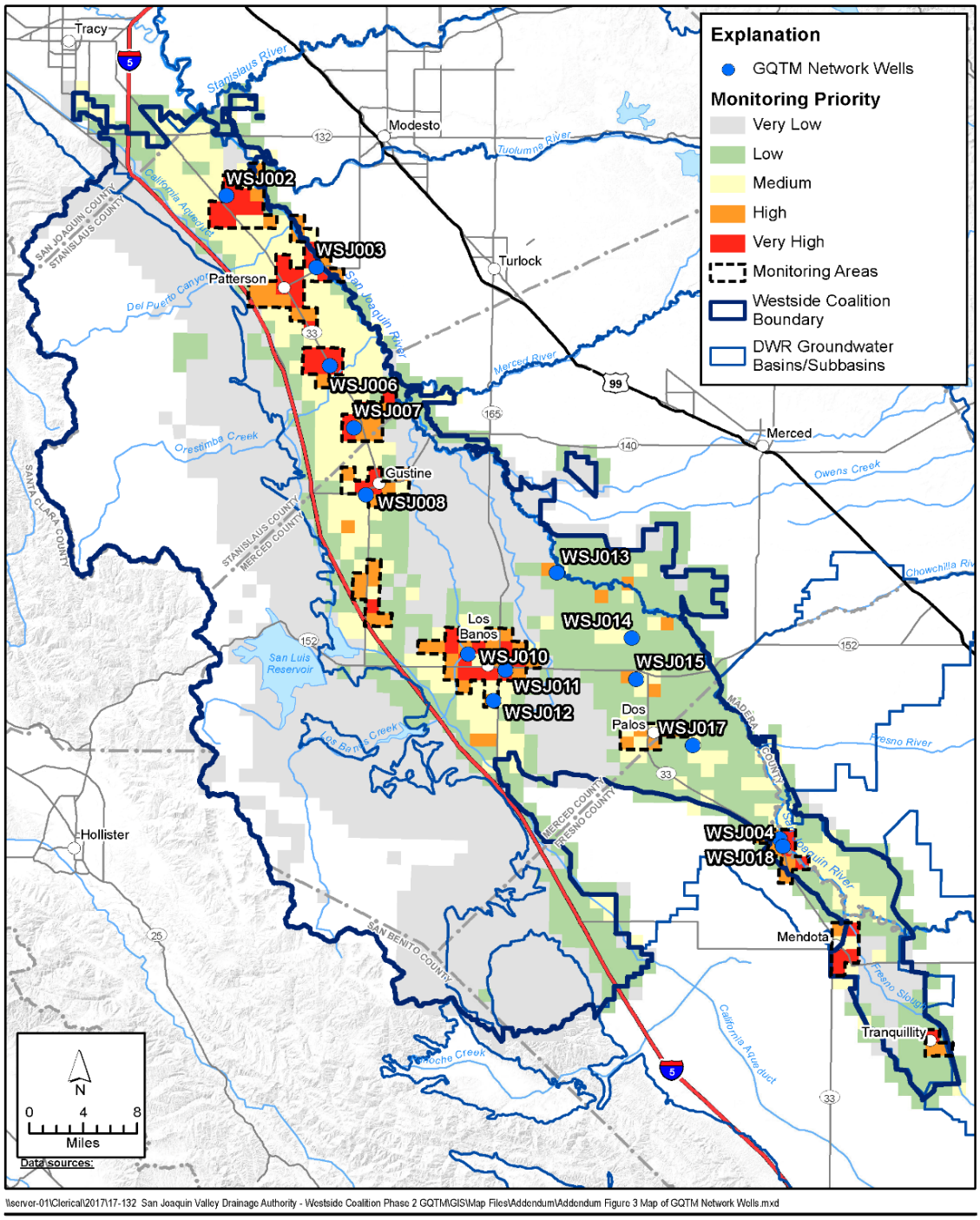


Figure 2-9. Westside San Joaquin River Watershed Coalition well network map.



Luhdorff & Scalmanini Consulting Engineers

Map of GQTM Network Wells

Groundwater Quality Trend Monitoring Workplan Addendum
Westside San Joaquin River Watershed Coalition

Figure 2-10. Westside Water Quality Coalition well network map.

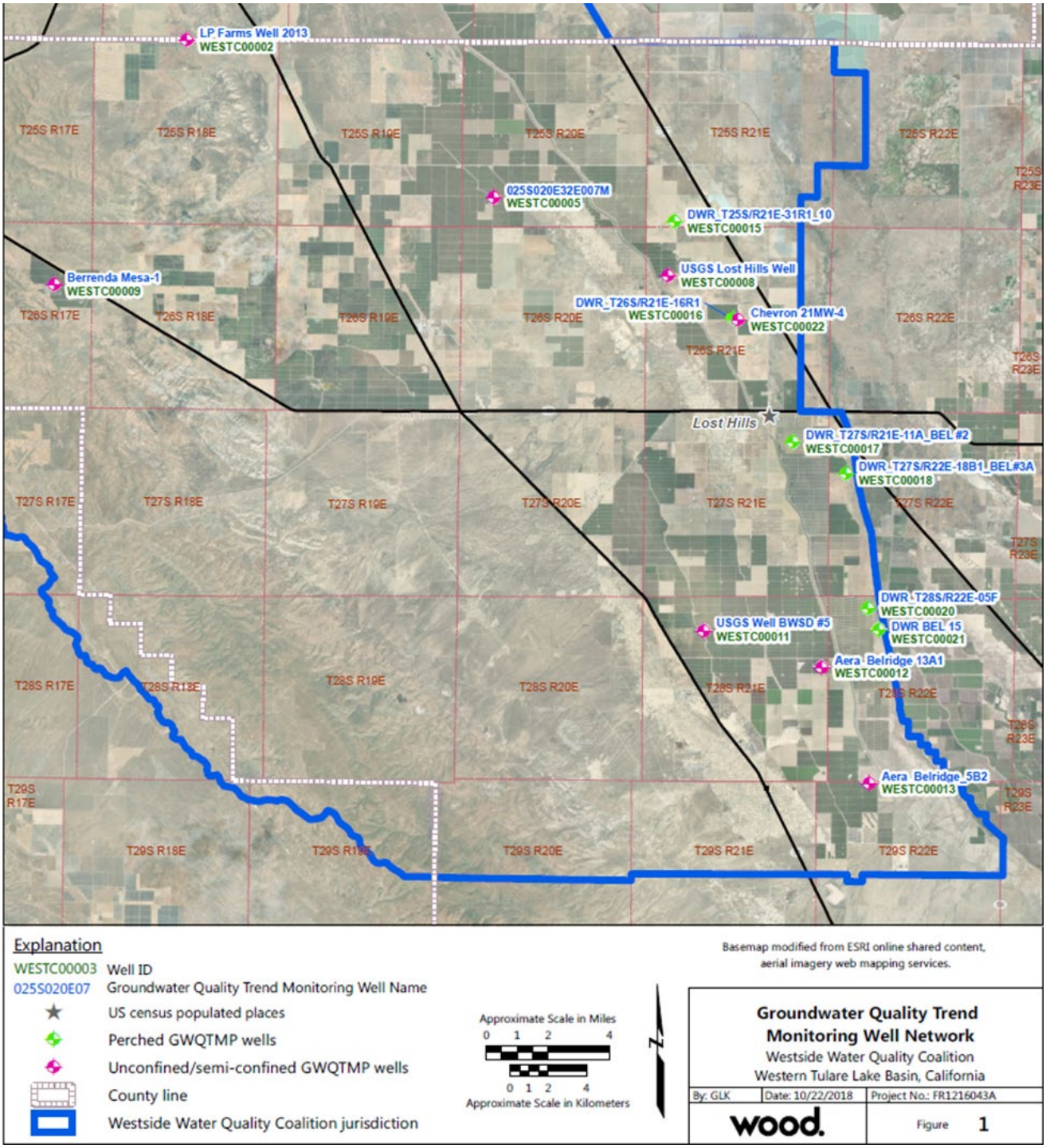


TABLE 7. SPECIALIZED TRAINING OR CERTIFICATIONS.

Table 7-1. Buena Vista Coalition specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
Safety Training	Potential field safety hazards	Phillip Melcher	All field crew members	P&P
Field Methods Training	Proper sample collection and field documentation	Sarah Rutherford/Morgan Campbell	All field crew members	P&P

Table 7-2. Cawelo Water District Coalition specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
Safety Training	Potential field safety hazards	Phillip Melcher	All field crew members	Cawelo Water District
Field Methods Training	Proper sample collection and field documentation	Sarah Rutherford/Morgan Campbell	All field crew members	Cawelo Water District

Table 7-3. East San Joaquin Water Quality Coalition specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
Field Sampling	Procedures and techniques for collecting groundwater samples.	MLJ Environmental	All sampling personnel	MLJ Environmental Offices
Field and Office Safety	Overview of safety concerns and procedures for field sampling and office work.	MLJ Environmental	All sampling personnel	MLJ Environmental Offices

Table 7-4. Grassland Drainage Area Coalition specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
CPR/First Aid	In-class and online course in first aid, AED, and CPR	Red Cross	Chris Curtis	Kept on file with LSCE
Well Sampling	Field instruments, sampling procedures ,well purge procedures	LSCE	Chris Curtis	Kept on file with LSCE

Table 7-5. Kaweah Basin Water Quality Association specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
Safety Training	Potential field safety hazards	Phillip Melcher	All field crew members	P&P
Field Methods Training	Proper sample collection and field documentation	Sarah Rutherford/Morgan Campbell	All field crew members	P&P

Table 7-6. Kern River Watershed Coalition Authority specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
Safety Training	Potential field safety hazards	Phillip Melcher	All field crew members	P&P
Field Methods Training	Proper sample collection and field documentation	Sarah Rutherford/Morgan Campbell	All field crew members	P&P

Table 7-7. Kings River Water Quality Coalition specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
Sample Collection and Transport	Correct collection, labeling, and transport of samples	Derek Ramirez, Moore-Twining Inc.	Eric Athorp, Jose Soto, Jarrett Winther	KRWQC/KRCD Office
General Safety	KRCD IIRP Program	Diane Ruble, KRCD District Office Safety Officer	All District Office Staff	KRCD District Office 4886 E Jensen Ave Fresno

Table 7-8. Westlands Water Quality Coalition specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
Field Sampling	Procedures and techniques for collecting groundwater samples.	MLJ Environmental	All sampling personnel	MLJ Environmental Offices
Field and Office Safety	Overview of safety concerns and procedures for field sampling and office work.	MLJ Environmental	All sampling personnel	MLJ Environmental Offices

Table 7-9. Westside San Joaquin River Watershed Coalition specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
CPR/First Aid	In-class and online course in first aid, AED, and CPR	Red Cross	Chris Curtis	Kept on file with LSCE
Well Sampling	Field instruments, sampling procedures ,well purge procedures	LSCE	Chris Curtis	Kept on file with LSCE

Table 7-10. Westside Water Quality Coalition specialized training or certifications.

Specialized Training	Description of Training	Training Provider	Personnel Receiving Training	Location of Records & Certificates
Driving Safety	Mobe and Demobe to site	Wood	Steve Velasquez	Not applicable
General Field	General field work training including communication, heat stress, slipping, and equipment failure.	Wood	Steve Velasquez	Not applicable
Groundwater Sampling	Groundwater sampling and calibration of field equipment	Wood	Steve Velasquez	Not applicable

FIGURE 3. COALITION FIELD SHEETS

Figure 3-1. Buena Vista Coalition field sheet.

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An Employee Owned Company

Buena Vista Coalition

Groundwater Monitoring Field Sheet

Client: _____ Sample ID: *(Initials + YYMMDD)* _____

Lab Client Number: _____ County: _____

Project Name: _____

Project Manager: _____ Weather: _____

Sampler: _____ Field Measure Instrumentation: _____

Sample Containers: _____ Date Last Calibrated: _____

(Field equipement should be calibrated for all parameters within 24 hours of sampling)

Well ID: _____ Sample Time: _____

Depth of Well: _____ Notes: _____

Depth to Water: _____

Standing Water Column:

Depth to Water Instrumentation:

Recorded Latitude/Longitude: Target Latitude/Longitude:

Rep.	Time	Gallons Purged	Temp (Celcius)	pH (units)	E.C. (umhos/cm)	DO (mg/L)
1						
2						
3						
4						
5						
6						
7						

Page 1

Purge Method: Sample Method:

Slotted Interval:

Calculated Purge Volume:

Well Casing Diameter:

Nearby Running Wells:

Nearby Surface Water:

Figure 3-2. Cawelo Water District Coalition field sheet.

FIELD SHEET

Cawelo Water District Coalition	
Groundwater Quality Trend Monitoring	Year:
Well ID:	Sample ID:
Sampler:	Sample Type:
Sample Container:	QC Sample Type:
Sample Time: Date:	Depth to GW:
Sampling Conditions:	
GPS Coordinates at Sampling Location Latitude:	Longitude:
Field Instrumentation:	Calibration Time/Date:

Field Measurements:

No.	Measurement Time	Cubic Feet Purged	Temp (Celsius)	pH	E.C (umhos/cm)	Turbidity (NTU)	DO (mg/L)		
1									
2									
3									
4									
5									

Additional Comments/Notes:

Figure 3-3. East San Joaquin Water Quality Coalition field sheet.

Well Purging and Sampling Log

State Well #: QTMP Well ID: Sample ID: Field Point:

Member Name:

Physical Address:

Date: Target Lat/Long: Well Depth:

Sky Code (Circle one): Field Lat.: Depth to Water:

Clear, Cloudy, Partly Cloudy, Rain

Wind: Calm, Light wind, Gusty

Field Long.: MP to LSE:

Accuracy: Casing Dia.:

Unit:

QC Site: Yes No

Blank pH:

Personnel:

Picture # (s):

Well Type: Domestic Irrigation Public Water Supply

Well Diameter Multiplier			Purge Volume Calculations
Diameter	L	Gal	**DTW (Depth to water); WD (well depth); CV (casing vol)**
2"	0.6	0.16	1CV= (TD-DTW)* Multiplier; 3CV= 1CV*3
4"	2.4	0.65	

Sampling Point Description:

At the wellhead

After pressure tanks

From a holding tank

Spigot away from wellhead

After Filter

Other:

Purge start time: **Purge Log** **Purge end time:**

Time	Volume	Temp	EC	DO	pH	ORP	DTW	Turbidity	Comments

Purge Method: Submersible Turbine pump other:

Sampling Method: Submersible Turbine pump other:

Sample Collection Log **Sample time:**

Analysis	Container	Volume	Quantity	Filtered	Preservative	Lab
Nitrate + Nitrite as N	Poly	500 mL	1	Yes / No	H_2SO_4	
B, Ca, K, Mg, Na	Poly	500 mL	1	Yes / No	HNO_3	
TDS/ Alk/ Cl/ SO_4	Poly	500 mL	1	Yes / No		

Notes:

Figure 3-4. Grassland Drainage Area Coalition well purge field sheet.

Grasslands Drainage Area Coalition - Well Purge Field Sheet

Well ID_____ **Date**_____**Arrival Time**_____

Field Staff_____**Time Since Well Last Pumped (hrs)** _____

Notes:_____

Water Level Ref. Point_____

TOTAL WELL DEPTH (ft)		SWL (ft)		STICKUP (ft)		CASING DIAMETER (in)	PVC / Steel
STANDING WATER COLUMN (ft)	X	0.16 (for 2" casing); 0.37 (for 3" casing); 0.65 (for 4" casing); 1.0 (for 5" casing); 1.47 (for 6" casing); 2.61 (for 8" casing); 4.08 (for 10" casing); 5.88 (for 12" casing); 10.45 (for 16" casing); 16.32 (for 20" casing)	=	WET CASING VOL. Ve (gal)	3 Ve (gal)		

Stability is achieved when pH varies by 1 SU or less, EC by 5% or less, and Turbidity is below 10 NTU

Clock Time	Pumping Time (min)	Flow Rate (gpm)	Cumulative Flow (gals)	Water Level (ft)	pH	EC (µs/cm)	Turbidity (NTU)	ORP (mV)	DO (mg/L)	Observations (color, odor, etc.)

Average Flow Rate (Q in gals/min):		4-Hour Extrapolated Drawdown (s in ft):		Specific Yield (Sc = Q/s):		%change since last test (100 x (ScCurrent-ScLast)/ScLast):	

Figure 3-5. Grassland Drainage Area Coalition well sampling field sheet.

Grasslands Drainage Area Coalition - Well Sampling Field Sheet

Well ID#_____ **Site Name**_____ **Site Address**_____

SWN_____ **Date**_____ **Event Type** (GQTM 1-yr) (GQTM 5-yr) **Other**_____

Field Staff _____ **Latitude (Decimal Deg. NAD 83)**_____ **Longitude (Decimal Deg. NAD 83)**_____

Current Weather Conditions (cloudy/sunny) (dry/raining) (hot/warm/cold) **Site Photos Taken (#)**_____ **Tap Photos Taken (#)**_____

Sample tap location if different from recommended sample tap (describe the tap and its location and why the recommended tap was not used).

_____

Condition of Sample Tap_____ **Wellhead**_____ **Well Seal/Pad**_____

Note Any Adjacent Contaminant Sources_____

Time Since Well Last Pumped (hours) _____ **Static Water Level**_____ **Water Level Ref. Point**_____

Pump Start Time _____ **Approx. Flow (GPM)** _____ **Field Purge Form Used: YES NO Sample Collection Time** _____

pH_____ **EC (uS/cm)**_____ **Water Temp (°C)**_____ **DO(mg/L)**_____ **ORP(mV)**_____ **Turbidity(NTU)**_____

Field Probe Make and Model_____ **Field Probe Last Calibration/Maintenance Date**_____

#	Sample ID	Size (mL)	Bottle Type (Amber glass, opaque plastic, or translucent plastic), Preservative	Analyte(s)	Sample Type (sample, blank, duplicate)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Comments:_____

_____

Figure 3-6. Kaweah Basin Water Quality Association field sheet.

EST. 1968
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CONSULTING GROUP
An Employee Owned Company

Kaweah Basin Water Quality Association

Groundwater Monitoring Field Sheet

Client: Sample ID: *(Intials+YYMMDD)*

Lab Client Number: County:

Project Name:

Project Manager: Weather:

Sampler: Field Measure Instrumentation:

Sample Containers: Date Last Calibrated:

(Field equipement should be calibrated for all parameters within 24 hours of sampling)

Well ID: Sample Time:

Depth of Well: Sample ID: (Intials + YYMMDD)

Depth to Water:

Standing Water Column:

Depth to Water Instrumentation:

Recorded Latitude/Longitude: Target Latitude/Longitude:

Rep.	Time	Gallons Purged	Temp (Celcius)	pH (units)	E.C. (umhos/cm)	Turbidity (NTU)	DO (mg/L)
1							
2							
3							
4							
5							
6							
7							

Page 1

Purge Method: Sample Method:

Slotted Interval:

Calculated Purge Volume:

Well Casing Diameter:

Nearby Running Wells:

Nearby Surface Water:

Figure 3-7. Kern River Watershed Coalition Authority field sheet.

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

Kern River Watershed Coalition Authority

Groundwater Monitoring Field Sheet

Client: _____ Sample ID: *(Initials - YYMMDD)*

Lab Client Number: _____ County: _____

Project Name: _____

Project Manager: _____ Weather: _____

Sampler: _____ Field Measure Instrumentation: _____

Sample Containers: _____ Date Last Calibrated: _____

(Field equipement should be calibrated for all parameters within 24 hours of sampling)

Well ID: _____ Sample Time: _____

Depth of Well: _____ Notes: _____

Depth to Water: _____

Standing Water Column: _____

Depth to Water Instrumentation: _____

Recorded Latitude/Longitude: _____ Target Latitude/Longitude: _____

Rep.	Time	Gallons Purged	Temp (Celcius)	pH (units)	E.C. (umhos/cm)	DO (mg/L)
1						
2						
3						
4						
5						
6						
7						

Page 1

Purge Method: _____ Sample Method: _____

Slotted Interval: _____

Calculated Purge Volume: _____

Well Casing Diameter: _____

Nearby Running Wells: _____

Nearby Surface Water: _____

Figure 3-8. Kings River Water Quality Coalition field sheet.

ILRP: Groundwater Trend Monitoring Field Sheet Pg of Pgs

Coalition Name: Kings River Water Quality Coalition			DATE (mm/dd/yyyy):
Project ID: Groundwater Trend Monitoring			FIRST SAMPLE TIME:
Station ID & Name :	Arrival Time:	Departure Time:	Latitude:
Physical Address:			Longitude:
			Datum: / Accuracy (ft / m):

State Well ID (if known):

Sampling Crew (and Agency): **KRCD**

Sample Type: Field Blank Field Duplicate Field Sample

Comments:

PHYSICAL PARAMETERS

	primary	duplicate
Water Temp (Celsius):		
pH:		
EC (uS/cm):		
DO (mg/L)		
Depth to Standing Water		

SKY CODE:	clear, partly cloudy, overcast, fog, hazy
PRECIPITATION:	None, Foggy, Drizzle, Rain, Snow
PRECIPITATION (last 24 hrs):	Unknown, <1", >1", None

	Sample ID	Analyte	Container	Number	Notes
	See COC for Chemistries and bottle assignments				
	Lab determines which bottle a test is run from based on method and volume required				
	Field Calibration Data				
	EC (uS/cm):				
	EC Standard (Blank)				
	EC Standard (100 uS/cm)				
	pH Standard (7)				

Figure 3-9. Westlands Water Quality Coalition field sheet.

Well Purging and Sampling Log

State Well #: _____ QTMP Well ID: _____ Sample ID: _____ Field Point: _____

Member Name: _____

Physical Address: _____

Date: _____ Target Lat/Long: _____ Well Depth: _____

Sky Code (Circle one): Field Lat.: _____ Depth to Water: _____

Clear, Cloudy, Partly Cloudy, Rain Field Long.: _____ MP to LSE: _____

Wind: Calm, Light wind, Gusty Accuracy: _____ Casing Dia.: _____

Unit: _____

QC Site: Yes No

Blank pH: _____

Personnel: _____

Picture # (s): _____

Well Type: Domestic Irrigation Public Water Supply

Sampling Point Description:

At the wellhead

After pressure tanks

From a holding tank

Spigot away from wellhead

After Filter

Other: _____

Well Diameter Multiplier			Purge Volume Calculations
Diameter	L	Gal	**DTW (Depth to water); WD (well depth); CV (casing vol)**
2"	0.6	0.16	1CV= (TD-DTW)* Multiplier; 3CV= 1CV*3
4"	2.4	0.65	

Purge start time: **Purge Log** **Purge end time:**

Time	Volume	Temp	EC	DO	pH	ORP	DTW	Turbidity	Comments

Purge Method: Submersible Turbine pump other: _____

Sampling Method: Submersible Turbine pump other: _____

Sample Collection Log **Sample time:**

Analysis	Container	Volume	Quantity	Filtered	Preservative	Lab
Nitrate + Nitrite as N	Poly	500 mL	1	Yes / No	H_2SO_4	
B, Ca, K, Mg, Na	Poly	500 mL	1	Yes / No	HNO_3	
TDS/ Alk/ Cl/ SO_4	Poly	500 mL	1	Yes / No		

Notes:

Figure 3-10. Westside San Joaquin River Watershed Coalition well purge field sheet.

Westside San Joaquin River Watershed Coalition - Well Purge Field Sheet

Well ID_____ **Date**_____ **Arrival Time**_____

Field Staff_____ **Time Since Well Last Pumped (hrs)** _____

Notes:_____

Water Level Ref. Point_____

TOTAL WELL DEPTH (ft)	SWL (ft)	STICKUP (ft)	CASING DIAMETER (in)	PVC / Steel

STANDING WATER COLUMN (ft)	X	0.16 (for 2" casing); 0.37 (for 3" casing); 0.65 (for 4" casing); 1.0 (for 5" casing); 1.47 (for 6" casing); 2.61 (for 8" casing); 4.08 (for 10" casing); 5.88 (for 12" casing); 10.45 (for 16" casing); 16.32 (for 20" casing)	=	WET CASING VOL. Ve (gal)	3 Ve (gal)

Stability is achieved when pH varies by 1 SU or less, EC by 5% or less, and Turbidity is below 10 NTU

Clock Time	Pumping Time (min)	Flow Rate (gpm)	Cumulative Flow (gals)	Water Level (ft)	pH	EC (µs/cm)	Turbidity (NTU)	ORP (mV)	DO (mg/L)	Observations (color, odor, etc.)

Average Flow Rate (Q in gals/min):		4-Hour Extrapolated Drawdown (s in ft):		Specific Yield (Sc = Q/s):		%change since last test (100 x (ScCurrent-ScLast)/ScLast):	

Figure 3-11. Westside San Joaquin River Watershed Coalition well sampling field sheet.

Westside San Joaquin River Watershed Coalition - Well Sampling Field Sheet

Well ID#_____ **Site Name**_____ **Site Address**_____

SWN_____ **Date**_____ **Event Type** (GQTM 1-yr) (GQTM 5-yr) Other_____

Field Staff _____ **Latitude (Decimal Deg. NAD 83)**_____ **Longitude (Decimal Deg. NAD 83)**_____

Current Weather Conditions (cloudy/sunny) (dry/raining) (hot/warm/cold) **Site Photos Taken (#)**_____ **Tap Photos Taken (#)**_____

Sample tap location if different from recommended sample tap (describe the tap and its location and why the recommended tap was not used).

_____

Condition of Sample Tap_____ **Wellhead**_____ **Well Seal/Pad**_____

Note Any Adjacent Contaminant Sources_____

Time Since Well Last Pumped (hours) _____ **Static Water Level**_____ **Water Level Ref. Point**_____

Pump Start Time _____ **Approx. Flow (GPM)** _____ **Field Purge Form Used: YES NO Sample Collection Time** _____

pH_____ **EC (uS/cm)**_____ **Water Temp (°C)**_____ **DO(mg/L)**_____ **ORP(mV)**_____ **Turbidity(NTU)**_____

Field Probe Make and Model_____ **Field Probe Last Calibration/Maintenance Date**_____

#	Sample ID	Size (mL)	Bottle Type (Amber glass, opaque plastic, or translucent plastic), Preservative	Analyte(s)	Sample Type (sample, blank, duplicate)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Comments:_____

_____

Figure 3-12. Westside Water Quality Coalition field sheet.

GROUNDWATER WELL SAMPLING RECORD

wood.

Project Name:_____
Project No.:_____
Property Address:_____
Latitude/Longitude:_____
Site Name: _____
Site Code:_____
State Well Number:_____
Sampled By:_____
Date:_____

Sample ID:_____
QC Sample Type_____
Sample Depth: _____
Method of Purging:_____
Method of Sampling:_____
Sample Preservation:_____
Sampling Conditions:_____

Initial Depth to Water (Static): _____
Depth to Water after Sampling: _____
Total Depth to Well:_____
Well Diameter:_____
1 Casing/Borehole Volume: _____
4 Casing/Borehole Volumes:_____
Total Casing/Borehole Volumes Removed:
_____

Time	Intake Depth	Rate (mL/min)	Cum. Vol. (mL)	Temp. (°C)	pH (s.u.)	Specific Electrical Conductance (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Remarks

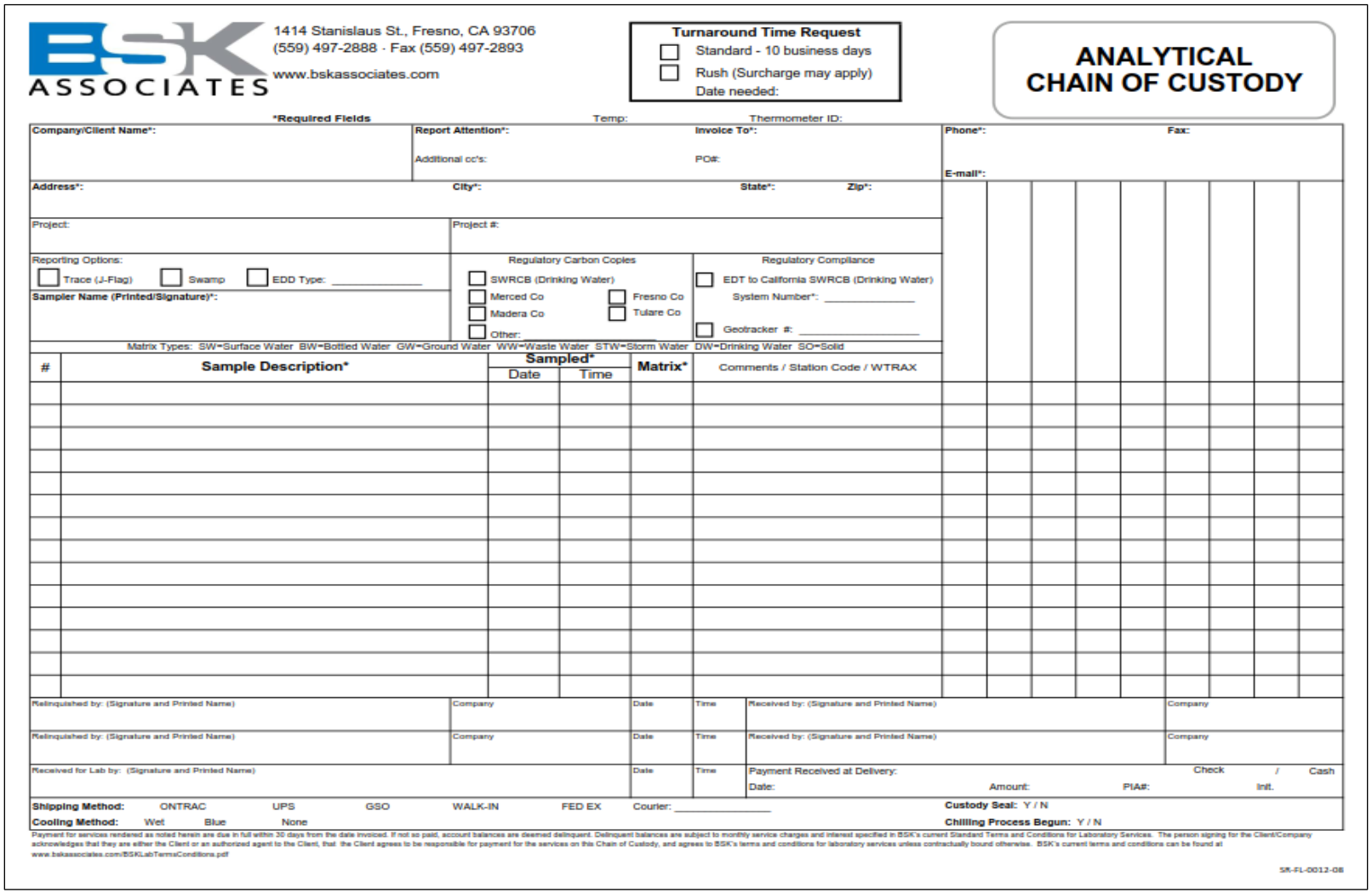
pH CALIBRATION (choose two)		Model or Unit Number:
Buffer Solution		
Field Temperature (°C)		
Instrument Reading		

Specific Electrical Conductance (SEC) Calibration							Model or Unit Number:
KCl Solution (µS/cm=µmhos/cm)							
Field Temperature °C							
Instrument Reading							

Notes

FIGURE 4. COALITION CHAIN OF CUSTODY FORMS

Figure 4-1. Buena Vista Coalition Chain of Custody form.



BSK ASSOCIATES

1414 Stanislaus St., Fresno, CA 93706
(559) 497-2888 · Fax (559) 497-2893
www.bskassociates.com

Turnaround Time Request
☐ Standard - 10 business days
☐ Rush (Surcharge may apply)
Date needed:

ANALYTICAL CHAIN OF CUSTODY

*Required Fields | Temp: | Thermometer ID:

Company/Client Name*:	Report Attention*:	Invoice To*:	Phone*:	Fax:
	Additional cc's:	PO#:	E-mail*:	

Address*: | City*: | State*: | Zip*:

Project: | Project #:

Reporting Options: ☐ Trace (J-Flag) ☐ Swamp ☐ EDD Type: _____

Sampler Name (Printed/Signature)*:

Regulatory Carbon Copies: ☐ SWRCB (Drinking Water) ☐ Merced Co ☐ Fresno Co ☐ Madera Co ☐ Tulare Co ☐ Other: _____

Regulatory Compliance: ☐ EDT to California SWRCB (Drinking Water) System Number*: _____ ☐ Geotracker #: _____

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX

Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Received for Lab by: (Signature and Printed Name)		Date	Time	Payment Received at Delivery: Date: Amount: PIA#:	Check / Cash Init.

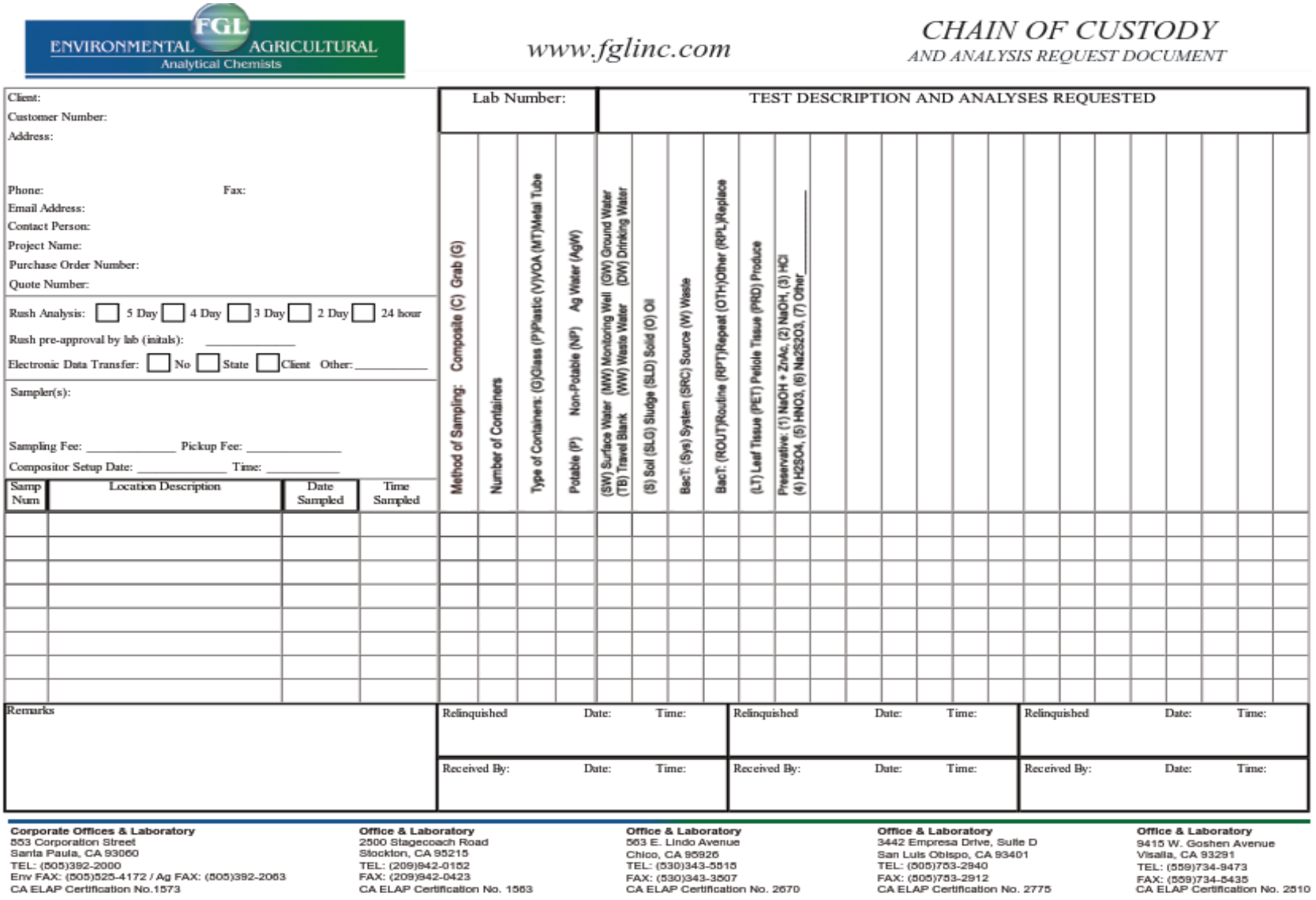
Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Courier: _____ **Custody Seal:** Y / N

Cooling Method: Wet Blue None **Chilling Process Begun:** Y / N

Payment for services rendered as noted herein are due in full within 30 days from the date invoiced. If not so paid, account balances are deemed delinquent. Delinquent balances are subject to monthly service charges and interest specified in BSK's current Standard Terms and Conditions for Laboratory Services. The person signing for the Client/Company acknowledges that they are either the Client or an authorized agent to the Client, that the Client agrees to be responsible for payment for the services on this Chain of Custody, and agrees to BSK's terms and conditions for laboratory services unless contractually bound otherwise. BSK's current terms and conditions can be found at www.bskassociates.com/BSKLabTermsConditions.pdf

SR-FL-0012-08

Figure 4-2. Cawelo Water District Coalition Chain of Custody form.



ENVIRONMENTAL FGL AGRICULTURAL
Analytical Chemists

www.fglinc.com

CHAIN OF CUSTODY
AND ANALYSIS REQUEST DOCUMENT

Client:
Customer Number:
Address:

Phone: Fax:
Email Address:
Contact Person:
Project Name:
Purchase Order Number:
Quote Number:

Rush Analysis: ☐ 5 Day ☐ 4 Day ☐ 3 Day ☐ 2 Day ☐ 24 hour
Rush pre-approval by lab (initals): _____
Electronic Data Transfer: ☐ No ☐ State ☐ Client Other: _____

Sampler(s):

Sampling Fee: _____ Pickup Fee: _____
Compositor Setup Date: _____ Time: _____

Lab Number:

TEST DESCRIPTION AND ANALYSES REQUESTED

Samp Num	Location Description	Date Sampled	Time Sampled	Method of Sampling: Composite (C) Grab (G)	Number of Containers	Type of Containers: (G)Glass (P)Plastic (V)VOA (MT)Metal Tube	Potable (P) Non-Potable (NP) Ag Water (AgW)	(SW) Surface Water (MW) Monitoring Well (GW) Ground Water (TB) Travel Blank (WW) Waste Water (DW) Drinking Water	(S) Soil (SLG) Sludge (SLD) Solid (O) Oil	BacT: (Sys) System (SRC) Source (W) Waste	BacT: (ROUT)Routine (RPT)Repeat (OTH)Other (RPL)Replace	(LT) Leaf Tissue (PET) Petiole Tissue (PRO) Produce	Preservative: (1) NaOH + ZnAc, (2) NaOH, (3) HCl (4) H2SO4, (5) HNO3, (6) Na2S2O3, (7) Other_____

Remarks

Relinquished	Date:	Time:	Relinquished	Date:	Time:	Relinquished	Date:	Time:
Received By:	Date:	Time:	Received By:	Date:	Time:	Received By:	Date:	Time:

Corporate Offices & Laboratory
553 Corporation Street
Santa Paula, CA 93060
TEL: (505)392-2000
Env FAX: (505)525-4172 / Ag FAX: (505)392-2063
CA ELAP Certification No.1573

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0152
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5515
FAX: (530)343-3507
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (505)753-2940
FAX: (505)753-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-5435
CA ELAP Certification No. 2510

Figure 4-3. East San Joaquin Water Quality Coalition Chain of Custody form.

MLJ ENVIRONMENTAL

Caltest CHAIN-OF-CUSTODY RECORD

Client Name:	MLJ-LLC
Address:	1480 Drew Ave. Suite #130, Davis, CA 95618
Sampled By:	
Phone:	(530) 756-5200
Fax:	(530) 756-5225
Project Manager:	Michael Johnson
Project Name:	East San Joaquin Water Quality Coalition

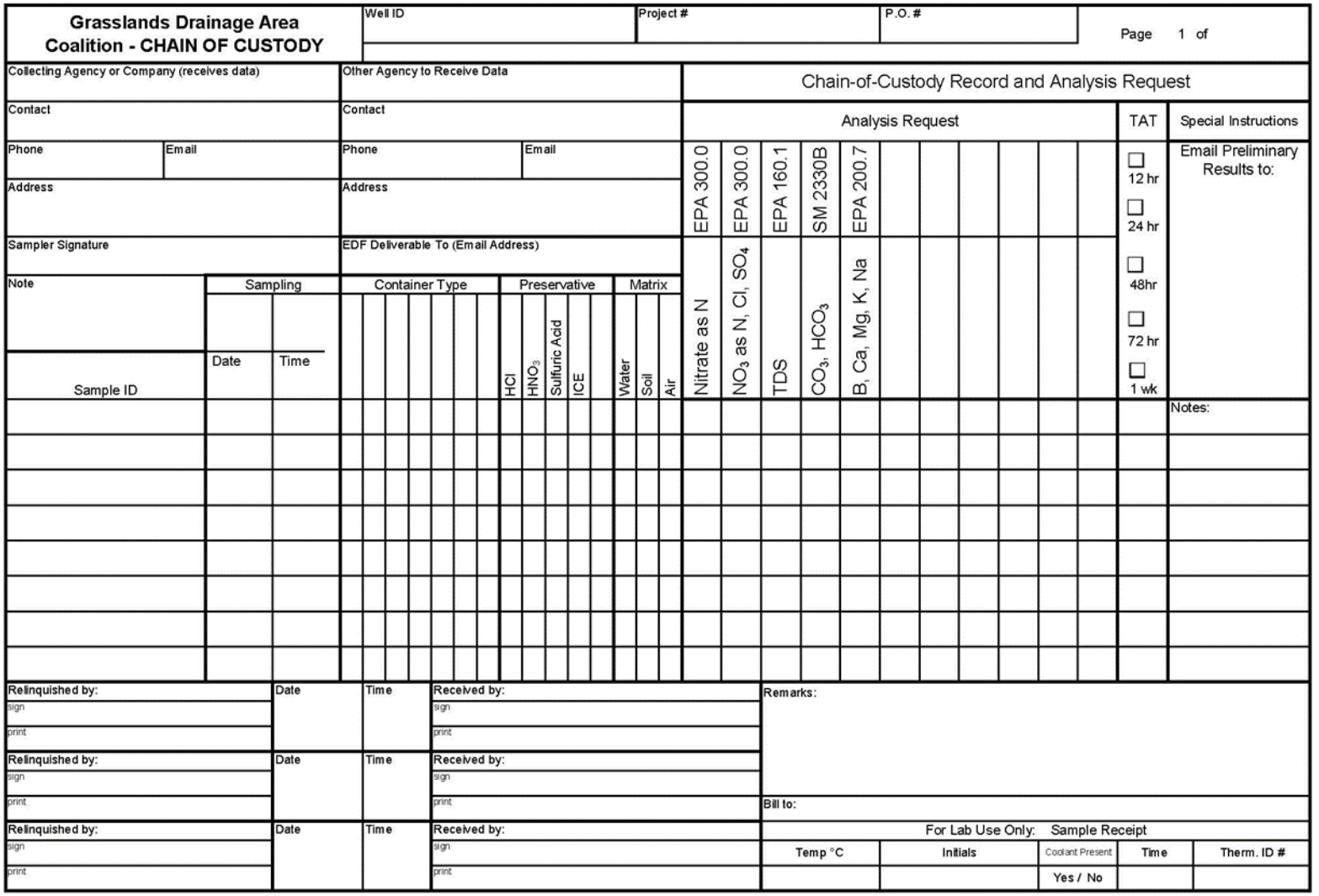
	Sample Identification	Field Point Name	Global ID	Sample Date	Sample Time	Number	Type	Total Alkalinity as CaCO3 (SM 2320B)	Total Dissolved Solids (SM2540C)	Chloride, Sulfate SO4 (EPA 300)	Boron, Calcium, Magnesium, Sodium, Potassium	Nitrate as N (EPA300)	Field pH	LAB ID
1						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
2						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
3						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
4						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
5						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
6						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
7						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							

Comments:	Relinquished By	Relinquished By
Please fax signed and completed COC to MLJ LLC: (530) 756-5225, or email to abrillante@mlj-llc.com	Signature	Signature
	Print Name	Print Name
	Organization	Organization
	Date Time	Date Time
If samples are collected for individual monitoring please write the individual Global ID in the sample comments.	**Received By**	**Received By**
	Signature	Signature
	Print Name	Print Name
Temperature at Log In: (°C)	Organization	Organization
	Date Time	Date Time

Full; pg ____ of ____

Sample Matrix: ☐ Sediment ☐ Freshwater ☐ Wastewater ☐ Stormwater ☒ Groundwater

Figure 4-4. Grassland Drainage Area Coalition Chain of Custody form.



Grasslands Drainage Area Coalition - CHAIN OF CUSTODY

Well ID | Project # | P.O. # | Page 1 of

Collecting Agency or Company (receives data) | Other Agency to Receive Data

Chain-of-Custody Record and Analysis Request

Contact | Contact

Phone | Email | Phone | Email

Address | Address

Sampler Signature | EDF Deliverable To (Email Address)

Note

Analysis Request | TAT | Special Instructions

Email Preliminary Results to:

☐ 12 hr ☐ 24 hr ☐ 48hr ☐ 72 hr ☐ 1 wk

Sample ID	Sampling: Date	Sampling: Time	Container Type	Preservative: HCl	Preservative: HNO_3	Preservative: Sulfuric Acid	Preservative: ICE	Matrix: Water	Matrix: Soil	Matrix: Air	Nitrate as N	NO_3 as N, Cl, SO_4	TDS	CO_3, HCO_3	B, Ca, Mg, K, Na	EPA 300.0	EPA 300.0	EPA 160.1	SM 2330B	EPA 200.7							Notes:

Relinquished by:	Date	Time	Received by:
sign			sign
print			print
Relinquished by:	Date	Time	Received by:
sign			sign
print			print
Relinquished by:	Date	Time	Received by:
sign			sign
print			print

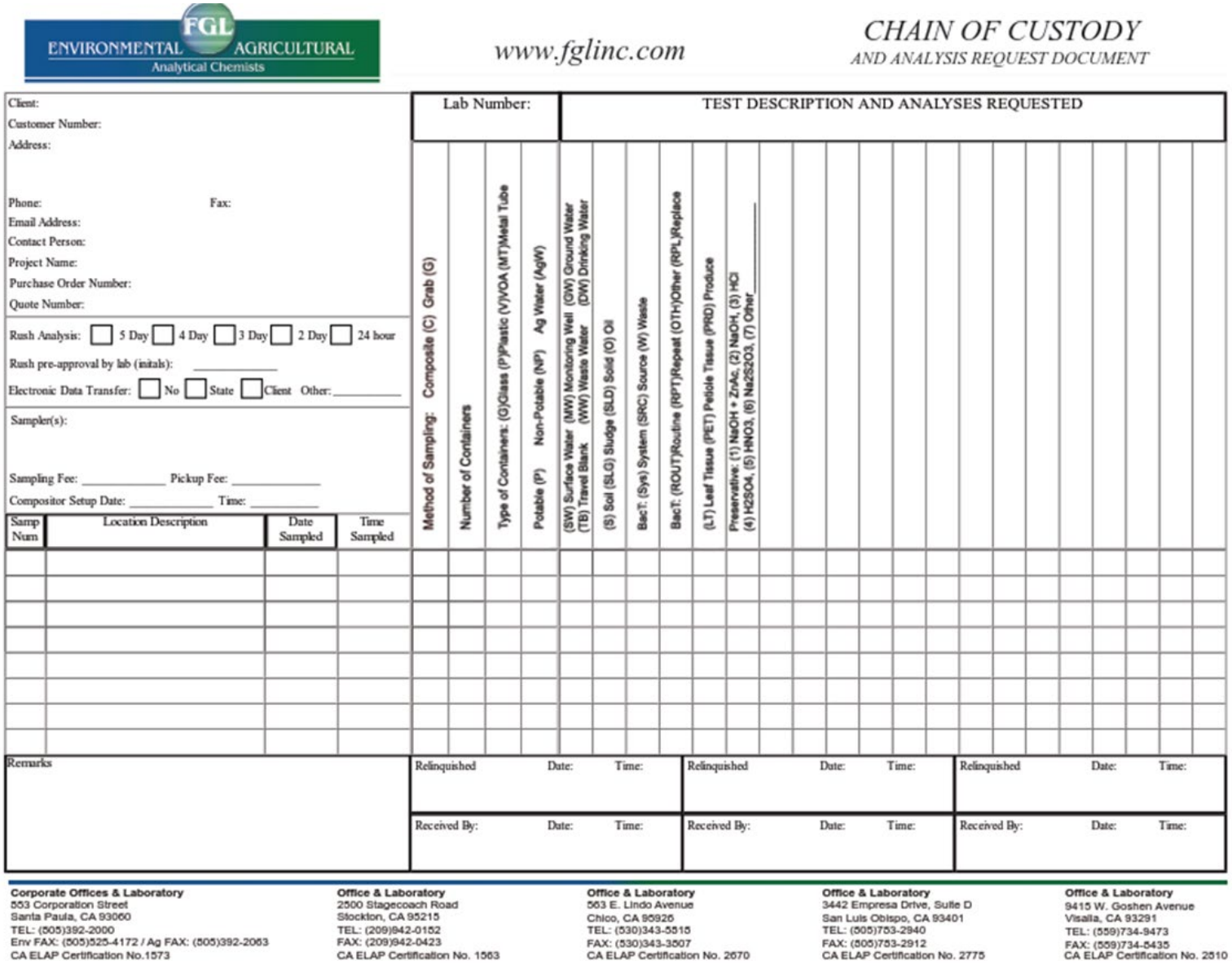
Remarks:

Bill to:

For Lab Use Only: Sample Receipt

Temp °C	Initials	Coolant Present	Time	Therm. ID #
		Yes / No		

Figure 4-5. Kaweah Basin Water Quality Association Chain of Custody form.



ENVIRONMENTAL FGL AGRICULTURAL
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CHAIN OF CUSTODY
AND ANALYSIS REQUEST DOCUMENT

Client:
Customer Number:
Address:

Phone: Fax:
Email Address:
Contact Person:
Project Name:
Purchase Order Number:
Quote Number:

Rush Analysis: ☐ 5 Day ☐ 4 Day ☐ 3 Day ☐ 2 Day ☐ 24 hour
Rush pre-approval by lab (initals): _____
Electronic Data Transfer: ☐ No ☐ State ☐ Client Other: _____

Sampler(s):

Sampling Fee: _____ Pickup Fee: _____
Compositor Setup Date: _____ Time: _____

Lab Number:

TEST DESCRIPTION AND ANALYSES REQUESTED

Samp Num	Location Description	Date Sampled	Time Sampled	Method of Sampling: Composite (C) Grab (G)	Number of Containers	Type of Containers: (G)Glass (P)Plastic (V)VOA (MT)Metal Tube	Potable (P) Non-Potable (NP) Ag Water (AgW)	(SW) Surface Water (MW) Monitoring Well (GW) Ground Water (TB) Travel Blank (WW) Waste Water (DW) Drinking Water	(S) Soil (SLG) Sludge (SLD) Solid (O) Oil	BacT: (Sys) System (SRC) Source (W) Waste	BacT: (ROUT)Routine (RPT)Repeat (OTH)Other (RPL)Replace	(LT) Leaf Tissue (PET) Petiole Tissue (PRD) Produce	Preservative: (1) NaOH + ZnAc, (2) NaOH, (3) HCl (4) H2SO4, (5) HNO3, (6) Na2S2O3, (7) Other_____

Remarks

Relinquished	Date:	Time:	Relinquished	Date:	Time:	Relinquished	Date:	Time:
Received By:	Date:	Time:	Received By:	Date:	Time:	Received By:	Date:	Time:

Corporate Offices & Laboratory
553 Corporation Street
Santa Paula, CA 93060
TEL: (505)392-2000
Env FAX: (505)525-4172 / Ag FAX: (505)392-2063
CA ELAP Certification No.1573

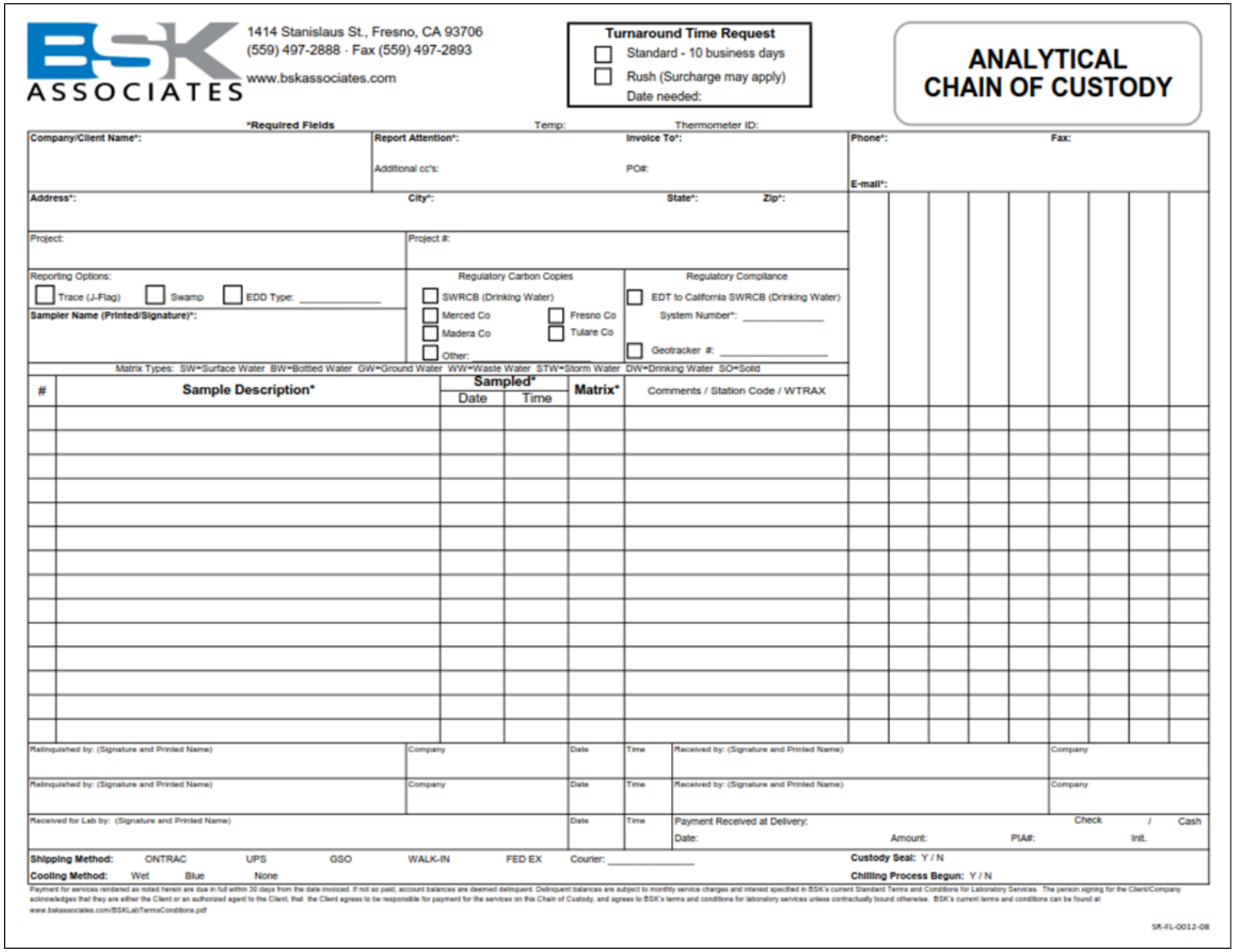
Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (505)753-2940
FAX: (505)753-2912
CA ELAP Certification No. 2775

Office & Laboratory
9415 W. Goshen Avenue
Visalia, CA 93291
TEL: (559)734-9473
FAX: (559)734-5435
CA ELAP Certification No. 2510

Figure 4-6. Kern River Watershed Coalition Authority Chain of Custody form.



BSK ASSOCIATES

1414 Stanislaus St., Fresno, CA 93706
(559) 497-2888 · Fax (559) 497-2893
www.bskassociates.com

Turnaround Time Request
☐ Standard - 10 business days
☐ Rush (Surcharge may apply)
Date needed:

ANALYTICAL CHAIN OF CUSTODY

*Required Fields | Temp: | Thermometer ID:

Company/Client Name*:	Report Attention*:	Invoice To*:	Phone*:	Fax:
	Additional cc's:	PO#:	E-mail*:	
Address*:	City*:	State*:	Zip*:	
Project:	Project #:			

Reporting Options: ☐ Trace (J-Flag) ☐ Swamp ☐ EDD Type: _____

Sampler Name (Printed/Signature)*:

Regulatory Carbon Copies: ☐ SWRCB (Drinking Water) ☐ Merced Co ☐ Fresno Co ☐ Madera Co ☐ Tulare Co ☐ Other:

Regulatory Compliance: ☐ EDT to California SWRCB (Drinking Water) System Number*: _____ ☐ Geotracker #: _____

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX

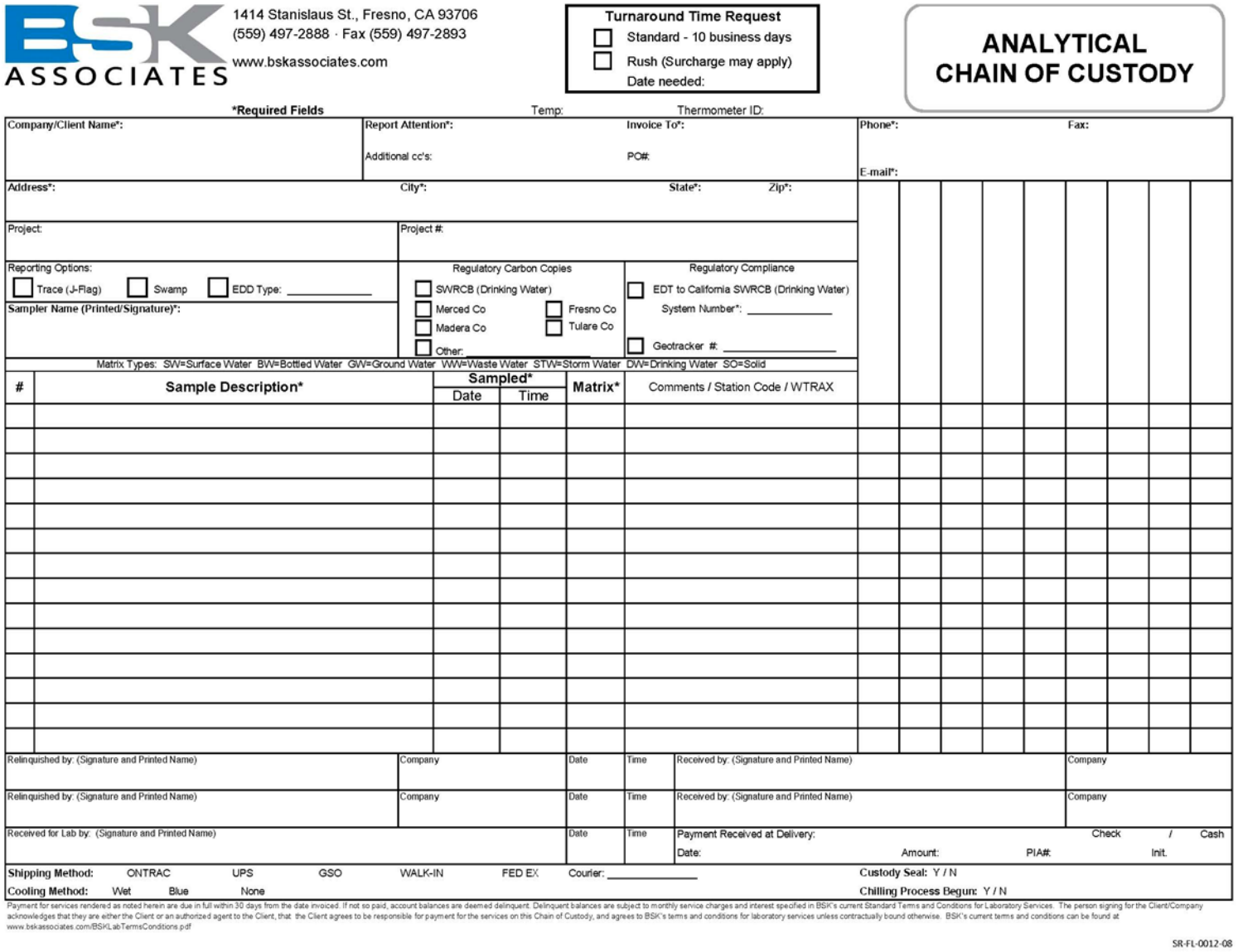
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Received for Lab by: (Signature and Printed Name)		Date	Time	Payment Received at Delivery: Date: Amount: PIA#:	Check / Cash Init.

Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Courier: _____
Cooling Method: Wet Blue None
Custody Seal: Y / N
Chilling Process Begun: Y / N

Payment for services rendered as noted herein are due in full within 30 days from the date invoiced. If not so paid, account balances are deemed delinquent. Delinquent balances are subject to monthly service charges and interest specified in BSK's current Standard Terms and Conditions for Laboratory Services. The person signing for the Client/Company acknowledges that they are either the Client or an authorized agent to the Client, that the Client agrees to be responsible for payment for the services on this Chain of Custody, and agrees to BSK's terms and conditions for laboratory services unless contractually bound otherwise. BSK's current terms and conditions can be found at www.bskassociates.com/BSKLabTermsConditions.pdf

SK-FL-0012-08

Figure 4-7. Kings River Water Quality Coalition Chain of Custody form.



BSK ASSOCIATES

1414 Stanislaus St., Fresno, CA 93706
(559) 497-2888 · Fax (559) 497-2893
www.bskassociates.com

Turnaround Time Request
☐ Standard - 10 business days
☐ Rush (Surcharge may apply)
Date needed:

ANALYTICAL CHAIN OF CUSTODY

*Required Fields | Temp: | Thermometer ID:

Company/Client Name*:	Report Attention*:	Invoice To*:	Phone*:	Fax:
	Additional cc's:	PO#:	E-mail*:	
Address*:	City*:	State*:	Zip*:	
Project:	Project #:			

Reporting Options: ☐ Trace (J-Flag) ☐ Swamp ☐ EDD Type: _____
Sampler Name (Printed/Signature)*:

Regulatory Carbon Copies: ☐ SWRCB (Drinking Water) ☐ Merced Co ☐ Fresno Co ☐ Madera Co ☐ Tulare Co ☐ Other: _____

Regulatory Compliance: ☐ EDT to California SWRCB (Drinking Water) System Number*: _____ ☐ Geotracker #: _____

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX

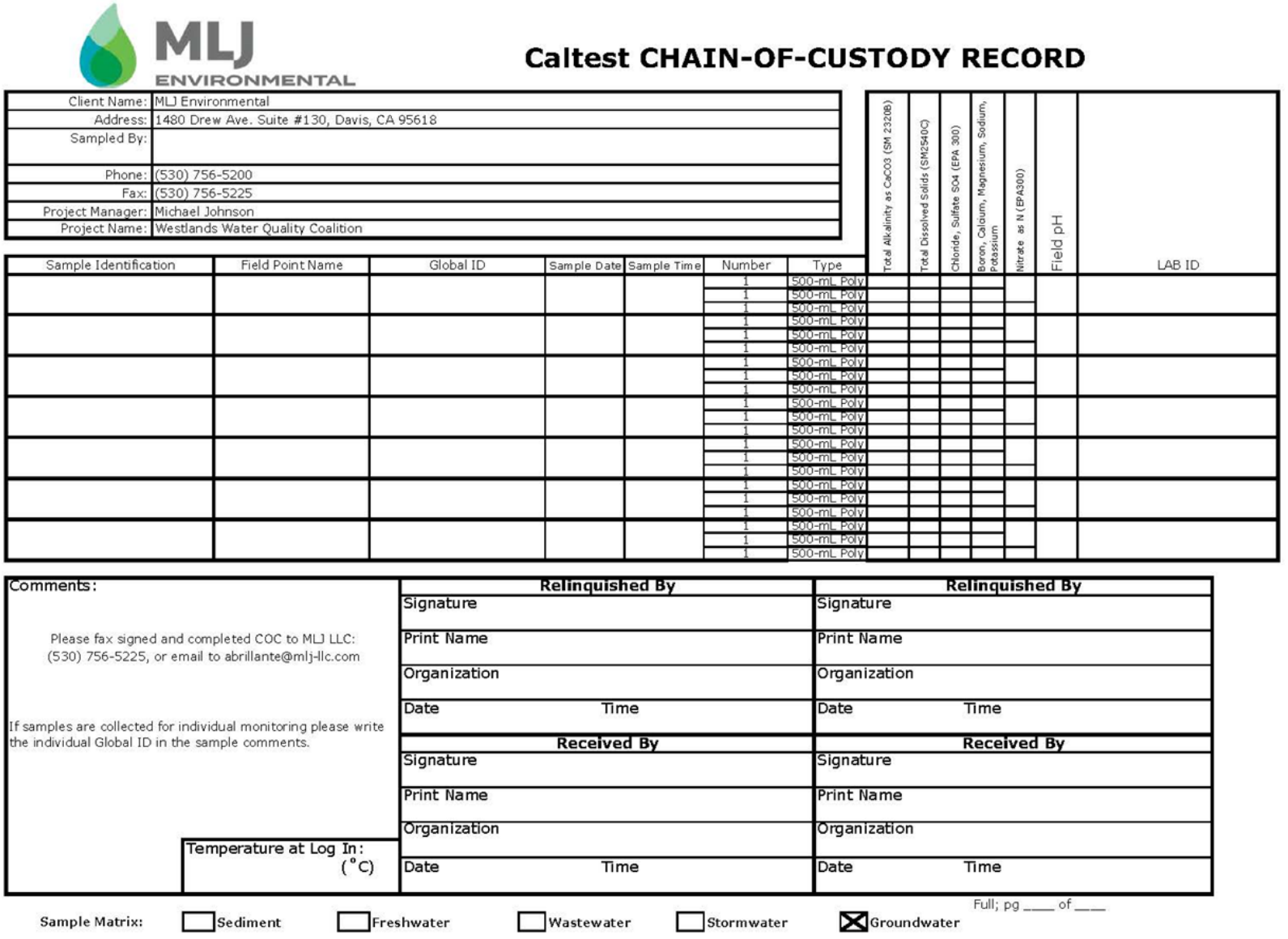
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Received for Lab by: (Signature and Printed Name)		Date	Time	Payment Received at Delivery: Check / Cash Date: Amount: PIA#: Init.	

Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Courier: _____ **Custody Seal:** Y / N
Cooling Method: Wet Blue None **Chilling Process Begun:** Y / N

Payment for services rendered as noted herein are due in full within 30 days from the date invoiced. If not so paid, account balances are deemed delinquent. Delinquent balances are subject to monthly service charges and interest specified in BSK's current Standard Terms and Conditions for Laboratory Services. The person signing for the Client/Company acknowledges that they are either the Client or an authorized agent to the Client, that the Client agrees to be responsible for payment for the services on this Chain of Custody, and agrees to BSK's terms and conditions for laboratory services unless contractually bound otherwise. BSK's current terms and conditions can be found at www.bskassociates.com/BSKLabTermsConditions.pdf

SR-FL-0012-08

Figure 4-8. Westlands Water Quality Coalition Chain of Custody form.



MLJ ENVIRONMENTAL

Caltest CHAIN-OF-CUSTODY RECORD

Client Name:	MLJ Environmental
Address:	1480 Drew Ave. Suite #130, Davis, CA 95618
Sampled By:	
Phone:	(530) 756-5200
Fax:	(530) 756-5225
Project Manager:	Michael Johnson
Project Name:	Westlands Water Quality Coalition

	Sample Identification	Field Point Name	Global ID	Sample Date	Sample Time	Number	Type	Total Alkalinity as CaCO3 (SM 2320B)	Total Dissolved Solids (SM2540C)	Chloride, Sulfate SO4 (EPA 300)	Boron, Calcium, Magnesium, Sodium, Potassium	Nitrate as N (EPA300)	Field pH	LAB ID
1						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
2						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
3						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
4						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
5						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
6						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							
7						1	500-mL Poly							
						1	500-mL Poly							
						1	500-mL Poly							

Comments:

Please fax signed and completed COC to MLJ LLC: (530) 756-5225, or email to abrillante@mlj-llc.com

If samples are collected for individual monitoring please write the individual Global ID in the sample comments.

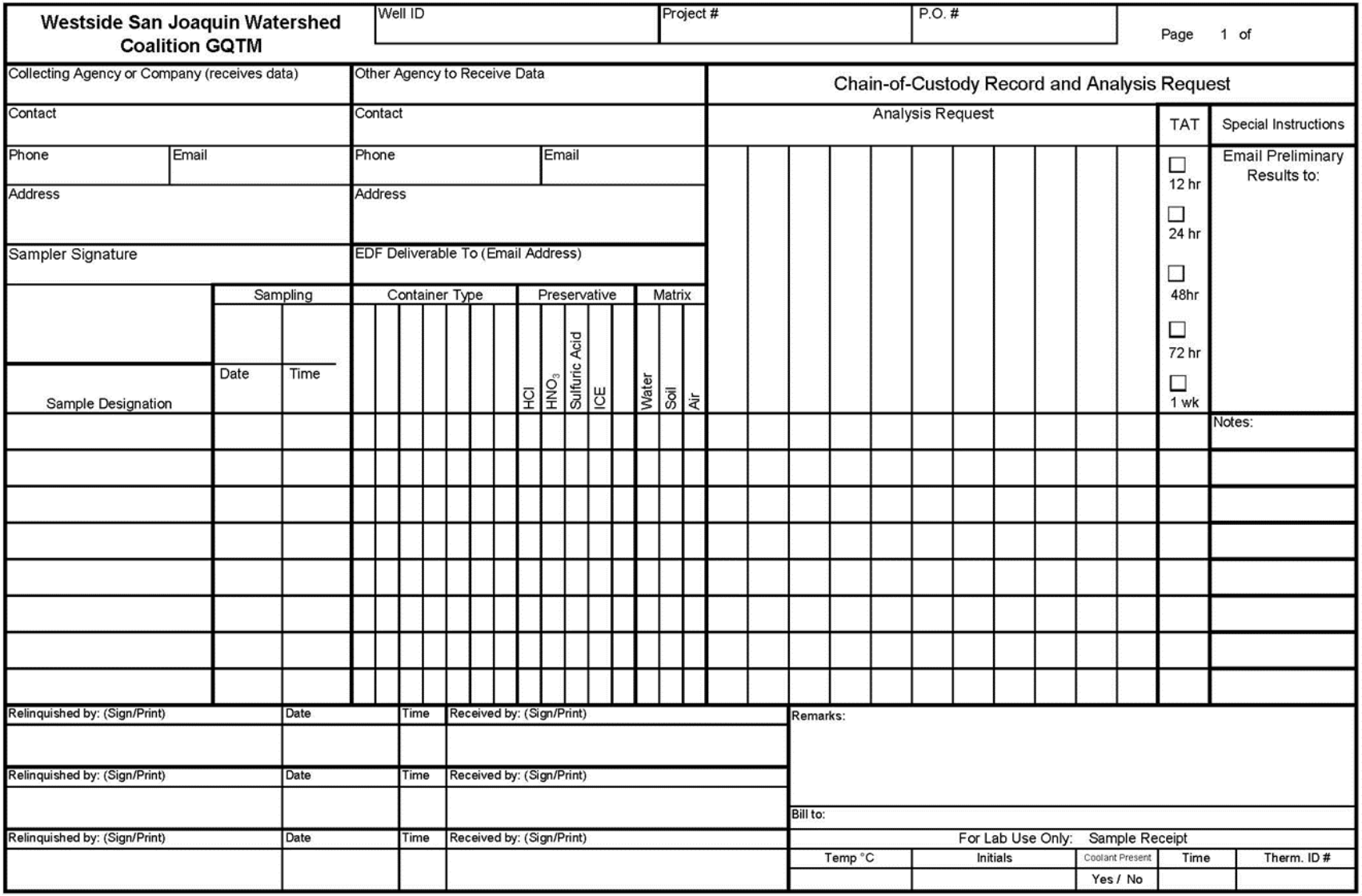
Temperature at Log In: (°C)

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

Full; pg ____ of ____

Sample Matrix: ☐ Sediment ☐ Freshwater ☐ Wastewater ☐ Stormwater ☒ Groundwater

Figure 4-9. Westside San Joaquin River Watershed Coalition Chain of Custody form.



Westside San Joaquin Watershed Coalition GQTM

Well ID | Project # | P.O. # | Page 1 of

Collecting Agency or Company (receives data) | Other Agency to Receive Data

Chain-of-Custody Record and Analysis Request

Contact | Contact

Analysis Request | TAT | Special Instructions

Phone | Email | Phone | Email

☐ 12 hr ☐ 24 hr ☐ 48hr ☐ 72 hr ☐ 1 wk

Email Preliminary Results to:

Address | Address

Sampler Signature | EDF Deliverable To (Email Address)

Sample Designation	Sampling: Date	Sampling: Time	Container Type	Preservative: HCl	Preservative: HNO_3	Preservative: Sulfuric Acid	Preservative: ICE	Matrix: Water	Matrix: Soil	Matrix: Air	Notes:

Relinquished by: (Sign/Print)	Date	Time	Received by: (Sign/Print)
Relinquished by: (Sign/Print)	Date	Time	Received by: (Sign/Print)
Relinquished by: (Sign/Print)	Date	Time	Received by: (Sign/Print)

Remarks:

Bill to:

For Lab Use Only: Sample Receipt

Temp °C	Initials	Coolant Present	Time	Therm. ID #
		Yes / No		

Figure 4-10. Westside Water Quality Coalition Chain of Custody form.

CHAIN-OF-CUSTODY RECORD **FRE 18101**

PROJECT NAME:			DATE	PAGE_____ OF_____
PROJECT NUMBER:	LABORATORY NAME:	CLIENT INFORMATION:	REPORTING REQUIREMENTS:	
RESULTS TO:	LABORATORY ADDRESS:			
TURNAROUND TIME:			1281 East Alluvial Ave., Suite 101 Fresno, CA 93720-2659 +1 (559) 264-2535 • Fax +1 (559) 264-7431	
SAMPLE SHIPMENT METHOD:	LABORATORY CONTACT:			
	LABORATORY PHONE NUMBER:			

wood.

SAMPLERS (SIGNATURE):			ANALYSES													GEOTRACKER REQUIRED YES NO SITE SPECIFIC GLOBAL ID NO.							
DATE	TIME	SAMPLE ID														CONTAINER TYPE AND SIZE	Soil(S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	TOTAL NUMBER OF CONTAINERS		
SIGNATURE:			SIGNATURE:			SAMPLING COMMENTS:		
PRINTED NAME:			PRINTED NAME:					
COMPANY:			COMPANY:					
SIGNATURE:			SIGNATURE:					
PRINTED NAME:			PRINTED NAME:					
COMPANY:			COMPANY:					
SIGNATURE:			SIGNATURE:					
PRINTED NAME:			PRINTED NAME:					
COMPANY:			COMPANY:					

TABLE 9. WELL INFORMATION

Table 9-1. Buena Vista Coalition well information.

Well ID/Field Point Name	GeoTracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
BVCWD00001	AGC100012323	T25SR24E29B	373832	Irrigation	460	ft	1991	35.38106	-119.4152	WGS84
BVCWD00002	AGC100012323	T29SR24E29	--	Irrigation	374	ft	1992	35.513731	-119.598401	WGS84
BVCWD00003	AGC100012323	T29SR24E19	--	Irrigation	485	ft	pending	35.39773	-119.4326	WGS84
BVCWD00004	AGC100012323	T29SR23E24	--	Irrigation	480	ft	pending	35.39731	-119.448	WGS84
BVCWD00005	AGC100012323	T29SR24E30	--	Domestic	pending	ft	pending	35.37812	-119.441	WGS84
BVCWD00006	AGC100012323	T29SR24E24	--	Irrigation	404	ft	1994	35.390536	-119.448123	WGS84
BVCWD00007	AGC100012323	T27SR22E08H	--	Piezometer	20	ft	1991	35.59445	-119.61765	WGS84
BVCWD00008	AGC100012323	T27SR22E15D	--	Piezometer	20	ft	1991	35.58645	-119.59748	WGS84
BVCWD00009	AGC100012323	T27SR22E15N	--	Piezometer	20	ft	1991	35.57297	-119.59866	WGS84
BVCWD00010	AGC100012323	T27SR22E29J	--	Piezometer	20	ft	1991	35.55035	-119.61831	WGS84
BVCWD00011	AGC100012323	T28SR22E04N	--	Piezometer	20	ft	1991	35.51404	-119.61546	WGS84
BVCWD00012	AGC100012323	T28SR22E16D	--	Piezometer	20	ft	1991	35.49936	-119.61649	WGS84
BVCWD00013	AGC100012323	T28SR22E09R	--	Piezometer	20	ft	1991	35.49958	-119.59816	WGS84

Table 9-2. Cawelo Water District Coalition well information.

Well ID/Field Point Name	GeoTracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
CAWDC00001	AGC100012324	26S27E18B	116287	Irrigation	1400	ft	1967	35.67114932	-119.1070657	NAD83
CAWDC00002	AGC100012324	26S26E24R	44362	Irrigation	1780'	ft	2006	35.64593678	-119.1166666	NAD83
CAWDC00003	AGC100012324	26S26E22E	unknown	Irrigation	2030'	ft	1969	35.65299793	-119.1649433	NAD83

CAWDC00004	AGC100012324	27S26E04R	60095	Irrigation	1200'	ft	1960	35.59522073	-119.1158421	NAD83
CAWDC00005	AGC100012324	27S26E12H	unknown	Irrigation	1220'	ft	1954	35.56601421	-119.1822723	NAD83
CAWDC00006	AGC100012324	27S26E21F02	301535	Irrigation	1605'	ft	2016	35.54056101	-119.169388	NAD83
CAWDC00007	AGC100012324	27S27E19E	516095	Irrigation	1500	ft	1997	35.52492188	-119.1696743	NAD83
CAWDC00008	AGC100012324	27S26E33H	unknown	Irrigation	Pending	ft	Pending	35.53358907	-119.1200261	NAD83
CAWDC00009	AGC100012324	28S27E06C	unknown	Irrigation	1215'	ft	1990	35.527437	-119.109986	NAD83
CAWDC00010	AGC100012324	28S26E04H	unknown	Irrigation	Pending	ft	Pending	35.51494849	-119.1034279	NAD83
CAWDC00011	AGC100012324	28S26E11M	723899	Irrigation	1065	ft	2000	35.50627234	-119.1482513	NAD83
CAWDC00012	AGC100012324	28S27E17K	394776	Irrigation	1326	ft	1992	35.46276323	-119.0749406	NAD83
CAWDC00013	AGC100012324	28S27E28L	99947	Irrigation	1000	ft	1976	35.60229875	-119.1691315	NAD83
CAWDC00014	AGC100012324	28S27E32B	unknown	Irrigation	Pending	ft	Pending	35.45566049	-119.0870615	NAD83
CAWDC00015	AGC100012324	28S26E24A	unknown	Irrigation	Pending	ft	Pending	35.48444239	-119.1176695	NAD83

Table 9-3. East San Joaquin Water Quality Coalition well information.

GQTM Well Name	Well ID	GeoTracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
P01_2a_McHenry	ESJQC00001	AGC100012331		190887	Domestic	135	Feet	1987	37.7522	-120.994	NAD83
P02_1b_Root	ESJQC00002	AGC100012331		290694	Domestic	180	Feet	1988	37.6467	-120.894	NAD83
P03_1q_Vivian	ESJQC00003	AGC100012331		64838	Domestic	105	Feet	1987	37.6031	-121.048	NAD83
P04_1e_Swanson	ESJQC00004	AGC100012331		22701	Domestic	136	Feet	1977	37.5641	-120.783	NAD83
P05_2f_Harding	ESJQC00005	AGC100012331		81-152-D	Domestic	180	Feet	1981	37.4629	-120.772	NAD83
P06_3g_Eucalyptus	ESJQC00006	AGC100012331		465203	Domestic	236	Feet	1993	37.4048	-120.589	NAD83
P07_2g_Atwater	ESJQC00007	AGC100012331	07S11E14	803853	Domestic	230	Feet	2003	37.3308	-120.735	NAD83
P08_1k_East	ESJQC00008	AGC100012331		359701	Domestic	180	Feet	1990	37.3178	-120.432	NAD83
P09_2h_Rodgers	ESJQC00009	AGC100012331		334471	Domestic	180	Feet	1989	37.3092	-120.556	NAD83
P10_2j_Rahilly	ESJQC00010	AGC100012331		Not Found	Domestic	180	Feet	1965	37.2144	-120.535	NAD83
P11_3y_Road11	ESJQC00011	AGC100012331		Not Found	Domestic				37.1497	-120.347	NAD83

P12_1p_Road25	ESJQC00012	AGC100012331		242495	Domestic	276	Feet	1985	36.9287	-120.092	NAD83

Table 9-4. Grassland Drainage Area Coalition well information.

GQTM Well Name	Well ID	GeoTracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
GDA001	GDACX00001	AGC100012335	11S/11E-30	426375	Domestic	160	feet	1993	36.9539	-120.8101	NAD83
GDA002	GDACX00002	AGC100012335	12S/12E-04R	e0167974	Domestic	227	feet	2013	36.9104	-120.6555	NAD83
GDA003	GDACX00003	AGC100012335	12S/12E-16B	574338	Irrigation	410	feet	1994	36.8910	-120.6609	NAD83
GDA004	GDACX00004	AGC100012335	12S/11E-08P	e0173400	Irrigation	205	feet	2013	36.8941	-120.7930	NAD83
GDA005	GDACX00005	AGC100012335	12S/12E-33D	01095504	Domestic	200	feet	2008	36.8489	-120.6717	NAD83
GDA006	GDACX00006	AGC100012335	12S/13E-31D	783270M	Monitoring	153	feet	2000	36.8501	-120.5985	NAD83
GDA007	GDACX00007	AGC100012335	12S/13E-35D	783272M	Monitoring	150	feet	2000	36.8504	-120.5262	NAD83
GDA011	GDACX00011	AGC100012335	13S/15E-30B	314244	Public Supply	308	feet	1990	36.7763	-120.3736	NAD83

Table 9-5. Kaweah Basin Water Quality Association well information.

Well ID/Field Point Name	GeoTracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
KBWQA00001	AGC100012325	N/A	498571	Domestic	116	Feet	1995	36.429063	-119.108579	NAD83
KBWQA00003	AGC100012325	N/A	399453	Domestic	270	Feet	1992	36.265167	-119.172827	NAD83
KBWQA00004	AGC100012325	N/A	517596	Domestic	140	Feet	1997	36.384126	-119.110619	NAD83
KBWQA00005	AGC100012325	N/A	468659	Irrigation	176	Feet	1998	36.395523	-119.144009	NAD83
KBWQA00007	AGC100012325	N/A	415022	Irrigation	192	Feet	1994	36.344112	-119.116969	NAD83
KBWQA00009	AGC100012325	N/A	517141	Irrigation	141	Feet	2002	36.163903	-119.344966	NAD83
KBWQA00010	AGC100012325	N/A	E0181205	Irrigation	159	Feet	2013	36.355412	-119.165169	NAD83
KBWQA00015	AGC100012325	N/A	461065	Domestic	150	Feet	1995	36.358628	-119.219952	NAD83

KBWQA00016	AGC100012325	N/A	718552	Domestic	180	Feet	2002	36.368128	-119.277349	NAD83
KBWQA00017	AGC100012325	N/A	773617	Domestic	168	Feet	2002	36.381252	-119.285407	NAD83
KBWQA00018	AGC100012325	N/A	381640	Irrigation	150	Feet	1991	36.334368	-119.184547	NAD83
KBWQA00020	AGC100012325	N/A	489256	Domestic	130	Feet	1992	36.295544	-119.174476	NAD83
KBWQA00021	AGC100012325	N/A	582463	Irrigation	225	Feet	1993	36.267647	-119.107291	NAD83
KBWQA00023	AGC100012325	N/A	E0005874	Domestic	209	Feet	2003	36.337056	-119.361466	NAD83

Table 9-6. Kern River Watershed Coalition Authority well information.

Well ID/Field Point Name	GeoTracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
KRWCA0002	AGC100012326	T25S-R26E-27	508093	Domestic/Irrigation	600	feet	1998	35.71930	-119.15622	NAD83
KRWCA0003	AGC100012326	T25S-R26E-33	508094	Domestic/Irrigation	440	feet	1998	35.70460	-119.18271	NAD83
KRWCA0004	AGC100012326	T25S-R27E-4	e068721	Irrigation	800	feet	2008	35.78728989	-119.0800907	NAD83
KRWCA0005	AGC100012326	T25S-R27E-14	e012452	Domestic	405	feet	2004	35.78725	-119.10359	NAD83
KRWCA0006	AGC100012326	T26S-R23E-12	e023106	Domestic/Irrigation	400	feet	2004	35.68653	-119.43757	NAD83
KRWCA0007	AGC100012326	T27S-R24E-22	724867	Domestic/Irrigation	400	feet	2000	35.68564	-119.40060	NAD83
KRWCA0008	AGC100012326	T27S-R25E-17	e0316643	Irrigation	900	feet	2015	35.64652	-119.23305	NAD83
KRWCA0009	AGC100012326	T27S-R25E	569623	Domestic/Irrigation	400	feet	1994	35.56781	-119.37549	NAD83
KRWCA0010	AGC100012326	T27S-R25E-31	151862	Irrigation	828	feet	2006	35.60911	-119.29039	NAD83
KRWCA0011	AGC100012326	T27S-R26E-5	1091572	Irrigation	838	feet	2006	35.55116	-119.25534	NAD83
KRWCA0012	AGC100012326	T28S-R23E-27	e0239535	Irrigation	810	feet	2014	35.53089	-119.26980	NAD83
KRWCA0013	AGC100012326	T28S-R23E-27	e068435	Irrigation	800	feet	2008	35.61069267	-119.1911175	NAD83
KRWCA0014	AGC100012326	T28S-R23E-33	e074073	Irrigation	440	feet	2008	35.45723	-119.48383	NAD83
KRWCA0015	AGC100012326	T28S-R25E-17	780438	Irrigation	380	feet	2003	35.45510	-119.51241	NAD83
KRWCA0016	AGC100012326	T28S-R25E-32	EO163192	Irrigation	850	feet	2013	35.48564	-119.29826	NAD83
KRWCA0017	AGC100012326	T29S-R24E-1	373298	Domestic	400	feet	1991	35.49916	-119.30460	NAD83
KRWCA0018	AGC100012326	T29S-R25E-1	EO219847	Domestic/Irrigation	870	feet	2014	35.44894	-119.29805	NAD83

KRWCA0019	AGC100012326	T29S-R25E-25	e0146271	Domestic	602	feet	2012	35.44119	-119.34497	NAD83
KRWCA0020	AGC100012326	T29S-R25E-25	e0194674	Irrigation	620	feet	2013	35.43179	-119.25136	NAD83
KRWCA0021	AGC100012326	T29S-R25E-27	-	Monitoring	350	feet	Unknown	35.374429	-119.251713	NAD83
KRWCA0022	AGC100012326	T29S-R25E-27	-	Monitoring	310	feet	Unknown	35.36932	-119.28697	NAD83
KRWCA0023	AGC100012326	T29S-R25E-34	e0360864	Irrigation	910	feet	2017	35.28895	-118.84698	NAD83
KRWCA0024	AGC100012326	T29S-R25E-34	e0261310	Irrigation	1220	feet	2014	35.31066	-118.80545	NAD83
KRWCA0025	AGC100012326	T29S-R25E-36	e0141238	Domestic	500	feet	2011	35.29420	-118.75335	NAD83
KRWCA0026	AGC100012326	T30S-R29E-27	e070644	Irrigation	960	feet	2008	35.20861	-119.27829	NAD83
KRWCA0027	AGC100012326	T30S-R30E-19	e069441	Irrigation	720	feet	2008	35.03113	-118.83457	NAD83
KRWCA0028	AGC100012326	T31S-R25E-27	542931	Irrigation	1020	feet	1996	35.13774	-119.14530	NAD83
KRWCA0029	AGC100012326	T32S-R26E-24	-	Monitoring	430	feet	Unknown	35.36170834	-119.2170589	NAD83
KRWCA0030	AGC100012326	T25S-R25E-29	0900615	Irrigation	340	feet	2006	35.71845	-119.30423	NAD83
KRWCA0031	AGC100012326	T25S-R25E-29	e073851	Domestic	300	feet	2008	35.72512	-119.29483	NAD83
KRWCA0033*	AGC100012326	T25S-R24E-10	f168212	Irrigation	930	feet	2007	35.76129	-119.38377	NAD83
KRWCA0034*	AGC100012326	T25S-R24E-9	e057090	Irrigation	1200	feet	2007	35.76822	-119.39262	NAD83
KRWCA0035*	AGC100012326	T25S-R24E-9	e057063	Irrigation	945	feet	2007	35.76133	-119.39262	NAD83
KRWCA0036*	AGC100012326	T25S-R24E-21	e0105552	Irrigation	947	feet	2007	35.73679	-119.38430	NAD83
KRWCA0037*	AGC100012326	T26S-R24E-9	e072256	Monitoring	800	feet	2007	35.67760	-119.39702	NAD83
KRWCA0038*	AGC100012326	T26S-R25E-19	e072643	Irrigation	800	feet	2008	35.64534	-119.31651	NAD83
KRWCA0039*	AGC100012326	T26S-R26E-9	e0089573	Irrigation	1240	feet	2009	35.67488	-119.17845	NAD83
KRWCA0040*	AGC100012326	T26S-R25E-9M	780415	Irrigation	805	feet	2002	35.68179	-119.18251	NAD83
KRWCA0041*	AGC100012326	T26S-R26E-21	1095418	Irrigation	1105	feet	2005	35.65040	-119.16936	NAD83
KRWCA0042*	AGC100012326	T26S-R26E-21	e0083772	Irrigation	1000	feet	2005	35.64225	-119.16942	NAD83
KRWCA0043*	AGC100012326	T27S-R23E-4R	780424	Irrigation	680	feet	2008	35.53034	-119.33923	NAD83
KRWCA0044*	AGC100012326	T27S-R23E-31	801174	Irrigation	500	feet	2003	35.53275	-119.53745	NAD83
KRWCA0045*	AGC100012326	T27S-24E-36Q	780436	Domestic	620	feet	2003	35.52993	-119.33868	NAD83
KRWCA0047*	AGC100012326	T27S-R23E-31	e041479	Irrigation	500	feet	2004	35.52782	-119.52839	NAD83
KRWCA0049*	AGC100012326	T28S-24E-31	-	Irrigation	700	feet	2009	35.44934	-119.42926	NAD83
KRWCA0052*	AGC100012326	T30S-R30E-9	EO-38690	Irrigation	600	feet	2006	35.32700	-118.75735	NAD83

KRWCA0053*	AGC100012326	T31S-R25E-36	e066238	Irrigation	1000	feet	2008	35.18113	-119.23581	NAD83
KRWCA0054*	AGC100012326	T31S-25E-25	e066233	Irrigation	1000	feet	2008	35.20154	-119.24418	NAD83
KRWCA0056*	AGC100012326	T31S-27E-12	e0079091	Irrigation	710	feet	2006	35.24320	-119.02585	NAD83
KRWCA0057*	AGC100012326	T31S-27E-12	e0079092	Irrigation	710	feet	2006	35.24142	-119.03004	NAD83
KRWCA0059*	AGC100012326	T11N-19W-11	e0081187	Irrigation	1000	feet	2008	35.05301	-118.87280	NAD83
KRWCA0060*	AGC100012326	T23S-35E-44	e0083811	Irrigation	1080	feet	2008	35.04184	-118.83734	NAD83
KRWCA0061*	AGC100012326	T32S-R26E-14	-	Irrigation	1002	feet	2002	35.14492	-119.14610	NAD83
KRWCA0062*	AGC100012326	T32S-R26E-21	e070637	Irrigation	1050	feet	2008	35.12665	-119.18995	NAD83
KRWCA0063*	AGC100012326	T32S-28E-16	EO172071	Irrigation	1002	feet	2013	35.14533	-118.97646	NAD83
KRWCA0064*	AGC100012326	T44S-R51E-18	785641	Irrigation	1200	feet	2004	35.11112	-118.93358	NAD83
KRWCA0065*	AGC100012326	T44S-R52-04	783349	Irrigation	1200	feet	2001	35.09670	-118.92792	NAD83
KRWCA0066*	AGC100012326	T44S-41E-26	e007896	Irrigation	920	feet	2008	35.12235	-118.90996	NAD83
KRWCA0067*	AGC100012326	T27S-R24E-7	1095425	Irrigation	681	feet	2006	35.59588	-119.43375	NAD83
KRWCA0068*	AGC100012326	T30S-R26E-35	e0092295	Irrigation	610	feet	2008	35.27810	-119.15558	NAD83
KRWCA0069*	AGC100012326	T30S-R26E-35	e0092275	Irrigation	810	feet	2008	35.27417	-119.15775	NAD83

*Wells pending Regional Board approval

Table 9-7. Kings River Water Quality Coalition well information.

GQTM Well Name	Well ID/ Field Point Name	GeoTracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
TM13S16E02	KRWQC00001	AGC100012327	13S16E25D	NN_img00150882	Irrigation	350	ft	1997	36.7778	-120.184099	WGS 1984
TM13S17E01	KRWQC00002	AGC100012327	13S17E25C	NN_img40351372	Irrigation	150	ft	1950	36.778535	-120.070451	WGS 1984
TM13S20E01	KRWQC00003	AGC100012327	13S20E12D	426677	Irrigation	270	ft	1993	36.821601	-119.753881	WGS 1984
TM13S20E02	KRWQC00004	AGC100012327	13S20E12J	500030	Public	398	ft	1997	36.814862	-119.740734	WGS 1984
TM13S21E01	KRWQC00005	AGC100012327	13S21E07D	37829	Irrigation	142	ft	1956	36.822846	-119.731576	WGS 1984

TM13S21E03	KRWQC00006	AGC100012327	13S21E07F	191800	Domestic	140	ft	1986	36.816169	-119.729638	WGS 1984
TM13S21E04	KRWQC00007	AGC100012327	13S21E36P	146882	Irrigation	140	ft	1980	36.753439	-119.638877	WGS 1984
TM13S22E01	KRWQC00008	AGC100012327	13S22E05G	E0182371	Domestic	240	ft	2013	36.831147	-119.596673	WGS 1984
TM13S22E03	KRWQC00009	AGC100012327	13S22E27M	286183	Domestic	140	ft	1990	36.771275	-119.572618	WGS 1984
TM13S22E04	KRWQC00010	AGC100012327	13S22E26M	E0033654	Irrigation	200	ft	2006	36.769254	-119.555683	WGS 1984
TM13S23E01	KRWQC00011	AGC100012327	13S23E34M	146351	Irrigation	118	ft	1975	36.756751	-119.462468	WGS 1984
TM14S16E01	KRWQC00012	AGC100012327	14S16E33N	E0273458	Monitoring	310	ft	2015	36.663502	-120.238889	WGS 1984
TM14S18E01	KRWQC00013	AGC100012327	14S18E07B	815050	Public	800	ft	1999	36.733118	-120.051223	WGS 1984
TM14S18E02	KRWQC00014	AGC100012327	14S18E01P	614	Domestic	120	ft	1950	36.735396	-119.961194	WGS 1984
TM14S19E01	KRWQC00015	AGC100012327	14S19E15L	21605	Irrigation	248	ft	1976	36.713575	-119.890169	WGS 1984
TM14S19E02	KRWQC00016	AGC100012327	14S19E19F	57660	Irrigation	249	ft	1962	36.698946	-119.943376	WGS 1984
TM14S19E03	KRWQC00017	AGC100012327	14S19E31A	48768	Irrigation	170	ft	1958	36.676935	-119.934578	WGS 1984
TM14S20E01	KRWQC00018	AGC100012327	14S20E20A	22233	Irrigation	188	ft	1977	36.704961	-119.80955	WGS 1984
TM14S20E02	KRWQC00019	AGC100012327	14S20E30E	E0086963	Irrigation	202	ft	2009	36.685572	-119.84236	WGS 1984
TM14S21E01	KRWQC00020	AGC100012327	14S21E20N	394552	Public	405	ft	1992	36.695441	-119.716957	WGS 1984
TM14S21E02	KRWQC00021	AGC100012327	14S21E21J	574355	Public	460	ft	1994	36.698414	-119.684302	WGS 1984
TM14S22E01	KRWQC00022	AGC100012327	14S22E06P	E0095950	Irrigation	300	ft	2009	36.736431	-119.620487	WGS 1984
TM14S22E02	KRWQC00023	AGC100012327	14S22E16G	1095880	Public	440	ft	2006	36.71419	-119.578771	WGS 1984
TM14S22E03	KRWQC00024	AGC100012327	14S22E22F	243328	Municipal	265	ft	1984	36.701419	-119.565613	WGS 1984
TM14S22E04	KRWQC00025	AGC100012327	14S22E30P	E0031780	Domestic	78	ft	2006	36.678545	-119.62125	WGS 1984
TM14S23E01	KRWQC00026	AGC100012327	14S23E28B	E0091044	Irrigation	154	ft	2009	36.691407	-119.473375	WGS 1984

TM15S16E01	KRWQC00027	AGC100012327	15S16E15K	E0273459	Monitoring	350	ft	2015	36.624577	-120.215841	WGS 1984
TM15S16E02	KRWQC00028	AGC100012327	15S16E34M	E0186246	Domestic	300	ft	2013	36.579697	-120.224186	WGS 1984
TM15S18E01	KRWQC00029	AGC100012327	15S18E27D	E0277691	Monitoring	280	ft	2015	36.603992	-120.002708	WGS 1984
TM15S18E02	KRWQC00030	AGC100012327	15S18E34A	344731	Domestic	350	ft	1991	36.587443	-119.990175	WGS 1984
TM15S18E03	KRWQC00031	AGC100012327	15S18E34B	E0332805	Irrigation	500	ft	2016	36.585939	-119.994433	WGS 1984
TM15S19E01	KRWQC00032	AGC100012327	15S19E26B	E0277697	Monitoring	280	ft	2015	36.604831	-119.871765	WGS 1984
TM15S21E01	KRWQC00033	AGC100012327	15S21E28B	21108	Irrigation	160	ft	1976	36.602904	-119.687052	WGS 1984
TM15S21E02	KRWQC00034	AGC100012327	15S21E35B	32249	Irrigation	137	ft	1955	36.589012	-119.655148	WGS 1984
TM15S22E01	KRWQC00035	AGC100012327	15S22E10A	146348	Irrigation	178	ft	1981	36.648519	-119.556885	WGS 1984
TM15S22E02	KRWQC00036	AGC100012327	15S22E10J	E0295101	Irrigation	240	ft	2015	36.641007	-119.557116	WGS 1984
TM15S22E03	KRWQC00037	AGC100012327	15S22E18B	E0271176	Irrigation	300	ft	2015	36.631082	-119.616246	WGS 1984
TM15S22E04	KRWQC00038	AGC100012327	15S22E18L	E0361185	Irrigation	340	ft	2018	36.624072	-119.620696	WGS 1984
TM15S22E05	KRWQC00039	AGC100012327	15S22E14K	E0264016	Domestic	220	ft	2015	36.623859	-119.547211	WGS 1984
TM15S22E06	KRWQC00040	AGC100012327	15S22E14J	1956 well log.tif	Irrigation	170	ft	1956	36.626526	-119.539156	WGS 1984
TM15S22E07	KRWQC00041	AGC100012327	15S22E27M	582518	Irrigation	200	ft	1994	36.594297	-119.574709	WGS 1984
TM15S23E01	KRWQC00042	AGC100012327	15S23E08D01	915269	Domestic/ Irrigation	235	ft	2006	36.647538	-119.501057	WGS 1984
TM15S23E02	KRWQC00043	AGC100012327	15S23E08D03	574399	Irrigation	240	ft	1994	36.644535	-119.500653	WGS 1984
TM15S23E03	KRWQC00044	AGC100012327	15S23E10C	568797	Irrigation	340	ft	1994	36.645859	-119.459964	WGS 1984
TM15S23E04	KRWQC00045	AGC100012327	15S23E21M	723772	Public	260	ft	2000	36.609345	-119.483817	WGS 1984
TM15S24E01	KRWQC00046	AGC100012327	15S24E17H	E0089481	Irrigation	380	ft	2009	36.627308	-119.376597	WGS 1984
TM16S17E01	KRWQC00047	AGC100012327	16S17E15R	568617	Public	610	ft	1994	36.533268	-120.100071	WGS 1984

TM16S18E01	KRWQC00048	AGC100012327	16S18E15F	82212	Irrigation	570	ft	1981	36.539353	-119.998594	WGS 1984
TM16S18E02	KRWQC00049	AGC100012327	16S18E02N	381724	Municipal	555	ft	1991	36.491201	-119.989214	WGS 1984
TM16S19E01	KRWQC00050	AGC100012327	16S19E13H	27446	Public	402	ft	1978	36.543295	-119.846255	WGS 1984
TM16S19E02	KRWQC00051	AGC100012327	16S19E25D	E0273451	Monitoring	280	ft	2015	36.517903	-119.863315	WGS 1984
TM16S20E01	KRWQC00052	AGC100012327	16S20E32A	E0273440	Monitoring	300	ft	2015	36.503585	-119.809123	WGS 1984
TM16S20E02	KRWQC00053	AGC100012327	16S20E36D	E0273439	Monitoring	270	ft	2015	36.503568	-119.755203	WGS 1984
TM16S21E01	KRWQC00054	AGC100012327	16S21E09A	33576	Irrigation	111	ft	1955	36.55981	-119.682899	WGS 1984
TM16S21E02	KRWQC00055	AGC100012327	16S21E10N	246607	Public	504	ft	1982	36.548709	-119.682379	WGS 1984
TM16S21E03	KRWQC00056	AGC100012327	16S21E33R	31314	Irrigation	138	ft	1954	36.492508	-119.684411	WGS 1984
TM16S23E01	KRWQC00057	AGC100012327	16S23E13M	943200	Public	245	ft	2006	36.53885	-119.428395	WGS 1984
TM16S24E01	KRWQC00058	AGC100012327	16S24E07J	749117	Public	630	ft	2002	36.552324	-119.399413	WGS 1984
TM16S24E02	KRWQC00059	AGC100012327	16S24E07P	220415	Municipal	572	ft	1984	36.548227	-119.408561	WGS 1984
TM16S24E03	KRWQC00060	AGC100012327	16S24E07N	398827	Public	615	ft	1992	36.54691	-119.412421	WGS 1984
TM16S24E04	KRWQC00061	AGC100012327	16S24E18M	1095744	Public	585	ft	2005	36.538522	-119.408633	WGS 1984
TM16S24E05	KRWQC00062	AGC100012327	1624E17N	411490	Public	650	ft	1992	36.531591	-119.393509	WGS 1984
TM16S24E06	KRWQC00063	AGC100012327	16S24E20B	943191	Public	595	ft	2005	36.530569	-119.382337	WGS 1984
TM16S24E07	KRWQC00064	AGC100012327	16S24E17H	460846	Public	540	ft	1997	36.540548	-119.378293	WGS 1984
TM16S24E08	KRWQC00065	AGC100012327	16S24E16A	145303	Irrigation	199	ft	1976	36.544839	-119.358798	WGS 1984
TM16S25E01	KRWQC00066	AGC100012327	16S25E33R	87530	Public	440	ft	1972	36.487202	-119.253117	WGS 1984
TM17S18E01	KRWQC00067	AGC100012327	7S18E02B	112141	Domestic	240	ft	1975	36.487846	-119.983778	WGS 1984
TM17S18E02	KRWQC00068	AGC100012327	17S18E01K	70193	Irrigation	552	ft	1980	36.477452	-119.966055	WGS 1984

TM17S18E03	KRWQC00069	AGC100012327	17S18E02P	75683	Irrigation	630	ft	1971	36.474752	-119.986511	WGS 1984
TM17S18E04	KRWQC00070	AGC100012327	17S18E08Q	568660	Irrigation	560	ft	1994	36.459222	-120.035936	WGS 1984
TM17S18E05	KRWQC00071	AGC100012327	17S18E12K	394140	Irrigation	510	ft	1992	36.46612	-119.968046	WGS 1984
TM17S18E06	KRWQC00072	AGC100012327	17S18E13C	22362	Irrigation	450	ft	1977	36.457393	-119.968369	WGS 1984
TM17S19E01	KRWQC00073	AGC100012327	17S19E10C	E0273452	Monitoring	266	ft	2015	36.474352	-119.896635	WGS 1984
TM17S19E02	KRWQC00074	AGC100012327	17S19E36J	1095357	Domestic	240	ft	2005	36.409005	-119.852826	WGS 1984
TM17S20E01	KRWQC00075	AGC100012327	17S20E11Q	54811	Domestic	264	ft	1980	36.460679	-119.771358	WGS 1984
TM17S20E02	KRWQC00076	AGC100012327	17S20E14H	399463	Dairy	425	ft	1992	36.453582	-119.762914	WGS 1984
TM17S21E01	KRWQC00077	AGC100012327	17S21E07P	E0031570	Irrigation	520	ft	2006	36.461624	-119.736817	WGS 1984
TM17S21E02	KRWQC00078	AGC100012327	17S21E23H	E0273438	Monitoring	280	ft	2015	36.438167	-119.654629	WGS 1984
TM17S22E01	KRWQC00079	AGC100012327	17S22E20D	E0005962	Domestic	233	ft	2004	36.442603	-119.618292	WGS 1984
TM17S22E03	KRWQC00080	AGC100012327	17S22E33A	E0091259	Domestic	300	ft	2009	36.415551	-119.586879	WGS 1984
TM17S23E01	KRWQC00081	AGC100012327	17S23E17Q	718280	Domestic	295	ft	1999	36.445452	-119.500285	WGS 1984
TM17S24E01	KRWQC00082	AGC100012327	17S24E02D	426821	Domestic	240	ft	1992	36.486744	-119.344456	WGS 1984
TM17S24E02	KRWQC00083	AGC100012327	17S24E02K	490591	Irrigation	340	ft	1991	36.477739	-119.335564	WGS 1984
TM18S20E01	KRWQC00084	AGC100012327	18S20E04C	67806	Irrigation	520	ft	1971	36.400958	-119.808446	WGS 1984
TM18S20E02	KRWQC00085	AGC100012327	18S20E11D	1086597	Public	773	ft	2007	36.38404	-119.776177	WGS 1984
TM18S20E03	KRWQC00086	AGC100012327	18S20E23N03	E016557	Monitoring	60	ft	2004	36.346053	-119.780567	WGS 1984
TM18S20E04	KRWQC00087	AGC100012327	18S20E23N01	E016558	Monitoring	280	ft	2004	36.346092	-119.780547	WGS 1984
TM19S20E01	KRWQC00088	AGC100012327	19S20E11C	480739	Public	505	ft	1991	36.296828	-119.775716	WGS 1984
TM19S20E02	KRWQC00089	AGC100012327	19S20E31A	E016560	Monitoring	360	ft	2004	36.240529	-119.834585	WGS 1984

TM19S21E01	KRWQC00090	AGC100012327	19S21E23P	49287	Irrigation	440	ft	1957	36.254935	-119.663932	WGS 1984
TM20S20E01	KRWQC00091	AGC100012327	20S20E26M	E019097	Monitoring	315	ft	2004	36.159834	-119.775815	WGS 1984

Table 9-8. Westlands Water Quality Coalition well information.

GQTM Well Name	Well ID	Geo-Tracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
WWQC_01	WWQCX00001	AGC100012329	13S/13E-30D02		Monitoring	150	Feet		36.78000	-120.6000	NAD83
WWQC_03	WWQCX00003	AGC100012329	15S/13E-05F04	25944	Monitoring	215	Feet	1988	36.65689	-120.57767	NAD83
WWQC_04	WWQCX00004	AGC100012329	15S/13E-11B07	298423	Monitoring	199	Feet		36.64697	-120.52302	NAD83
WWQC_05	WWQCX00005	AGC100012329	15S/13E-22A01	164872	Monitoring	379	Feet	1988	36.6185	-120.53256	NAD83
WWQC_06	WWQCX00006	AGC100012329	15S/15E-09D06	320142	Monitoring	267	Feet	1986	36.64667	-120.35175	NAD83
WWQC_07	WWQCX00007	AGC100012329	14S/13E-24N05	164859	Monitoring	505	Feet	1985	36.69106	-120.51321	NAD83
WWQC_08	WWQCX00008	AGC100012329	13S/13E-28A01	197116	Monitoring	208	Feet	1987	36.77620	-120.55130	NAD83
WWQC_10	WWQCX00010	AGC100012329	17S/16E-20N02	298406	Monitoring	50	Feet		36.42930	-120.26570	NAD83
WWQC_11	WWQCX00011	AGC100012329	17S/16E-26R01	373583	Monitoring	28.5	Feet		36.41480	-120.19470	NAD83
WWQC_12	WWQCX00012	AGC100012329			Monitoring	350	Feet	2018	36.42986	-120.04938	NAD83
WWQC_13	WWQCX00013	AGC100012329	18S/16E-22Q03		Irrigation	400	Feet		36.34233	-120.22092	NAD83
WWQC_14	WWQCX00014	AGC100012329	20S/16E-10H02		Monitoring	400	Feet		36.20273	-120.21292	NAD83
WWQC_15	WWQCX00015	AGC100012329	20S/17E-29J01	330963	Monitoring	500	Feet		36.15700	-120.13878	NAD83
WWQC_16	WWQCX00016	AGC100012329			Monitoring	310	Feet	2018	36.53123	-120.17318	NAD83
WWQC_17	WWQCX00017	AGC100012329	16S/14E-09A02		Monitoring	50.6	Feet	1967	36.55651	-120.44446	NAD83

Table 9-9. Westside San Joaquin River Watershed Coalition well information.

GQTM Well Name	Well ID	GeoTracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
WSJ002	WSJRC00002	AGC100012334	04S/07E-21M	96924	Domestic	212	feet	1980	37.5716	-121.209	NAD83
WSJ003	WSJRC00003	AGC100012334	05S/08E-16R	427229	Irrigation	255	feet	1991	37.49403	-121.086	NAD83
WSJ004	WSJRC00004	AGC100012334	12S/14E-28E	E006024	Public Supply	245	feet	2005	36.86157	-120.452	NAD83
WSJ006	WSJRC00006	AGC100012334	06S/08E-26E	944477	Domestic	200	feet	2008	37.38611	-121.066	NAD83
WSJ007	WSJRC00007	AGC100012334	07S/08E-24A	488212	Domestic	203	feet	1991	37.31794	-121.033	NAD83
WSJ008	WSJRC00008	AGC100012334	08S/09E-18A	960003	Domestic	175	feet	2009	37.2445	-121.016	NAD83
WSJ010	WSJRC00010	AGC100012334	10S/10E-16B	739637	Public Supply	540	feet	2002	37.07059	-120.876	NAD83
WSJ011	WSJRC00011	AGC100012334		54231	Public Supply	242	feet	1991	37.05321	-120.826	NAD83
WSJ012	WSJRC00012	AGC100012334	10S/10E-35J	1095517	Domestic	210	feet	2008	37.01647	-120.841	NAD83
WSJ013	WSJRC00013	AGC100012334	09S/11E-10N	783061	Irrigation	210	feet	2001	37.16078	-120.758	NAD83
WSJ014	WSJRC00014	AGC100012334	10S/12E-04J	508390	Irrigation	180	feet	1997	37.0897	-120.657	NAD83
WSJ015	WSJRC00015	AGC100012334	10S/12E-22M	e074839	Irrigation	184	feet	2008	37.04465	-120.65	NAD83
WSJ017	WSJRC00017	AGC100012334	11S/13E-17L	174386	Irrigation	165	feet	1986	36.97232	-120.574	NAD83
WSJ018	WSJRC00018	AGC100012334	12S/14E-20	22296	Irrigation	245	feet	1967	36.86651	-120.456	NAD83

Table 9-10. Westside Water Quality Coalition well information.

GQTM Well Name	Well ID	GeoTracker Global ID	State Well Number	Well Completion Report Number	Well Type	Well Depth	Well Depth Unit	Year Drilled	Latitude	Longitude	Datum
LP Farms Well 3013	WESTC00002	AGC100012330	025S018E04A	E0133847	Irrigation	405	feet	213	35.788646	-120.028073	NAD83
025S020E32E007M	WESTC00005	AGC100012330	025S020E32E007M	E074216	Irrigation	490	feet	2008	35.716095	-119.849763	NAD83
USGS Lost Hills Well[4]	WESTC00008	AGC100012330	026S021E07K	N/A	Piezometer	TBD	feet	TBD	35.679594	-119.748315	NAD83
Berrenda Mesa-1	WESTC00009	AGC100012330	026SR17E14A	N/A	Domestic	250	feet	Not Avail.	35.668823	-120.090742	NAD83

USGS Well BWSD #5	WESTC00011	AGC100012330	028S021E08A001M	N/A	Piezometer	300	feet	2018	35.512571	-119.726464	NAD83
Aera Belridge 13A1	WESTC00012	AGC100012330	028S021E13H	N/A	Monitoring	90	feet	2013	35.495564	-119.658	NAD83
AeraBelridge_5B2	WESTC00013	AGC100012330	029S022E05B002M	154332	Monitoring	110	feet	1986	35.441081	-119.630269	NAD83
DWR T25S/R21E-31R1_10	WESTC00015	AGC100012330	025S021E31R001M	817189	Monitoring	19	feet	1998	35.70518	-119.745008	NAD83
DWR T26S/R21E-16R1	WESTC00016	AGC100012330	026S021E16R001M	334616	Piezometer	22	feet	1989	35.659687	-119.71014	NAD83
DWR T27S/R21E-11A_BEL #2	WESTC00017	AGC100012330	027S021E11A001M	373414	Piezometer	20	feet	1990	35.60153	-119.67556	NAD83
DWR T27S/R22E-18B1_BEL #3A	WESTC00018	AGC100012330	027S022E18B001M	373416	Piezometer	20	feet	1990	35.586965	-119.64486	NAD83
DWR T28S/R22E-05F	WESTC00020	AGC100012330	028S022E05F001M	373410	Piezometer	20	feet	1990	35.523388	-119.631671	NAD83
DWR Bel 1S	WESTC00021	AGC100012330	028S022E08G001M	373405	Piezometer	20	feet	1990	35.506436	-119.62746	NAD83
Chevron 21MW-4	WESTC00022	AGC100012330	---	---	Monitoring	350.3	feet	2014	35.6591570	-119.7078893	NAD83

TABLE 10. WELL OWNERSHIP TYPE AND SAMPLING AGENCY

Table 10-1. Buena Vista Coalition well ownership type and sampling agency.

WELL ID/FIELD POINT NAME	OWNER TYPE	SAMPLING AGENCY	SAMPLING SOP
BVCWD00001	Private	Provost & Pritchard	BVC 03-19
BVCWD00002	Private	Provost & Pritchard	BVC 03-19
BVCWD00003	Private	Provost & Pritchard	BVC 03-19
BVCWD00004	Private	Provost & Pritchard	BVC 03-19
BVCWD00005	Private	Provost & Pritchard	BVC 03-19
BVCWD00006	Private	Provost & Pritchard	BVC 03-19
BVCWD00007	Private	Provost & Pritchard	BVC 03-19
BVCWD00008	Private	Provost & Pritchard	BVC 03-19
BVCWD00009	Private	Provost & Pritchard	BVC 03-19
BVCWD00010	Private	Provost & Pritchard	BVC 03-19
BVCWD00011	Private	Provost & Pritchard	BVC 03-19
BVCWD00012	Private	Provost & Pritchard	BVC 03-19
BVCWD00013	Private	Provost & Pritchard	BVC 03-19

Table 10-2. Cawelo Water District Coalition well ownership type and sampling agency.

WELL ID/FIELD POINT NAME	OWNER TYPE	SAMPLING AGENCY	SAMPLING SOP
CAWDC00001	District	Cawelo Water District	CWDC 03-19
CAWDC00002	District	Cawelo Water District	CWDC 03-19
CAWDC00003	District	Cawelo Water District	CWDC 03-19
CAWDC00004	District	Cawelo Water District	CWDC 03-19
CAWDC00005	District	Cawelo Water District	CWDC 03-19
CAWDC00006	District	Cawelo Water District	CWDC 03-19
CAWDC00007	District	Cawelo Water District	CWDC 03-19
CAWDC00008	District	Cawelo Water District	CWDC 03-19
CAWDC00009	District	Cawelo Water District	CWDC 03-19
CAWDC00010	District	Cawelo Water District	CWDC 03-19
CAWDC00011	District	Cawelo Water District	CWDC 03-19
CAWDC00012	District	Cawelo Water District	CWDC 03-19
CAWDC00013	District	Cawelo Water District	CWDC 03-19
CAWDC00014	District	Cawelo Water District	CWDC 03-19

Table 10-3. East San Joaquin Water Quality Coalition well ownership type and sampling agency.

WELL ID	OWNER TYPE	SAMPLING AGENCY	SAMPLING SOP
ESJQC00001	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00002	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling

Well ID	Owner Type	Sampling Agency	Sampling SOP
ESJQC00003	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00004	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00005	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00006	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00007	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00008	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00009	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00010	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00011	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling
ESJQC00012	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling

Table 10-4. Grassland Drainage Area Coalition well ownership type and sampling agency.

GQTM Well Name	Well ID	Owner Type	Sampling Agency	Sampling SOP
GDA001	GDACX00001	Member	LSCE	Well Water Sample Collection SOP LSCE 2018
GDA002	GDACX00002	Member	LSCE	Well Water Sample Collection SOP LSCE 2018
GDA003	GDACX00003	Member	LSCE	Well Water Sample Collection SOP LSCE 2018
GDA004	GDACX00004	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018
GDA005	GDACX00005	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018
GDA006	GDACX00006	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018
GDA007	GDACX00007	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018
GDA011	GDACX00011	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018

Table 10-5. Kaweah Basin Water Quality Association well ownership type and sampling agency.

Well ID/Field Point Name	Owner Type	Sampling Agency	Sampling SOP
KBWQA00001	Private	P &P	KBWQA 03-19
KBWQA00003	Private	P &P	KBWQA 03-19
KBWQA00004	Private	P &P	KBWQA 03-19
KBWQA00005	Private	P &P	KBWQA 03-19
KBWQA00007	Private	P &P	KBWQA 03-19
KBWQA00009	Private	P &P	KBWQA 03-19
KBWQA00010	Private	P &P	KBWQA 03-19

Well ID/Field Point Name	Owner Type	Sampling Agency	Sampling SOP
KBWQA00015	Private	P &P	KBWQA 03-19
KBWQA00016	Private	P &P	KBWQA 03-19
KBWQA00017	Private	P &P	KBWQA 03-19
KBWQA00018	Private	P &P	KBWQA 03-19
KBWQA00020	Private	P &P	KBWQA 03-19
KBWQA00021	Private	P &P	KBWQA 03-19
KBWQA00023	Private	P &P	KBWQA 03-19

Table 10-6. Kern River Watershed Coalition Authority well ownership type and sampling agency.

Well ID/Field Point Name	Owner Type	Sampling Agency	Sampling SOP
KRWCA0002	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0003	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0004	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0005	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0006	Private	Provost & Pritchard	KRWCA 03-19
KRWCA0007	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0008	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0009	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0010	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0011	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0012	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0013	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0014	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0015	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0016	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0017	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0018	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0019	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0020	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0021	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0022	Water District	Provost & Pritchard	KRWCA 03-19
KRWCA0023	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0024	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0025	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0026	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0027	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0028	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0029	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0030	Member	Provost & Pritchard	KRWCA 03-19

Well ID/Field Point Name	Owner Type	Sampling Agency	Sampling SOP
KRWCA0031	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0033	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0034	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0035	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0036	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0037	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0038	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0039	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0040	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0041	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0042	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0043	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0044	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0045	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0047	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0049	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0052	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0053	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0054	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0056	Water District	Provost & Pritchard	KRWCA 03-19
KRWCA0057	Water District	Provost & Pritchard	KRWCA 03-19
KRWCA0059	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0060	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0061	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0062	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0063	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0064	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0065	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0066	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0067	Member	Provost & Pritchard	KRWCA 03-19
KRWCA0068	Water District	Provost & Pritchard	KRWCA 03-19
KRWCA0069	Water District	Provost & Pritchard	KRWCA 03-19

Table 10-7. Kings River Water Quality Coalition well ownership type and sampling agency.

GQTM Well Name	Well ID	Owner Type	Sampling Agency	Sampling SOP
TM13S16E02	KRWQC00001	Member	KRWQC	KRWQC GWTM SOP 2.0
TM13S17E01	KRWQC00002	Member	KRWQC	KRWQC GWTM SOP 2.0
TM13S20E01	KRWQC00003	Member	KRWQC	KRWQC GWTM SOP 2.0
TM13S20E02	KRWQC00004	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM13S21E01	KRWQC00005	Member	KRWQC	KRWQC GWTM SOP 2.0

GQTM Well Name	Well ID	Owner Type	Sampling Agency	Sampling SOP
TM13S21E03	KRWQC00006	Member	KRWQC	KRWQC GWTM SOP 2.0
TM13S21E04	KRWQC00007	Member	KRWQC	KRWQC GWTM SOP 2.0
TM13S22E01	KRWQC00008	Member	KRWQC	KRWQC GWTM SOP 2.0
TM13S22E03	KRWQC00009	Member	KRWQC	KRWQC GWTM SOP 2.0
TM13S22E04	KRWQC00010	Member	KRWQC	KRWQC GWTM SOP 2.0
TM13S23E01	KRWQC00011	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S16E01	KRWQC00012	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S18E01	KRWQC00013	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM14S18E02	KRWQC00014	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S19E01	KRWQC00015	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S19E02	KRWQC00016	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S19E03	KRWQC00017	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S20E01	KRWQC00018	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S20E02	KRWQC00019	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S21E01	KRWQC00020	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM14S21E02	KRWQC00021	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM14S22E01	KRWQC00022	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S22E02	KRWQC00023	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM14S22E03	KRWQC00024	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM14S22E04	KRWQC00025	Member	KRWQC	KRWQC GWTM SOP 2.0
TM14S23E01	KRWQC00026	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S16E01	KRWQC00027	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S16E02	KRWQC00028	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S18E01	KRWQC00029	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S18E02	KRWQC00030	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S18E03	KRWQC00031	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S19E01	KRWQC00032	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S21E01	KRWQC00033	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S21E02	KRWQC00034	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S22E01	KRWQC00035	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S22E02	KRWQC00036	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S22E03	KRWQC00037	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S22E04	KRWQC00038	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S22E05	KRWQC00039	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S22E06	KRWQC00040	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S22E07	KRWQC00041	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S23E01	KRWQC00042	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S23E02	KRWQC00043	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S23E03	KRWQC00044	Member	KRWQC	KRWQC GWTM SOP 2.0
TM15S23E04	KRWQC00045	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM15S24E01	KRWQC00046	Member	KRWQC	KRWQC GWTM SOP 2.0
TM16S17E01	KRWQC00047	PSW	KRWQC	KRWQC GWTM SOP 2.0

GQTM Well Name	Well ID	Owner Type	Sampling Agency	Sampling SOP
TM16S18E01	KRWQC00048	Member	KRWQC	KRWQC GWTM SOP 2.0
TM16S18E02	KRWQC00049	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S19E01	KRWQC00050	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S19E02	KRWQC00051	Member	KRWQC	KRWQC GWTM SOP 2.0
TM16S20E01	KRWQC00052	Member	KRWQC	KRWQC GWTM SOP 2.0
TM16S20E02	KRWQC00053	Member	KRWQC	KRWQC GWTM SOP 2.0
TM16S21E01	KRWQC00054	Member	KRWQC	KRWQC GWTM SOP 2.0
TM16S21E02	KRWQC00055	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S21E03	KRWQC00056	Member	KRWQC	KRWQC GWTM SOP 2.0
TM16S23E01	KRWQC00057	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S24E01	KRWQC00058	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S24E02	KRWQC00059	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S24E03	KRWQC00060	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S24E04	KRWQC00061	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S24E05	KRWQC00062	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S24E06	KRWQC00063	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S24E07	KRWQC00064	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM16S24E08	KRWQC00065	Member	KRWQC	KRWQC GWTM SOP 2.0
TM16S25E01	KRWQC00066	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM17S18E01	KRWQC00067	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S18E02	KRWQC00068	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S18E03	KRWQC00069	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S18E04	KRWQC00070	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S18E05	KRWQC00071	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S18E06	KRWQC00072	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S19E01	KRWQC00073	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S19E02	KRWQC00074	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S20E01	KRWQC00075	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S20E02	KRWQC00076	DAIRY	KRWQC	KRWQC GWTM SOP 2.0
TM17S21E01	KRWQC00077	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S21E02	KRWQC00078	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S22E01	KRWQC00079	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S22E03	KRWQC00080	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S23E01	KRWQC00081	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S24E01	KRWQC00082	Member	KRWQC	KRWQC GWTM SOP 2.0
TM17S24E02	KRWQC00083	Member	KRWQC	KRWQC GWTM SOP 2.0
TM18S20E01	KRWQC00084	Member	KRWQC	KRWQC GWTM SOP 2.0
TM18S20E02	KRWQC00085	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM18S20E03	KRWQC00086	Member	KRWQC	KRWQC GWTM SOP 2.0
TM18S20E04	KRWQC00087	Member	KRWQC	KRWQC GWTM SOP 2.0
TM19S20E01	KRWQC00088	PSW	KRWQC	KRWQC GWTM SOP 2.0
TM19S20E02	KRWQC00089	Member	KRWQC	KRWQC GWTM SOP 2.0

GQTM Well Name	Well ID	Owner Type	Sampling Agency	Sampling SOP
TM19S21E01	KRWQC00090	Member	KRWQC	KRWQC GWTM SOP 2.0
TM20S20E01	KRWQC00091	Member	KRWQC	KRWQC GWTM SOP 2.0

Table 10-8. Westlands Water Quality Coalition well ownership type and sampling agency.

Well ID	Owner Type	Sampling Agency	Sampling SOP
WWQCX00001	WWD	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00003	USGS	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00004	USGS	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00005	USGS	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00006	USGS	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00007	USGS	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00008	USGS	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00010	USBR	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00011	USBR	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00012	Fresno County	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00013	Member	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00014	USBR	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00015	WWD	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00016	Fresno County	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental
WWQCX00017	USBR	MLJ Environmental	Standard Operating Procedures for Groundwater Sampling – MLJ Environmental

Table 10-9. Westside San Joaquin River Watershed Coalition well ownership type and sampling agency.

GQTM Well Name	Well ID	Owner Type	Sampling Agency	Sampling SOP
WSJ002	WSJRC00002	Member	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ003	WSJRC00003	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ004	WSJRC00004	PWS	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ006	WSJRC00006	Member	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ007	WSJRC00007	Member	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ008	WSJRC00008	Non-Member Domestic Well	LSCE	Well Water Sample Collection SOP LSCE 2018

GQTM Well Name	Well ID	Owner Type	Sampling Agency	Sampling SOP
WSJ010	WSJRC00010	PWS	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ011	WSJRC00011	PWS	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ012	WSJRC00012	Member	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ013	WSJRC00013	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ014	WSJRC00014	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ015	WSJRC00015	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ017	WSJRC00017	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018
WSJ018	WSJRC00018	Water District	LSCE	Well Water Sample Collection SOP LSCE 2018

Table 10-10. Westside Water Quality Coalition well ownership type and sampling agency.

GQTM Well Name	Well ID	Owner Type	Sampling Agency	Sampling SOP
LP Farms Well 3013	WESTC00002	Member	Wood	Wood
025S020E32E007M	WESTC00005	Member	Wood	Wood
USGS Lost Hills Well[4]	WESTC00008	USGS	USGS	USGS
Berrenda Mesa-1	WESTC00009	Member	Wood	Wood
USGS Well BWSD #5	WESTC00011	USGS	USGS	USGS
Aera Belridge 13A1	WESTC00012	Aera	Wood	Wood
AeraBelridge_5B2	WESTC00013	Member	Wood	Wood
DWR T25S/R21E-31R1_10	WESTC00015	Member	Wood	Wood
DWR T26S/R21E-16R1	WESTC00016	Member	Wood	Wood
DWR T27S/R21E-11A_BEL #2	WESTC00017	Member	Wood	Wood
DWR T27S/R22E-18B1_BEL #3A	WESTC00018	unknown	Wood	Wood
DWR T28S/R22E-05F	WESTC00020	unknown	Wood	Wood
DWR Bel 1S	WESTC00021	unknown	Wood	Wood
Chevron 21MW-4	WESTC00022	Chevron	Wood	Wood

TABLE 13. SAMPLE HANDLING AND ANALYTICAL INFORMATION

Table 13-1. Buena Vista Coalition sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preparation	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters												
Dissolved Oxygen (DO)	P&P	360.1	Ground-water	Unfiltered	NA	NA	None	None	NA	0.01	0.01	mg/L
Electrical Conductivity (EC) at 25 °C	P&P	120.1	Ground-water	Unfiltered	NA	NA	None	None	NA	0.001	2.5	µS/cm
pH	P&P	150.1	Ground-water	Unfiltered	NA	NA	None	None	15 minutes	0.1	0.1	pH units
Temperature	P&P	SM 2550	Ground-water	Unfiltered	NA	NA	None	None	NA	0.01	0.1	°C
Depth to standing water (static water level)	P&P	NA	Ground-water	Unfiltered	NA	NA	None	None	NA	NA	NA	ft
Nutrients												
Nitrate as N	BSK	EPA 300.0	Ground-water	Unfiltered	250mL	Polyethylene	None	None	48 hours	0.099 mg/L	0.23	mg/L
Anions												
Carbonate	BSK	SM 2320B	Ground-water	Unfiltered	250mL	Polyethylene	None	None	14 days	3mg/L	3mg/L	mg/L
Chloride	BSK	EPA 300.0	Ground-water	Unfiltered	250mL	Polyethylene	None	None	28 days	0.5082mg/L	1mg/L	mg/L
Bicarbonate	BSK	SM 2320B	Ground-water	Unfiltered	250mL	Polyethylene	None	None	14 days	3mg/L	3mg/L	mg/L
Sulfate (SO4)	BSK	EPA 300.0	Ground-water	Unfiltered	250mL	Polyethylene	None	None	28 days	0.3981 mg/L	1mg/L	mg/L
Cations												
Boron	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.0455mg/L	0.1mg/L	mg/L
Calcium	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.0455mg/L	0.1mg/L	mg/L
Magnesium	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.0455mg/L	0.1mg/L	mg/L
Potassium	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.9091mg/L	2mg/L	mg/L
Sodium	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.4545mg/L	1mg/L	mg/L
Solids												
Total Dissolved Solids (TDS)	BSK	SM 2540C	Ground-water	Unfiltered	1000mL	Polyethylene	None	None	7 days	5mg/L	5mg/L	mg/L

Table 13-2. Cawelo Water District Coalition sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters											
Dissolved Oxygen (DO)	Field	Field Instrument	Ground-water	Unfiltered	12 oz	Polyethylene	N/A	N/A	N/A	0.01	mg/L
Electrical Conductivity (EC) at 25 °C	Field	Field Instrument	Ground-water	Unfiltered	12 oz	Polyethylene	N/A	N/A	N/A	0.001	µmhos/cm
pH	Field	Field Instrument	Ground-water	Unfiltered	12 oz	Polyethylene	N/A	N/A	N/A	0.1	units
Temperature	Field	Field Instrument	Ground-water	Unfiltered	12 oz	Polyethylene	N/A	N/A	N/A	0.01	C°
Depth to standing water (static water level)	Field	Field Instrument	Ground-water	Unfiltered	12 oz	Polyethylene	N/A	N/A	N/A	N/A	Ft
Nutrients											
Nitrate as N	FGL	SM 4500-NO3	Ground-water	Unfiltered	32 oz	Polyethylene	N/A	48 Hours	0.0072	0.05	mg/L
Anions											
Carbonate	FGL	SM 2320B	Ground-water	Unfiltered	32 oz	Polyethylene	N/A	14 days	1.1	10	mg/L
Chloride	FGL	EPA 300.0	Ground-water	Unfiltered	32 oz	Polyethylene	N/A	28 days	0.026	1	mg/L
Bicarbonate	FGL	SM 2320B	Ground-water	Unfiltered	32 oz	Polyethylene	N/A	14 days	1.1	10	mg/L
Sulfate (SO4)	FGL	EPA 300.0	Ground-water	Unfiltered	32 oz	Polyethylene	N/A	28 days	0.015	1	mg/L
Cations											
Boron	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	N/A	6 months	0.0088	0.1	mg/L
Calcium	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	N/A	6 months	0.018	0.5	mg/L
Magnesium	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	N/A	6 months	0.0058	0.5	mg/L
Potassium	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	N/A	6 months	0.12	1	mg/L
Sodium	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	N/A	6 months	0.05	1	mg/L
Solids											
Total Dissolved Solids (TDS)	FGL	SM 2540C	Ground-water	Lab Filtered	32oz	Polyethylene	N/A	7 days	5.8	10	mg/L

Table 13-3. East San Joaquin Water Quality Coalition sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preparation	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters												
Dissolved Oxygen (DO)	MLJ	SM 4500-O	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.01	mg/L
Electrical Conductivity (EC) at 25 °C	MLJ	EPA 120.1	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	2.5	µS/cm
pH	MLJ	EPA 150.1	Groundwater	Unfiltered	NA	NA	None	None	15 minutes	NA	0.1	pH units
Temperature	MLJ	SM 2550	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.1	°C
Depth to standing water (static water level)	MLJ	NA	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	NA	ft
Oxidation-reduction potential (ORP)	MLJ	NA	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	NA	mV
Turbidity	MLJ	EPA 180.1	Groundwater	Unfiltered	10 mL	NA	None	None	NA	NA	1	NTU
Nutrients												
Nitrate + Nitrite as N	Caltest	EPA 353.2	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	H2SO4	28 days	0.07	0.1	mg/L (as N)
Anions												
Bicarbonate	Caltest	SM 2320B	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	14 days	1.2	10	mg/L
Carbonate	Caltest	SM 2320B	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	14 days	1.2	10	mg/L
Chloride	Caltest	EPA 300.0	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	28 days	0.2	1	mg/L
Sulfate (SO4)	Caltest	EPA 300.0	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	28 days	0.1	0.5	mg/L
Cations												
Boron	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.002	.01	mg/L
Calcium	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.02	0.05	mg/L
Magnesium	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.005	0.05	mg/L
Potassium	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.02	0.05	mg/L
Sodium	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.02	0.05	mg/L
Solids												
Total Dissolved Solids (TDS)	Caltest	SM 2540 C	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	7 days	4	10	mg/L

*Samples with a final turbidity measurement > 10 NTU will be filtered in the field.

Table 13-4. Grassland Drainage Area Coalition sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preparation	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters												
Dissolved Oxygen (DO)	LSCE	SM4500-OG-2001	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.01	mg/L
Electrical Conductivity (EC) at 25 °C	LSCE	SM2510-B 1997	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	2.5	µS/cm
pH	LSCE	SM4500-H+ B-2000	Groundwater	Unfiltered	NA	NA	None	None	15 minutes	NA	0.1	pH units
Temperature	LSCE	SM2550-B 2000	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.1	°C
Depth to standing water (static water level)	LSCE	NA	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	NA	ft
Oxidation-reduction potential (ORP)	LSCE	NA	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	NA	mV
Turbidity	LSCE	EPA180.1	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	1	NTU
Nutrients												
Nitrate as N	Eurofins Eaton	EPA 300.0	Groundwater	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	48 hours	0.004	0.0125	mg/L
Anions												
Carbonate	Eurofins Eaton	SM 2330B	Groundwater	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	14 days	2	2	mg/L
Chloride	Eurofins Eaton	EPA 300.0	Groundwater	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	28 days	0.025	0.5	mg/L
Bicarbonate	Eurofins Eaton	SM 2330B	Groundwater	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	14 days	2	2	mg/L
Sulfate (SO4)	Eurofins Eaton	EPA 300.0	Groundwater	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	28 days	0.06	0.5	mg/L
Cations												
Boron	Eurofins Eaton	EPA 200.7	Groundwater	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.008	0.05	mg/L
Calcium	Eurofins Eaton	EPA 200.7	Groundwater	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.118	1	mg/L
Magnesium	Eurofins Eaton	EPA 200.7	Groundwater	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.003	0.1	mg/L
Potassium	Eurofins Eaton	EPA 200.7	Groundwater	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.13	1	mg/L
Sodium	Eurofins Eaton	EPA 200.7	Groundwater	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.113	1	mg/L
Solids												
Total Dissolved Solids (TDS)	Eurofins Eaton	EPA 160.1	Groundwater	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	7 days	4.224	10	mg/L

Table 13-5. Kaweah Basin Water Quality Association sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preparation	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters												
Dissolved Oxygen (DO)	P&P	EPA 360.1	Ground-water	Un-filtered	NA	Not Applicable	None	None	NA	NA	0.01	0.01
Electrical Conductivity (EC) at 25 °C	P&P	EPA 120.1	Ground-water	Un-filtered	NA	Not Applicable	None	None	NA	NA	0.001	2.5
pH	P&P	EPA 150.1	Ground-water	Un-filtered	NA	Not Applicable	None	None	15 minutes	NA	0.1	0.1
Temperature	P&P	SM 2550	Ground-water	Un-filtered	NA	Not Applicable	None	None	NA	NA	0.01	0.1
Depth to standing water (static water level)	P&P	NA	Ground-water	Un-filtered	NA	Not Applicable	None	None	NA	NA	NA	NA
Nutrients												
Nitrate as N	FGL	SM 4500-NO3	Ground-water	Un-filtered	32 oz	Polyethylene	Lab Acidified	None	48 Hours	0.0072	0.05	mg/L (as N)
Anions												
Carbonate	FGL	SM 2320B	Ground-water	Un-filtered	32 oz	Polyethylene	None	None	14 days	1.1	10	mg/L
Chloride	FGL	EPA 300.0	Ground-water	Un-filtered	32 oz	Polyethylene	None	None	28 days	0.026	1	mg/L
Bicarbonate	FGL	SM 2320B	Ground-water	Un-filtered	32 oz	Polyethylene	None	None	14 days	1.1	10	mg/L
Sulfate (SO4)	FGL	EPA 300.0	Ground-water	Un-filtered	32 oz	Polyethylene	None	None	28 days	0.015	1	mg/L
Cations												
Boron	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	None	None	6 months	0.0088	0.1	mg/L
Calcium	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	None	None	6 months	0.018	0.5	mg/L
Magnesium	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	None	None	6 months	0.0058	0.5	mg/L
Potassium	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	None	None	6 months	0.12	1	mg/L
Sodium	FGL	EPA 200.7	Ground-water	Lab Filtered	250 mL	Polyethylene	None	None	6 months	0.05	1	mg/L
Solids												
Total Dissolved Solids (TDS)	FGL	SM 2540C	Ground0water	Lab Filtered	32oz	Polyethylene	None	None	7 days	5.8	10	mg/L

Table 13-6. Kern River Watershed Coalition Authority sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preparation	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters												
Dissolved Oxygen (DO)	P&P	360.1	Ground-water	Unfiltered	NA	NA	None	None	NA	0.01	0.01	mg/L
Electrical Conductivity (EC) at 25 °C	P&P	120.1	Ground-water	Unfiltered	NA	NA	None	None	NA	0.001	2.5	µS/cm
pH	P&P	150.1	Ground-water	Unfiltered	NA	NA	None	None	15 minutes	0.1	0.1	pH units
Temperature	P&P	SM 2550	Ground-water	Unfiltered	NA	NA	None	None	NA	0.01	0.1	°C
Depth to standing water (static water level)	P&P	NA	Ground-water	Unfiltered	NA	NA	None	None	NA	NA	NA	ft
Nutrients												
Nitrate as N	BSK	EPA 300.0	Ground-water	Unfiltered	250mL	Polyethylene	None	None	48 hours	0.099	0.23	mg/L
Anions												
Carbonate	BSK	SM 2320B	Ground-water	Unfiltered	250mL	Polyethylene	None	None	14 days	3mg/L	3mg/L	mg/L
Chloride	BSK	EPA 300.0	Ground-water	Unfiltered	250mL	Polyethylene	None	None	28 days	0.5082mg/L	1mg/L	mg/L
Bicarbonate	BSK	SM 2320B	Ground-water	Unfiltered	250mL	Polyethylene	None	None	14 days	3mg/L	3mg/L	mg/L
Sulfate (SO4)	BSK	EPA 300.0	Ground-water	Unfiltered	250mL	Polyethylene	None	None	28 days	0.3981	1mg/L	mg/L
Cations												
Boron	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.0455mg/L	0.1mg/L	mg/L
Calcium	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.0455mg/L	0.1mg/L	mg/L
Magnesium	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.0455mg/L	0.1mg/L	mg/L
Potassium	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.9091mg/L	2mg/L	mg/L
Sodium	BSK	EPA 200.7	Ground-water	LabFiltered	500mL	Polyethylene	None	HNO3	6 months	0.4545mg/L	1mg/L	mg/L
Solids												
Total Dissolved Solids (TDS)	BSK	SM 2540C	Ground-water	Unfiltered	1000mL	Polyethylene	None	None	7 days	5mg/L	5mg/L	mg/L

Table 13-7. Kings River Water Quality Coalition sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preparation	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters												
Dissolved Oxygen (DO)	Field	SM 4500-O	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.01	mg/L
Electrical Conductivity (EC) at 25 °C	Field	EPA 120.1	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	2.5	µS/cm
pH	Field	EPA 150.1	Groundwater	Unfiltered	NA	NA	None	None	15 minutes	NA	0.1	pH units
Temperature	Field	SM 2550	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.1	°C
Depth to standing water (static water level)	Field	NA	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	NA	ft
Nutrients												
Nitrate as N	BSK	EPA 300.0	Groundwater	Unfiltered	1 L White cap	Polyethylene	None	None	48 hours	0.099	0.23	mg/L
Anions												
Carbonate	BSK	SM 2320B	Groundwater	Unfiltered	1 L White cap	Polyethylene	None	None	14 days	3.0	3.0	mg/L
Chloride	BSK	EPA 300.0	Groundwater	Unfiltered	1 L White cap	Polyethylene	None	None	28 days	0.5082	1.0	mg/L
Bicarbonate	BSK	SM 2320B	Groundwater	Unfiltered	1 L White cap	Polyethylene	None	None	14 days	3.0	3.0	mg/L
Sulfate (SO4)	BSK	EPA 300.0	Groundwater	Unfiltered	1 L White cap	Polyethylene	None	None	28 days	0.3981	1.0	mg/L
Cations												
Boron	BSK	EPA 200.7	Groundwater	Unfiltered	500 ml Red Cap	Polyethylene	FieldAcidified	HNO3	6 months	0.0455	0.1	mg/L
Calcium	BSK	EPA 200.7	Groundwater	Unfiltered	500 ml Red Cap	Polyethylene	FieldAcidified	HNO3	6 months	0.0455	0.1	mg/L
Magnesium	BSK	EPA 200.7	Groundwater	Unfiltered	500 ml Red Cap	Polyethylene	FieldAcidified	HNO3	6 months	0.0455	0.1	mg/L
Potassium	BSK	EPA 200.7	Groundwater	Unfiltered	500 ml Red Cap	Polyethylene	FieldAcidified	HNO3	6 months	0.9091	2.0	mg/L
Sodium	BSK	EPA 200.7	Groundwater	Unfiltered	500 ml Red Cap	Polyethylene	FieldAcidified	HNO3	6 months	0.4545	1.0	mg/L
Solids												
Total Dissolved Solids (TDS)	BSK	SM 2540C	Groundwater	unfiltered	1 L White cap	Polyethylene	None	None	7 days	5.0	5.0	mg/L

Table 13-8. Westland Water Quality Coalition sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preparation	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters												
Dissolved Oxygen (DO)	MLJ	SM 4500-O	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.01	mg/L
Electrical Conductivity (EC) at 25 °C	MLJ	EPA 120.1	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	2.5	µS/cm
pH	MLJ	EPA 150.1	Groundwater	Unfiltered	NA	NA	None	None	15 minutes	NA	0.1	pH units
Temperature	MLJ	SM 2550	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.1	°C
Depth to standing water (static water level)	MLJ	NA	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	NA	ft
Oxidation-reduction potential (ORP)	MLJ	NA	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	NA	mV
Turbidity	MLJ	EPA 180.1	Groundwater	Unfiltered	10 mL	NA	None	None	NA	NA	1	NTU
Nutrients												
Nitrate + Nitrite as N	Caltest	EPA 353.2	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	H2SO4	28 days	0.07	0.1	mg/L (as N)
Anions												
Bicarbonate	Caltest	SM 2320B	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	14 days	1.2	10	mg/L
Carbonate	Caltest	SM 2320B	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	14 days	1.2	10	mg/L
Chloride	Caltest	EPA 300.0	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	28 days	0.2	1	mg/L
Sulfate (SO4)	Caltest	EPA 300.0	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	28 days	0.1	0.5	mg/L
Cations												
Boron	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.002	0.01	mg/L
Calcium	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.02	0.05	mg/L
Magnesium	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.005	0.05	mg/L
Potassium	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.02	0.05	mg/L
Sodium	Caltest	EPA 200.8	Groundwater	Unfiltered*	500 mL	Polyethylene	Field Acidified	HNO3	6 months	0.02	0.05	mg/L
Solids												
Total Dissolved Solids (TDS)	Caltest	SM 2540 C	Groundwater	Unfiltered*	500 mL	Polyethylene	None	None	7 days	4	10	mg/L

*Samples with a final turbididty measurement > 10 NTU will be filtered in the field.

Table 13-9. Westside San Joaquin River Watershed Coalition sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preparation	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters												
Dissolved Oxygen (DO)	LSCE	SM4500-O G-2001	Ground-water	Un-filtered	NA	NA	None	None	NA	NA	0.01	mg/L
Electrical Conductivity (EC) at 25 °C	LSCE	SM2510-B 1997	Ground-water	Un-filtered	NA	NA	None	None	NA	NA	2.5	µS/cm
pH	LSCE	SM4500-H+ B-2000	Ground-water	Un-filtered	NA	NA	None	None	15 minutes	NA	0.1	pH units
Temperature	LSCE	SM2550-B 2000	Ground-water	Un-filtered	NA	NA	None	None	NA	NA	0.1	°C
Depth to standing water (static water level)	LSCE	NA	Ground-water	Un-filtered	NA	NA	None	None	NA	NA	NA	ft
Oxidation-reduction potential (ORP)	LSCE	NA	Ground-water	Un-filtered	NA	NA	None	None	NA	NA	NA	mV
Turbidity	LSCE	EPA180.1	Ground-water	Un-filtered	NA	NA	None	None	NA	NA	1	NTU
Nutrients												
Nitrate as N	Eurofins Eaton	EPA 300.0	Ground-water	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	48 hours	0.004	0.0125	mg/L
Anions												
Carbonate	Eurofins Eaton	SM 2330B	Ground-water	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	14 days	2	2	mg/L
Chloride	Eurofins Eaton	EPA 300.0	Ground-water	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	28 days	0.025	0.5	mg/L
Bicarbonate	Eurofins Eaton	SM 2330B	Ground-water	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	14 days	2	2	mg/L
Sulfate (SO4)	Eurofins Eaton	EPA 300.0	Ground-water	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	28 days	0.06	0.5	mg/L
Cations												
Boron	Eurofins Eaton	EPA 200.7	Ground-water	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.008	0.05	mg/L
Calcium	Eurofins Eaton	EPA 200.7	Ground-water	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.118	1	mg/L
Magnesium	Eurofins Eaton	EPA 200.7	Ground-water	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.003	0.1	mg/L
Potassium	Eurofins Eaton	EPA 200.7	Ground-water	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.13	1	mg/L
Sodium	Eurofins Eaton	EPA 200.7	Ground-water	NA	Lab Provide Bottle	Polyethylene	Manufacturer Acidified	HNO3	6 months	0.113	1	mg/L
Solids												
Total Dissolved Solids (TDS)	Eurofins Eaton	SM2540C	Ground-water	NA	Lab Provide Bottle	Polyethylene	Lab Provided, Sealed, New	None	7 days	4.224	10	mg/L

Table 13-10. Westside Water Quality Coalition sample handling and analytical information.

Constituent	Laboratory	Analytical Method	Matrix	Fraction	Sample Volume	Sample Container	Preparation	Preservative	Maximum Hold Time	Method Detection Limit (MDL)	Reporting Limit (RL)	Reporting Unit
Field Parameters												
Dissolved Oxygen (DO)	Wood	SM4 4500-O	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.01	mg/L
Electrical Conductivity (EC) at 25 °C	Wood	EPA 120.1	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	2.5	µS/cm
pH	Wood	EPA 150.1	Groundwater	Unfiltered	NA	NA	None	None	15 minutes	NA	0.1	pH units
Temperature	Wood	SM 2550	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	0.1	°C
Depth to standing water (static water level)	Wood	NA	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	NA	ft
Oxidation-reduction potential (ORP)	Wood	NA	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	NA	mV
Turbidity	Wood	EPA 180.1	Groundwater	Unfiltered	NA	NA	None	None	NA	NA	1	NTU
Nutrients												
Nitrate + Nitrite as N	BSK	SM 4500	Groundwater	Unfiltered	250 mL	Polyethylene	None	H_2SO_4	28 days	0.099 mg/L	0.23 mg/L	mg/L (as N)
Nitrate as N	BSK	EPA 300.0	Groundwater	Unfiltered	250 mL	Polyethylene	None	None	48 hours	0.099 mg/L	0.23 mg/L	mg/L (as N)
Anions												
Carbonate	BSK	SM 2320B	Groundwater	Unfiltered	250 mL	Polyethylene	None	None	14 days	3 mg/L	3 mg/L	mg/L
Chloride	BSK	EPA 300.0	Groundwater	Unfiltered	250 mL	Polyethylene	None	None	28 days	0.5082 mg/L	1 mg/L	mg/L
Bicarbonate	BSK	SM 2320B	Groundwater	Unfiltered	250 mL	Polyethylene	None	None	14 days	3 mg/L	3 mg/L	mg/L
Sulfate (SO_4)	BSK	EPA 300.0	Groundwater	Unfiltered	250 mL	Polyethylene	None	None	28 days	0.3981 mg/L	1 mg/L	mg/L
Cations												
Boron	BSK	EPA 200.7	Groundwater	Unfiltered	500 mL	Polyethylene	Field Acidified	HNO_3	6 months	0.0455 mg/L	0.1 mg/L	mg/L
Calcium	BSK	EPA 200.7	Groundwater	Unfiltered	500 mL	Polyethylene	Field Acidified	HNO_3	6 months	0.0455 mg/L	0.1 mg/L	mg/L
Magnesium	BSK	EPA 200.7	Groundwater	Unfiltered	500 mL	Polyethylene	Field Acidified	HNO_3	6 months	0.0455 mg/L	0.1 mg/L	mg/L
Potassium	BSK	EPA 200.7	Groundwater	Unfiltered	500 mL	Polyethylene	Field Acidified	HNO_3	6 months	0.9091 mg/L	2 mg/L	mg/L
Sodium	BSK	EPA 200.7	Groundwater	Unfiltered	500 mL	Polyethylene	Field Acidified	HNO_3	6 months	0.4545 mg/L	1 mg/L	mg/L
Solids												
Total Dissolved Solids (TDS)	BSK	SM 2540C	Groundwater	Unfiltered	1000 mL	Polyethylene	None	None	7 days	5 mg/L	5 mg/L	mg/L

TABLE 18. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE.

Table 18-1. Buena Vista Coalition instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
PE ICP- OES 8300	Replace tubing; clean or replace nebulizer and cones.	Weekly; As Needed	Norman Espinoza
930 Compact IC Flex Metrohm	Replace tubing, syringe, and columns	As Needed	Joshua Scales
Mantech Titrasip Titration Bid	Replace tubing	As Needed	Joshua Scales
Scale Torbal AGCN200	Clean Balance	Daily	Joshua Scales
Horbia U-52	Sensor Cleaning	Post Sampling	Jordan Muell
Horbia U-52	DO Sensor Cleaning	Bi-monthly	Jordan Muell

Table 18-2. Cawelo Water District Coalition instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
ICP-OES	Replace tubing, nebuliser; clean or replace cones.	As needed	Lab QA Officer
Ion Chromatograph	Replace tubing and syringe	As needed	Lab QA Officer
Skalar 5000 Analyzer	Replace tubing	As needed	Lab QA Officer
Metrohm 855 Analyzer	Replace tubing	As needed	Lab QA Officer
Furnace	Clean oven	As needed	Lab QA Officer
Balance	Clean balance surface	As needed	Lab QA Officer
Horbia U-52	Sensor Cleaning	Post Sampling	Field Lead
Horbia U-52	DO Sensor Cleaning	Bi-monthly	Field Lead

Table 18-3. East San Joaquin Water Quality Coalition instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
YSI Pro Plus - Glass Electrode pH Sensor	Clean glass bulb and visually inspect	<24 hours before sampling	Field Lead
YSI Pro Plus - Polarographic DO Sensor	Change membrane and KCl solution	Every 30 days	Field Lead
YSI Pro Plus - Electrode Cell EC and Thermistor Temperature Probe	Clean electrodes	<24 hours before sampling	Field Lead
YSI Pro Plus - Platinum Band ORP Sensor	Clean sensor	<24 hours before sampling	Field Lead
Hanna Instruments Portable Turbidimeter	Battery check; visually inspect and clean samples cuvets	<24 hours before sampling	Field Lead
DGSI Water Level Indicator	Clean cable and check batteries.	<24 hours before sampling	Field Lead

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
SEAL AQ2 Discrete Analyzer	Clean cells, check all tubing, regenerate cadimum coil	According to manufacturer specifications	Lab QA Officer
Man-Sci Titrasip	Clean titration cup, check tubing	According to manufacturer specifications	Lab QA Officer
Ion Chromatograph (DX 320)	Clean column, check bed supports, replace regenerant, replace suppressor	According to manufacturer specifications	Lab QA Officer
ICP-MS	Check pump tubing, check pump oil, clean cones, clean torch, replace nebulizer, replace torch	According to manufacturer specifications	Lab QA Officer
Balance	Clean pan and check if level, check range of mass used	According to manufacturer specifications	Lab QA Officer

Table 18-4. Grassland Drainage Area Coalition instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
YSI 556 MPS	DO Sensor KCl solution and membrane cap change	Monthly	Field Lead
YSI 556 MPS	pH/ORP Sensor Cleaning	As Needed	Field Lead
YSI 556 MPS	Temp/Conductivity Sensor Cleaning	As Needed	Field Lead
Probe (Turbidity) Oakton T-100	Cleaning Sample Vials	Prior to any week in which sampling will occur, and as needed .	Field Lead
ICP (EPA200.7)	Replace Cones, Torch, Clean Nebulizer, Replace Pump tubing; PM Service	Weekly ; Annually	Lab Analyst; Service Technician
IC (EPA300.0)	Change Support Bed; change columns; PM Maintenance	Weekly; as needed; every 6 months	Lab Analyst; Service Technician
Probe (SM2330B)	Calculation, not applicable	Calculation, not applicable	N/A
Balance (SM2540C)	Verification with 6 masses; PM Service	Daily; Yearly	Lab Analyst; Service Technician

Table 18-5. Kaweah Basin Water Quality Association instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
ICP-OES	Replace tubing, nebuliser; clean or replace cones.	As needed	Lab QA Officer
Ion Chromatograph	Replace tubing and syringe	As needed	Lab QA Officer
Skalar 5000 Analyzer	Replace tubing	As needed	Lab QA Officer
Metrohm 855 Analyzer	Replace tubing	As needed	Lab QA Officer
Furnace	Clean oven	As needed	Lab QA Officer
Balance	Clean balance surface	As needed	Lab QA Officer
Horbia U-52	Sensor Cleaning	Post Sampling	Jordan Muell

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
Horbia U-52	DO Sensor Cleaning	Bi-monthly	Jordan Muell

Table 18-6. Kern River Watershed Coalition Authority instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
PE ICP- OES 8300	Replace tubing; clean or replace nebulizer and cones.	Weekly; As Needed	Norman Espinoza
930 Compact IC Flex Metrohm	Replace tubing, syringe, and columns	As Needed	Joshua Scales
Mantech Titrasip Titration Bid	Replace tubing	As Needed	Joshua Scales
Scale Torbal AGCN200	Clean Balance	Daily	Joshua Scales
Horbia U-52	Sensor Cleaning	Post Sampling	Jordan Muell
Horbia U-52	DO Sensor Cleaning	Bi-monthly	Jordan Muell

Table 18-7. Kings River Water Quality Coalition instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
YSI Field Instruments: DO (YSI Pro Series 20) EC/Temp (YSI Pro Series 30) pH (YSI Pro Series 10)	Calibration against known standards, Battery Check/Replacement Replace DO components as necessary	Each Use (Monthly) Manufacturer recommendation Yearly	Project Field Lead
PE ICP-OES 8300	Replace tubing; clean or replace nebulizer and cones.	Weekly; As Needed	Norm Espinoza
930 Compact IC Flex Metrohm	Replace tubing, syringe, and columns	As Needed	Joshua Scales
Mantech Titrasip Titration Bid	Replace tubing	As Needed	Joshua Scales
Scale Torbal AGCN200	Clean Balance	Daily	Joshua Scales

Table 18-8. Westlands Water Quality Coalition instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
YSI Pro Plus - Glass Electrode pH Sensor	Clean glass bulb and visually inspect	<24 hours before sampling	Field Lead
YSI Pro Plus - Polarographic DO Sensor	Change membrane and KCl solution	Every 30 days	Field Lead
YSI Pro Plus - Electrode Cell EC and Thermistor Temperature Probe	Clean electrodes	<24 hours before sampling	Field Lead
YSI Pro Plus - Platinum Band ORP Sensor	Clean sensor	<24 hours before sampling	Field Lead

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
Hanna Instruments Portable Turbidimeter	Battery check; visually inspect and clean samples cuvets	<24 hours before sampling	Field Lead
DGSI Water Level Indicator	Clean cable and check batteries.	<24 hours before sampling	Field Lead
SEAL AQ2 Discrete Analyzer	Clean cells, check all tubing, regenerate cadimum coil	According to manufacturer specifications	Lab QA Officer
Man-Sci Titrasip	Clean titration cup, check tubing	According to manufacturer specifications	Lab QA Officer
Ion Chromatograph (DX 320)	Clean column, check bed supports, replace regenerant, replace suppressor	According to manufacturer specifications	Lab QA Officer
ICP-MS	Check pump tubing, check pump oil, clean cones, clean torch, replace nebulizer, replace torch	According to manufacturer specifications	Lab QA Officer
Balance	Clean pan and check if level, check range of mass used	According to manufacturer specifications	Lab QA Officer

Table 18-9. Westside San Joaquin River Watershed Coalition instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
YSI 556 MPS	DO Sensor KCl solution and membrane cap change	Monthly	Field Lead
YSI 556 MPS	pH/ORP Sensor Cleaning	As Needed	Field Lead
YSI 556 MPS	Temp/Conductivity Sensor Cleaning	As Needed	Field Lead
Probe (Turbidity) Oakton T-100	Cleaning Sample Vials	Prior to any week in which sampling will occur, and as needed .	Field Lead
ICP (EPA200.7)	Replace Cones, Torch, Clean Nebulizer, Replace Pump tubing; PM Service	Weekly ; Annually	Lab Analyst; Service Technician
IC (EPA300.0)	Change Support Bed; change columns; PM Maintenance	Weekly; as needed; every 6 months	Lab Analyst; Service Technician
Probe (SM2330B)	Calculation, not applicable	Calculation, not applicable	N/A
Balance (SM2540C)	Verification with 6 masses; PM Service	Daily; Yearly	Lab Analyst; Service Technician

Table 18-10. Westside Water Quality Coalition instrument/equipment testing, inspection, and maintenance.

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
Horiba U-50 Series Multimeter or similar (rental)	Equipment supply company inspects and tests upon return of equipment and prior to rental	upon each rental	Rental supply company
PE ICP-OES 8300	Replace tubing; clean or replace nebulizer and cones.	Weekly; As Needed	Norm Espinoza
930 Compact IC Flex Metrohm	Replace tubing, syringe, and columns	As Needed	Joshua Scales

Equipment / Instrument	Maintenance Activity, Testing Activity or Inspection Activity	Frequency	Responsible Person
Mantech Titrasip Titration Bid	Replace tubing	As Needed	Joshua Scales
Scale Torbal AGCN200	Clean Balance	Daily	Joshua Scales

TABLE 19. INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY.

Table 19-1. Buena Vista Coalition instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
930 Compact IC Flex Metrohm	9 to 10 points calibration r>0.995	Calibration checked daily	Joshua Scales
Mantech Titrasip Titration Bid	CCV 10% (Alakalinity)	Calibration checked daily	Joshua Scales
Scale Torbal AGCN200	100mg & 200g wt to check accuracy	Calibration checked daily	Joshua Scales
PE ICP- OES 8300	1 point Calibration r = 1	Calibration checked daily	Norm Espinoza
Horbia U-52	pH and EC calibration	Pre-sampling	Jordan Muell

Table 19-2. Cawelo Water District Coalition instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
Sounder (TBD)	NA	Prior to each sampling event	Field Crew
Horbia U-52	pH calibration	Prior to each sampling event	Field Crew
Horbia U-52	DO calibration	Prior to each sampling event	Field Crew
Horbia U-52	EC calibration	Prior to each sampling event	Field Crew
ICP-OES	Calibration with Continuing Calibration Verification (CCV) - CCV Criteria: 90-110%	Calibration-Daily CCV- Every Ten samples and at end of run	Lab QA Officer
Ion Chromatograph	Calibration Criteria -Correlation Coefficient = <0.995 Continuing Calibration Verification (CCV) -CCV Criteria: 90-110%	Calibration -as needed CCV- Every Ten samples and at end of run	Lab QA Officer
Skalar 5000 Analyzer	Calibration Criteria -Correlation Coefficient = <0.995 Continuing Calibration Verification (CCV) -CCV Criteria: 90-110%	Calibration-Daily CCV- Every Ten samples and at end of run	Lab QA Officer
Metrohm 855 Analyzer	Continuing Calibration Verification (CCV) -CCV Criteria: 90-110%	CCV- Every twenty samples and at end of run	Lab QA Officer
Furnace	Temperature setting 105 °C	Daily Temperature recorded in logbook	Lab QA Officer
Balance	Balance verified with 2 calibrated weights -high and low	Daily weights recorded in logbook	Lab QA Officer

Table 19-3. East San Joaquin Water Quality Coalition instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
YSI Pro Plus - Glass Electrode pH Sensor	3 Point calibration at pH 4, 7, and 10; calibration must be accepted by YSI meter	Daily before first measurement	Field Lead
YSI Pro Plus - Polarographic DO Sensor	H20 Saturated air calibration (%O2) at default 760mm Hg	Before each measurement	Field Lead
YSI Pro Plus - Electrode Cell EC and Thermistor Temperature Probe	Calibration to 1413 µS/cm; calibration must be accepted by YSI meter. Temperature calibration is factory set and does not require user calibration	Daily before first measurement and when EC changes substantially between wells	Field Lead
YSI Pro Plus - Platinum Band ORP Sensor	Calibration using ZoBell solution to proper value based on temperature	Daily before first measurement	Field Lead
Hanna Instruments Portable Turbidimeter	2 point calibration at < 0.10 and 15 NTUs	<24 hours before sampling event	Field Lead
SEAL AQ2 Discrete Analyzer	Linear, r≥0.995	Daily, before analysis	Lab QA Officer
Man-Sci Titrasip	pH calibration before use,	Daily, before analysis	Lab QA Officer
Ion Chromatograph (DX 320)	Mixed-standard curve calibration, r≥0.995	Daily, before analysis	Lab QA Officer
ICP-MS	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	Lab QA Officer
Balance	Mass within 0.5%	Daily, before analysis	Lab QA Officer

Table 19-4. Grassland Drainage Area Coalition instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
Probe (DO, pH, EC, Temp) YSI 556 MPS	All probes calibrated to 5%	Weekly or prior to any week in which sampling will occur.	Field Lead
Probe (Turbidity) Oakton T-100	Calibrate at 800, 100, 20, and 0.02 NTU to within 5% of calibration value.	Weekly or prior to any week in which sampling will occur.	Field Lead
ICP (EPA200.7)	6-point, 1st order function; R2 >/= 0.999	Daily	Lab Analyst
IC (EPA300.0)	Refer to SOP for EPA300.0	Refer to SOP for EPA300.0	Lab QA Officer
Probe (SM2330B)	2nd order function with 7-11 points depending upon the analyte; R >/= 0.990	when QC fails	Lab Analyst
Furnace (SM2540C)	Refer to SOP for SM2540C	Refer to SOP for SM2540C	Lab QA Officer

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
Balance (SM2540C)	Calculation, not applicable	Calculation, not applicable	IT

Table 19-5. Kaweah Basin Water Quality Association instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
Sounder (TBD)	NA	Prior to each sampling event	Field Crew
Horbia U-52	pH calibration	Prior to each sampling event	Field Crew
Horbia U-52	DO calibration	Prior to each sampling event	Field Crew
Horbia U-52	EC calibration	Prior to each sampling event	Field Crew
ICP-OES	Calibration with Continuing Calibration Verification (CCV) -CCV Criteria: 90-110%	Calibration-Daily CCV- Every Ten samples and at end of run	Lab QA Officer
Ion Chromatograph	Calibration Criteria -Correlation Coefficient = <0.995 Continuing Calibration Verification (CCV) -CCV Criteria: 90-110%	Calibration -as needed CCV- Every Ten samples and at end of run	Lab QA Officer
Skalar 5000 Analyzer	Calibration Criteria -Correlation Coefficient = <0.995 Continuing Calibration Verification (CCV) -CCV Criteria: 90-110%	Calibration-Daily CCV- Every Ten samples and at end of run	Lab QA Officer
Metrohm 855 Analyzer	Continuing Calibration Verification (CCV) -CCV Criteria: 90-110%	CCV- Every twenty samples and at end of run	Lab QA Officer
Furnace	Temperature setting 105 °C	Daily Temperature recorded in logbook	Lab QA Officer
Balance	Balance verified with 2 calibrated weights -high and low	Daily weights recorded in logbook	Lab QA Officer

Table 19-6. Kern River Watershed Coalition Authority instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
930 Compact IC Flex Metrohm	9 to 10 points calibration r>0.995	Calibration checked daily	Joshua Scales
Mantech Titrasip Titration Bid	CCV 10% (Alakalinity)	Calibration checked daily	Joshua Scales
Scale Torbal AGCN200	100mg & 200g wt to check accuracy	Calibration checked daily	Joshua Scales
PE ICP- OES 8300	1 point Calibration r = 1	Calibration checked daily	Norm Espinoza
Horbia U-52	pH and EC calibration	Pre-sampling	Jordan Muell

Table 19-7. Kings River Water Quality Coalition instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
YSI Field Instruments	2 point (EC, 0 & 100 umhos/cm), 3 point (pH, 4.0, 7.0, 10.0), DO (barometer)	Monthly (Manufacturer states Yearly)	Project Field Lead
930 Compact IC Flex Metrohm	9-10 points calibration r>0.995	Daily	Joshua Scales
Mantech Titrasip Titration Bid	CCV 10% (Alkalinity)	Daily	Joshua Scales
Scale Torbal AGCN200	100 mg & 200 g weight	Daily	Joshua Scales
PE ICP-OES 8300	1 pt calibration r = 1	Daily	Norm Espinoza

Table 19-8. Westlands Water Quality Coalition instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
YSI Pro Plus - Glass Electrode pH Sensor	3 Point calibration at pH 4, 7, and 10; calibration must be accepted by YSI meter	Daily before first measurement	Field Lead
YSI Pro Plus - Polarographic DO Sensor	H20 Saturated air calibration (%O2) at default 760mm Hg	Before each measurement	Field Lead
YSI Pro Plus - Electrode Cell EC and Thermistor Temperature Probe	Calibration to 1413 µS/cm; calibration must be accepted by YSI meter. Temperature calibration is factory set and does not require user calibration	Daily before first measurement and when EC changes substantially between wells	Field Lead
YSI Pro Plus - Platinum Band ORP Sensor	Calibration using ZoBell solution to proper value based on temperature	Daily before first measurement	Field Lead
Hanna Instruments Portable Turbidimeter	2 point calibration at < 0.10 and 15 NTUs	<24 hours before sampling event	Field Lead
SEAL AQ2 Discrete Analyzer	Linear, r≥0.995	Daily, before analysis	Lab QA Officer
Man-Sci Titrasip	pH calibration before use,	Daily, before analysis	Lab QA Officer
Ion Chromatograph (DX 320)	Mixed-standard curve calibration, r≥0.995	Daily, before analysis	Lab QA Officer
ICP-MS	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	Lab QA Officer
Balance	Mass within 0.5%	Daily, before analysis	Lab QA Officer

Table 19-9. Westside San Joaquin River Watershed Coalition instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
Probe (DO, pH, EC, Temp) YSI 556 MPS	All probes calibrated to 5%	Weekly or prior to any week in which sampling will occur.	Field Lead
Probe (Turbidity) Oakton T-100	Calibrate at 800, 100, 20, and 0.02 NTU to within 5% of calibration value.	Weekly or prior to any week in which sampling will occur.	Field Lead
ICP (EPA200.7)	6-point, 1st order function; R2 >/= 0.999	Daily	Lab Analyst
IC (EPA300.0)	Refer to SOP for EPA300.0	Refer to SOP for EPA300.0	Lab QA Officer
Probe (SM2330B)	2nd order function with 7-11 points depending upon the analyte; R >/= 0.990	when QC fails	Lab Analyst
Furnace (SM2540C)	Refer to SOP for SM2540C	Refer to SOP for SM2540C	Lab QA Officer
Balance (SM2540C)	Calculation, not applicable	Calculation, not applicable	IT

Table 19-10. Westside Water Quality Coalition instrument/equipment calibration and frequency.

Equipment / Instrument	Calibration Description and Criteria	Frequency of Calibration	Responsible Person
Horiba U-50 Series Multimeter or similar (rental)	Equipment supply company uses appropriate buffer solutions; field staff will calibrate using auto-cal feature and will have buffer solutions available	Each day of sampling; Equipment supply company calibrates upon return of equipment and prior to rental;	Field Technician
PE ICP-OES 8300	1 point calibration r = 1	Calibration checked daily	Norm Espinoza
930 Compact IC Flex Metrohm	9 to 10 points calibration r > 0.995	Calibration checked daily	Joshua Scales
Mantech Titrasip Titration Bid	CCV 10% (Alkalinity)	Calibration checked daily	Joshua Scales
Scale Torbal AGCN200	100 mg & 200 g wt to check accuracy	Calibration checked daily	Joshua Scales

TABLE 20. INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES.

Table 20-1. Buena Vista Coalition inspection/acceptance of supplies and consumables.

CONSUMABLE	ACCEPTANCE CRITERIA	FREQUENCY	RESPONSIBLE PERSON
Nitrile gloves - unpowedered	Unused, clean in box	Prior to sampling	Field Sampler
Calibration Standards	Not expired	Prior to sampling	Field Sampler
Sample Bottles	Not expired, unopened, clean with label in tact	Prior to sampling	Field Sampler

Table 20-2. Cawelo Water District Coalition inspection/acceptance of supplies and consumables.

CONSUMABLE	ACCEPTANCE CRITERIA	FREQUENCY	RESPONSIBLE PERSON
Nitrile gloves - unpowedered	Unused, clean in box	Prior to sampling	Field Sampler
Calibration Standards	Not expired	Prior to sampling	Field Sampler
Sample Bottles	Not expired, unopened, clean with label in tact	Prior to sampling	Field Sampler

Table 20-3. East San Joaquin Water Quality Coalition inspection/acceptance of supplies and consumables.

CONSUMABLE	ACCEPTANCE CRITERIA	FREQUENCY	RESPONSIBLE PERSON
pH standard calibrating solutions (Fisher Scientific)	Manufacturer's seal intact, measurements within ±0.2 of prior standard measurement	Upon opening a fresh standard solution	Field Lead
EC standard calibrating solutions (Fisher Scientific)	Manufacturer's seal intact, measurements within ±0.5% or 1µS/cm of prior standard measurement	Upon opening a fresh standard solution	Field Lead
Certified pre-cleaned bottles (from laboratory)	Bottles and caps intact	At receipt date of shipment	Field Lead
Pre-preserved containers (from laboratory)	Proper preservative volume present, bottles and caps intact	At receipt date of shipment	Field Lead
Nitrile Gloves (Fisher Scientific)	Carton is intact and gloves within are clean and intact	At receipt date of shipment	Field Lead

Table 20-4. Grassland Drainage Area Coalition inspection/acceptance of supplies and consumables.

CONSUMABLE	ACCEPTANCE CRITERIA	FREQUENCY	RESPONSIBLE PERSON
Nitrile gloves	New box unopened/undamaged; contents clean, dry; previously opened boxes kept in clean ziplock bag	Each sample site	Field Lead
Sample Bottles	Supplied by Certified Lab, clean and unopened until sample is collected	Prior to each sampling day	Field Lead
Field Instrument Calibration Standards	Within use-by date, unopened/undamaged packets	Per operators manual	Field Lead

Table 20-5. Kaweah Basin Water Quality Association inspection/acceptance of supplies and consumables.

Consumable	Acceptance Criteria	Frequency	Responsible Person
Nitrile gloves - unpowedered	Unused, clean in box	Prior to sampling	Field Sampler
Calibration Standards	Not expired	Prior to sampling	Field Sampler
Sample Bottles	Not expired, unopened, clean with label intact	Prior to sampling	Field Sampler

Table 20-6. Kern River Watershed Coalition Authority inspection/acceptance of supplies and consumables.

Consumable	Acceptance Criteria	Frequency	Responsible Person
Nitrile gloves - unpowedered	Unused, clean in box	Prior to sampling	Field Sampler
Calibration Standards	Not expired	Prior to sampling	Field Sampler
Sample Bottles	Not expired, unopened, clean with label in tact	Prior to sampling	Field Sampler

Table 20-7. Kings River Water Quality Coalition inspection/acceptance of supplies and consumables.

Consumable	Acceptance Criteria	Frequency	Responsible Person
Sample Bottles	New, Sealed Container	Event	BSK Sample Prep, Project Field Lead
Distilled Water	New, sealed container	Daily	Project Field Lead
Calibration Standards	Manufacturer/Supplier Guarantee	Monthly*	Project Field Lead
Field Supplies (gloves)	New Box, no leaks (air)	Event	Project Field Lead

*Instruments used to measure physical parameters also used for KRWQC Surface Water Program, and are calibrated monthly (manufacturer recommends yearly).

Table 20-8. Westlands Water Quality Coalition inspection/acceptance of supplies and consumables.

Consumable	Acceptance Criteria	Frequency	Responsible Person
pH standard calibrating solutions (Fisher Scientific)	Manufacturer's seal intact, measurements within ±0.2 of prior standard measurement	Upon opening a fresh standard solution	Field Lead
EC standard calibrating solutions (Fisher Scientific)	Manufacturer's seal intact, measurements within ±0.5% or 1µS/cm of prior standard measurement	Upon opening a fresh standard solution	Field Lead
Certified pre-cleaned bottles (from laboratory)	Bottles and caps intact	At receipt date of shipment	Field Lead
Pre-preserved containers (from laboratory)	Proper preservative volume present, bottles and caps intact	At receipt date of shipment	Field Lead
Nitrile Gloves (Fisher Scientific)	Carton is intact and gloves within are clean and intact	At receipt date of shipment	Field Lead

Table 20-9. Westside San Joaquin River Watershed Coalition inspection/acceptance of supplies and consumables.

Consumable	Acceptance Criteria	Frequency	Responsible Person
Nitrile gloves	New box unopened/undamaged; contents clean, dry; previously opened boxes kept in clean ziplock bag	Each sample site	Field Lead
Sample Bottles	Supplied by Certified Lab, clean and unopened until sample is collected	Prior to each sampling day	Field Lead
Field Instrument Calibration Standards	Within use-by date, unopened/undamaged packets	Per operators manual	Field Lead

Table 20-10. Westside Water Quality Coalition inspection/acceptance of supplies and consumables.

Consumable	Acceptance Criteria	Frequency	Responsible Person
Nitrile gloves	Free from holes and tears	Fresh pair prior to sampling each well	Field technician
Laboratory sampling containers	Receive from the laboratory; sealed containers	Each sampling event	Laboratory
Calibration solutions	Receive from the rental supply company in sealed, labeled containers	Each sampling event	Rental equipment supply company
Pump tubing	New, damage-free dedicated tubing for each well, as applicable	Replace as needed	Field technician

APPENDIX II– DATA MANAGEMENT SOP

STANDARD OPERATING PROCEDURES FOR GROUNDWATER DATA MANAGEMENT

For Groundwater Monitoring by the

CENTRAL VALLEY GROUNDWATER MONITORING COLLABORATIVE

REVISION 1.0

UPDATED MARCH 20, 2019

Prepared by:

Table 1. SOP for Groundwater Data Management revision history.

Revision No.	Revision Date	Person Responsible	Revision Description	Section(s) Affected
1.0	3/20/19	L. McCrink	Original submittal.	All

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COC	Chain of Custody
CVGMC	Central Valley Groundwater Monitoring Collaborative
DMS	Data Management System
DMT	Data Management Team
EDD	Electronic Data Deliverable
EDF	Electronic Deliverable Format
ELAP	Environmental Laboratory Accreditation Program
ESI	Electronic Submittal Information
FAQ	Frequently Asked Questions
FPN	Field Point Name
GPS	Global Positioning System
GQTM	Groundwater Quality Trend Monitoring
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
LIMS	Laboratory Information Management System
MDL	Minimum Detection Limit
MQO	Measurement Quality Objective
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PR	Percent Recovery
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QAPrP	Quality Assurance Program Plan
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference
SOP	Standard Operating Procedures

I. INTRODUCTION

A. PURPOSE

This document describes the procedures and protocols for managing groundwater data collected and analyzed under the Central Valley Groundwater Monitoring Collaborative (CVGMC) Workplan. This Standard Operating Procedure (SOP) for groundwater data management describes minimum information requirements, data verification and validation procedures for field and laboratory results, and the storage of results in the CVGMC Data Management System (DMS). Figure 1 is a diagram of the data flow associated with the CVGMC DMS and illustrates how data are obtained, received and managed following the procedures outlined within this document.

II. REQUIRED PROJECT INFORMATION

A. PROJECT AND WELL INFORMATION

Minimum project and well identification information is necessary for the data management team (DMT) to correctly load results into the CVGMC DMS and GeoTracker. At a minimum the following data will be entered into the DMS for each well within the sampling network prior to loading any field or laboratory results.

- *Project Code:* The Project Code is unique for each Coalition and is associated with a Groundwater Quality Trend Monitoring (GQTM) Workplan. The Project Code connects the well information and associated sampling results to the original workplan and well monitoring network. Project codes are assigned to participating Coalitions by the Program Quality Assurance (QA) Officer.
- *Well Name:* The Well Name is the well identification that was used in the GQTM Workplan. This should be a unique for the well within the project.
- *Well Code:* The Well Code is a unique identifier within the entire database assigned to each well. Well codes will be generated by the Program QA Officer to ensure uniqueness.
- *Global ID*: The Global ID is the GeoTracker identification number assigned by Regional Water Board staff. Each Coalition will have a unique Global ID associated with their GQTM wells and results on GeoTracker.
- *Field Point Name*: The Field Point Name (FPN) is the individual well identification used in GeoTracker. FPNs should follow the naming convention identified in the programmatic documents of a five-letter Coalition code followed by a five-digit number assigned to the well.
- *Field Point Class*: The Field Point Class is a code that describes the type of well (e.g., Agriculture/irrigation well – AGIR, Domestic/Private Drinking Water Well – PRIW). This information is required with the FPN for loading to GeoTracker.

- *Target Latitude and Longitude*: Target Latitude and Longitude is used to positively identify the well location during sampling and reporting. Datum and source must also be provided with any coordinates.
- *Well Depth*: Well Depth is the total depth of the well in feet.
- *Upper and Lower Screen Depths*: Upper and Lower Screen Depths is the well screened interval information is required for inclusion in the network.

Additional project, location, and construction information may be useful for querying, evaluating, and reporting results. These data can be stored in the DMS and should be recorded whenever available.

All project and well information will be submitted to the DMT to be included in the DMS at the beginning of the project. Project and well information can be submitted through an Excel template with the required fields. The DMT will verify the submitted data against the well information provided in the project-specific QAPP (Appendix I of the QAPrP); any deviations will be confirmed with the Project Manager and noted in the DMS. Updates to either project and/or well information, including the addition of new wells and/or the removal of original wells from the network, must be communicated to the DMT. Updates will be recorded with a date/time stamp and notes referring to the rationale of the update. If wells are no longer part of the network, the DMS will record this information for reference and completeness assessment. It is ideal to have the project and well information within the DMS prior to sampling. The DMS can be queried to provide information in GeoTracker formats to be uploaded to GeoTracker (e.g., FPN and GEO_XY). Alternatively, if the field point name and well coordinates have already been loaded to GeoTracker, the FPN and GEO_XY files can be utilized to populate this information in the DMS.

B. GEOTRACKER

Each project requires the well results and well information to be loaded to GeoTracker, the State Water Boards' data management system. In order to load data to or manage results in GeoTracker, a GeoTracker Electronic Submittal Information (ESI) account is required. Access needs to be granted to a specific Global ID through the GeoTracker ESI account in order to upload or view data. Information on requesting access to a Global ID can be found in the GeoTracker Frequently Asked Questions (FAQs): https://www.waterboards.ca.gov/ust/electronic_submittal/docs/faq.pdf. Depending on the Coalition, data may be uploaded to GeoTracker by the Project Manager, Field Lead and/or laboratory. Each entity should have its own ESI account with access to the Global ID as the authorized responsible party (AUTH_RP) or as a laboratory (LABORATORY).

There are several different GeoTracker files that are required; below is a brief description of each type of file that must be uploaded to the Coalition's Global ID. For more specifics, refer to the GeoTracker FAQs.

- GEO_MAP – electronic file of a generalized site plan map. The Regional Board has specifically requested shapefiles containing a map of coalition boundaries as a KMZ file.

- FPN – this file includes the Field Point Name, Global ID, and Field Point Class for each well within the network. This file must be uploaded prior to loading any of the other GeoTracker files excluding the KMZ file.
- GEO_XY – associates well location (latitude/longitude coordinates) to the Global ID, Field Point Name, and Field Point Class. Coordinates detail includes obtainment method, source, datum, and accuracy. GeoTracker requires one set of coordinates per well and does not record actual coordinates obtained in the field when a sample is collected; this information is used for verification and is stored within the DMS only.
- GEO_WELL – status of well (e.g., Active, Inactive, Destroyed) and depth to water.
- EDF – Electronic Deliverable Format (EDF)file containing field or laboratory results
  - EDF Field Results: Results collected in the field during the sampling.
  - EDF Lab Results: Results analyzed by the laboratory.

Once access to a project Global ID is granted files can be loaded through the project ESI account using the "Upload EDD" tools located underneath the heading "Tools" (EDD refers to Electronic Data Deliverable). Excluding the GEO_MAP KMZ file, all files loaded to GeoTracker are submitted as text files. For FPNs, it is possible to manually enter individual field point names rather than uploading the FPN text file. If this option is necessary, the "Edit Field Points" tool on GeoTracker will be utilized.

The GEO_MAP, FPN, and GEO_XY files need to be created and loaded to GeoTracker at the beginning of a project, prior to loading results. The GEO_WELL and EDF files cannot be created or loaded until the well has been sampled. The GEO_MAP, FPN, GEO_XY, and GEO_WELL files only need to be submitted once, unless something about the well changes (e.g., change to the well use classification or removal from the well network). Laboratory results (in the form of the EDF) should be submitted to the DMS after every sampling event.

III. FIELD DATA PROCESSING

A. ELECTRONIC FILING OF FIELD DOCUMENTATION

All field sheets, Chains of Custody (COCs), and sampling photos must be stored electronically on a secure server. All hard copies should be physically and electronically filed where they can be accessed by data management staff and the Program QA Officer upon request. Electronic documents must be retained for 10 years.

B. FIELD DATA ENTRY

Field data must be entered into the CVGMC DMS after sampling is complete using information collected on the field sheets. This may occur by completing an Excel template and uploading the data or directly entering the data into the DMS. At a minimum, the following information must be submitted to the DMT to be processed; an asterisk indicates information that can be exported from the DMS in an EDF file for uploading field results to GeoTracker:

Well and Sampling Information

- Well identification information. Well and project information should be entered in the CVGMC DMS prior to field sample data entry (Section II). Verify the well information already included in the DMS against the information available on the field sheet.
- Sample collection date* and time*.
- Sampling agency* and personnel. Record all personnel responsible for sample collection and associated agency. Sampling agency is required for loading to GeoTracker as a LOGCODE, which needs to be requested from GeoTracker.
- Sampling protocol. This information should be stored in the DMS to record the sample collection SOP followed by sampling agency staff.

Sample Collection Details

- Sample point. Indicate the location where the sample was taken (e.g., from holding tank, spigot away from wellhead).
- Sample location. Latitude and longitude should be recorded with each sample for positive site identification. GPS datum must be recorded with all coordinates. GPS device and accuracy should also be recorded.
- Groundwater sample collection method (e.g., submersible pump, bladder pump, HydraSleeve).
- Field measurement equipment (e.g., YSI ProPlus) and the date of calibration.

Additional Well and Sample Collection Information

- Depth to water. If depth to water measurements are taken, record measurement in feet and include the collection device. Annual collection of this information will be stored within the DMS, whereas GeoTracker only stores one result per well.
- Weather and general site observations.

Field Sample Results

- Well purging data including purge method, volume, and duration. If a no-purge sampling apparatus was used, then the deployment depth and deployment duration must be recorded.
- Measurements for the following parameters and their associated units:
  - Water Temperature (deg C)*
  - Specific Conductivity (µS/cm)*
  - Dissolved Oxygen (mg/L)*
  - pH*
  - OPTIONAL: Oxidation-Reduction Potential (ORP) (µS/cm)* and Turbidity (NTU)* if measured

Collection Comments. Any additional comments or observations recorded by field personnel should be captured within the DMS in comment fields associated with field measurements and sample collection.

Field data can be queried from the DMS and exported in the EDF format to be uploaded to GeoTracker. When field data are received by the DMT, the data will be checked for completeness and proper formatting. In addition, sample collection methods and equipment and field parameter equipment will be compared to the QAPP (Appendix I of the QAPrP). Any deviations from the

QAPP will be discussed with the Project Manager, Project QA Officer and the Program QA Officer.

C. FIELD RESULT QUALITY ASSURANCE

Prior to submittal to the DMT, all electronic field data should be double checked and should include field sampling information for the well network. If a well is dry and/or cannot be accessed, this should be noted on the field sheet and provided to the DMT. All field data submittals will be reviewed for missing or incomplete records and an evaluation of whether field data met QAPP requirements. Any deviations from the QAPP will be discussed with the Project Manager and Project QA Officer and resolved, if possible. If the issue cannot be resolved, the data will be flagged accordingly, and corrective actions may be discussed with the Program QA Officer. Sample failures will be recorded as flagged records in the DMS.

D. SAMPLE COLLECTION VERIFICATION

Once field results are entered into the DMS and double-checks are complete, the DMT will compare the collection information to requirements within the QAPP to ensure that all samples were collected including required field quality control (QC).

All field quality control samples (field blanks, field duplicates, travel blanks, equipment blanks) must be entered as records into the DMS with their associated environmental samples.

Trend monitoring events are classified as either: 1) "All Constituents" (all constituents required in the Orders are analyzed for; occurs every five years) and 2) "Nitrate Only" (only field results and nitrate analysis; annually). The sampling event classification must be recorded to ensure all analyses were correctly requested and corresponding results received.

Any wells scheduled for sampling that could not be successfully collected must be recorded as sample failures. Acceptable sample failures are selected from look up lists approved by the Program QA Officer. Acceptable sample failures include:

- Dry well
- No Access (e.g., if owner will not allow access to a well or a well and/or pump needs repair and/or is being repaired (temporarily) and a sample cannot be collected for a specific sampling attempt or event).
- Inactive (a well is permanently unavailable or inaccessible for sampling purposes or is removed from the workplan and replaced with an alternate well).

Sample collection information is verified against the original sample schedule for each sampling event. All samples planned to be collected must be accounted for with all sample collection data, field measurements, and expected analyses. Any wells that were scheduled to be sampled but do not have associated sample collection records or field measurement results must be flagged with the proper failure codes to sufficiently explain the reasons for sample failure. Sample collection verification activities are overseen by the Project QA Officers.

Minimum field QC sample collection rates are verified when sample collection review occurs. Failure to meet minimum field QC sample requirements during a sampling event must be reported

to the Program QA Officer immediately and discussed with the Project Manager and Project QA Officer.

Any changes to the monitoring well network that occurred in the field, such as samplers needing to switch to an alternate well or significant changes to the available well information within the DMS, must be reported to the Project QA Officer and Project Manager. Changes to the well network must be reviewed by the associated geotechnical consultants responsible for the workplan and well network. Any changes to the well network must be updated within the project QAPP by the Project QA Officer and submitted to the Program QA Officer for submittal to the Regional Board.

E. UPLOADING FIELD DATA TO GEOTRACKER

Once field data are verified and loaded into the DMS, they must be submitted to GeoTracker under the Global ID for the project. EDF Field Result files and any updates to the GEO_WELL information are submitted to GeoTracker as text files. Once field data are verified and entered in the Program DMS, they can be exported as EDF result files and loaded to GeoTracker using the "Upload EDD" tools located underneath the heading "Tools".

F. FIELD DATA PROCESSING NOTIFICATION

Overall sample collection tracking and data consistency checks will be performed on all data once they are verified and entered into the DMS.

The Project Manager must notify the Program QA Officer that each of the following steps are complete:

- Sample collection completed
- Field data entered into DMS
- Field data reviewed for accuracy
- Sample collection verified against schedule
- Field data loaded into GeoTracker

Once data are verified and loaded in the DMS, sample detail information can be exported out and submitted to the laboratory. The laboratory can utilize this information to populate their Laboratory Information Management System (LIMS) and provide complete EDFs for review and submittal to GeoTracker. Some project information required in the laboratory result EDF must be provided to the laboratory so that they can load results (e.g., LOGCODE).

IV. LABORATORY DATA PROCESSING

A. RECEIPT AND FILING OF LABORATORY RESULTS

Each Coalition will receive laboratory results as a PDF report and as GeoTracker EDF files. Both should be electronically filed on secure servers and tracked as they are received by the laboratory; all documents must be retained for 10 years. Original versions of laboratory data should be available to the Program QA Officer upon request. All laboratory deliverables should be tracked

electronically to ensure timely receipt of results. Results must be received from the laboratory and submitted to the DMT within 60 days of sampling; exceptions to this must be discussed with the Program QA Officer.

B. SAMPLE ANALYSIS VERIFICATION

All laboratory results should be verified against the sample collection records and COCs upon receipt from the laboratory. Any missing or mis-reported analyses must be communicated back to the individual contract laboratory. The Project QA Officer is responsible for overseeing laboratory result verification and obtaining revised reports and data deliverables as necessary.

Any re-analyses should be reviewed by the Project QA Officer for proper reporting procedures. The Project QA Officer should communicate with the contract laboratory to decide which data are acceptable and ensure they are properly flagged and qualified. Only one set of results for any analysis will be loaded into the DMS.

Electronic data deliverables should be verified against the PDF lab reports to ensure reporting consistency between report formats. It is recommended that at least 10% of data are verified between reports and EDFs.

All results should be verified against the project-specific analysis requirements outlined in the Project QAPP. Any discrepancies should be communicated back to the contract laboratory and the report amended if applicable. In cases where the laboratory reported results do not meet requirements outlined in QAPP, the results will be flagged, and corrective actions identified. All corrective actions should also be communicated to the Program QA Officer. At a minimum, results should be checked for:

- Expected analyte/calculation reporting.
- Expected preparation or digest methods.
- Expected minimum detection limits (MDLs) and reporting limits (RLs). Make sure detection and reporting limits match those specified in the QAPP. Diluted samples are reported with elevated limits, so only results with a dilution factor of 1 would be expected to match the QAPP.
- Expected reporting units.
- Hold time compliance.

C. LABORATORY DATA QUALITY CONTROL

All laboratory analysis results will be checked against Measurement Quality Objects (MQOs) outlined in the Project QAPP. Any data that do not meet the project acceptability criteria must be flagged with one of the quality assurance flags listed in Table 2.

Only codes on Table 2 will be used to qualify data. Any quality assurance concerns that require an additional code must be reviewed by the Program QA Officer. All approved codes are reviewed for GeoTracker compatibility and for consistency of QA failure classification. Qualified data are still considered useable as multiple factors are considered when determining usability; refer to the QAPrP regarding the determination of useable data.

Prior to being loaded into the DMS, the following QC checks must be performed:

QC sample frequency evaluation. All batches should be analyzed with a laboratory blank, laboratory controls spike (LCS), matrix spike (MS), and laboratory duplicate as outlined in the QAPrP (TDS and Alkalinity do not require MS samples).

Calculate necessary quality assurance metrics and evaluate against MQOs.

- Percent recovery (PR) for spiked control samples.
- Relative percent difference (RPD) for laboratory and field duplicate samples.

Environmental sample evaluation

- Non-detect reporting consistency – any non-detect results should be populated with a zero and coded "ND" for the result qualifier code. Results below the MDL are considered non-detect.
- Hold time violations – ensure all environmental samples were extracted and/or analyzed within hold time as prescribed in the QAPP.

Field QC sample evaluation

- Field blank detections – any field blank detections should be below the acceptable limit outlined in the QAPP.
- Field duplicate acceptability – field duplicate RPDs must be below the acceptable limit outlined in the QAPP.

Laboratory QC sample evaluation

- Laboratory blank detections – any laboratory blank detections should be below the acceptable limit outlined in the QAPP.
- Laboratory control spike (LCS) recoveries – PR values for LCS samples should be within the acceptable limits outlined in the QAPP.
- Matrix spike recoveries – PR values for MS samples should be within the acceptable limits outlined in the QAPP.
- Laboratory replicate acceptability – lab replicate RPDs must be below the acceptable limit outlined in the QAPP.

All acceptable, unflagged data should be given a QACode of None. No records with an unpopulated QACode field can be loaded to the DMS.

Table 2. Approved CVGMC quality assurance codes and flagging rules.

All quality assurance codes correspond to GeoTracker LNOTE codes, with the exception of "None".

Sample Type		QACode	Code Description (GeoTracker)	Flagging Business Rules
Environmental Samples	Holding Time	H	A holding time violation has occurred	Apply to each result with the holding time exceeded. Apply to Matrix spikes with parent environmental samples. Do not apply to LABQA.
	Dilutions performed	D	EPA Flag - Analytes analyzed at a secondary dilution	Apply to results with a dilution factor greater than 1.
	Estimated Value	J	EPS Flag – Estimated value	Apply to results that are below the RL but above the MDL.
Field QC Samples	Field Blanks	IP	Analyte detected in method, trip, or equipment blank	Apply to FieldBlank results with a detection above the acceptable limit.
	Field Duplicates	VFD	Field duplicate RPD outside of established limits	Apply to results for both replicates with an RPD above the acceptable limit.
Laboratory QC Samples	LabBlank	IP	Analyte detected in method, trip, or equipment blank	Apply to LabBlank result with a detection above the acceptable limit.
	MS/MSD	GB	Matrix spike recovery not within control limits	Apply to MS or MSD result with a percent recovery outside of acceptable recovery limits.
	LCS (above limits)	LQ	LCS recovery above method control limits.	Apply to LCS result with a percent recovery above the acceptable recovery limit.
	LCS (below limits)	LR	LCS recovery below method control limits.	Apply to LCS result with a percent recovery below the acceptable recovery limit.
	Laboratory Dup/MSD	GP	Duplicate analysis not within control limits.	Apply to results for both replicates with an RPD above the acceptable limit.
All Samples		None	None - No QA Qualifier (Null values submitted to GeoTracker)	Apply to any result that meets all MQOs outlined in the QAPP.

D. LOAD RESULTS INTO PROGRAM DATABASE

Once data are verified and appropriately qualified, they can be finalized within the result tables of the DMS. GeoTracker EDFs are loaded into the DMS. It is recommended to load the EDFs to GeoTracker **after** the data are reviewed and finalized to ensure that data on GeoTracker do not have to be denied and reloaded. The Project Manager is responsible for ensuring that the correct data are loaded to GeoTracker.

Data are loaded using a series of queries to add the results to the relational database. Checks are performed on the data to ensure that results are unique, assigned to the correct well, are formatted correctly, and are complete. Verification checks are performed to ensure that data are flagged appropriately. Any discrepancies will be noted and communicated back to the Project Manager and Project QA Officer to be reconciled. The Program QA Officer is notified once all field and laboratory data have been successfully loaded.

E. FINAL GEOTRACKER UPLOAD BY LABORATORY

Laboratory EDFs should be loaded to GeoTracker by the contract laboratory that generates them. Projects may also load the verified data themselves. Any updates made to the electronic data during the data verification and validation process must be reflected in the file that is uploaded. These updates are communicated back to the laboratory to ensure consistency between the published data and that stored within the DMS.

Laboratories should only load EDF files to GeoTracker after the results have been approved for loading into the CVGMC DMS following the procedures outlined above. Once results have been successfully loaded to GeoTracker, confirmation should be provided by the laboratories to the Project Manager, and ultimately to the CVGMC Program QA Officer. GeoTracker loading dates and confirmations are tracked in the CVGMC DMS.

V. NON-DIRECT DATA VERIFICATION

It may be the case that data generated by agencies outside of the CVGMC need to be processed for reporting purposes. These data should be assessed against the QAPrP MQOs and flagged when discrepancies occur.

A. EXTERNAL SAMPLE COLLECTION

In some cases, the data utilized by the project will not have been collected by the sampling agency identified and approved under the requirements of the CVGMC Programmatic QAPrP. In such cases, an external agency collects samples and field measurements and submits samples to a laboratory for analysis. Each QAPP identifies which wells will be sampled by external entities as part of other monitoring programs but meet minimum requirements. At a minimum, the analysis must be performed by an ELAP certified laboratory by a method outlined within the QAPrP. Samples must be analyzed for required constituents and the data loaded to GeoTracker. Coordination regarding Program requirements with the external sampling agency should be conducted to ensure as much useable information as possible is recorded.

These results must be identified within the DMS through the sample collection information. At a minimum the following fields should be used to identify such data:

- *Sampling Agency:* The agency that collected the samples must be identified.
- *Sampling Protocol:* The sampling procedures used by the external agencies must be identified.

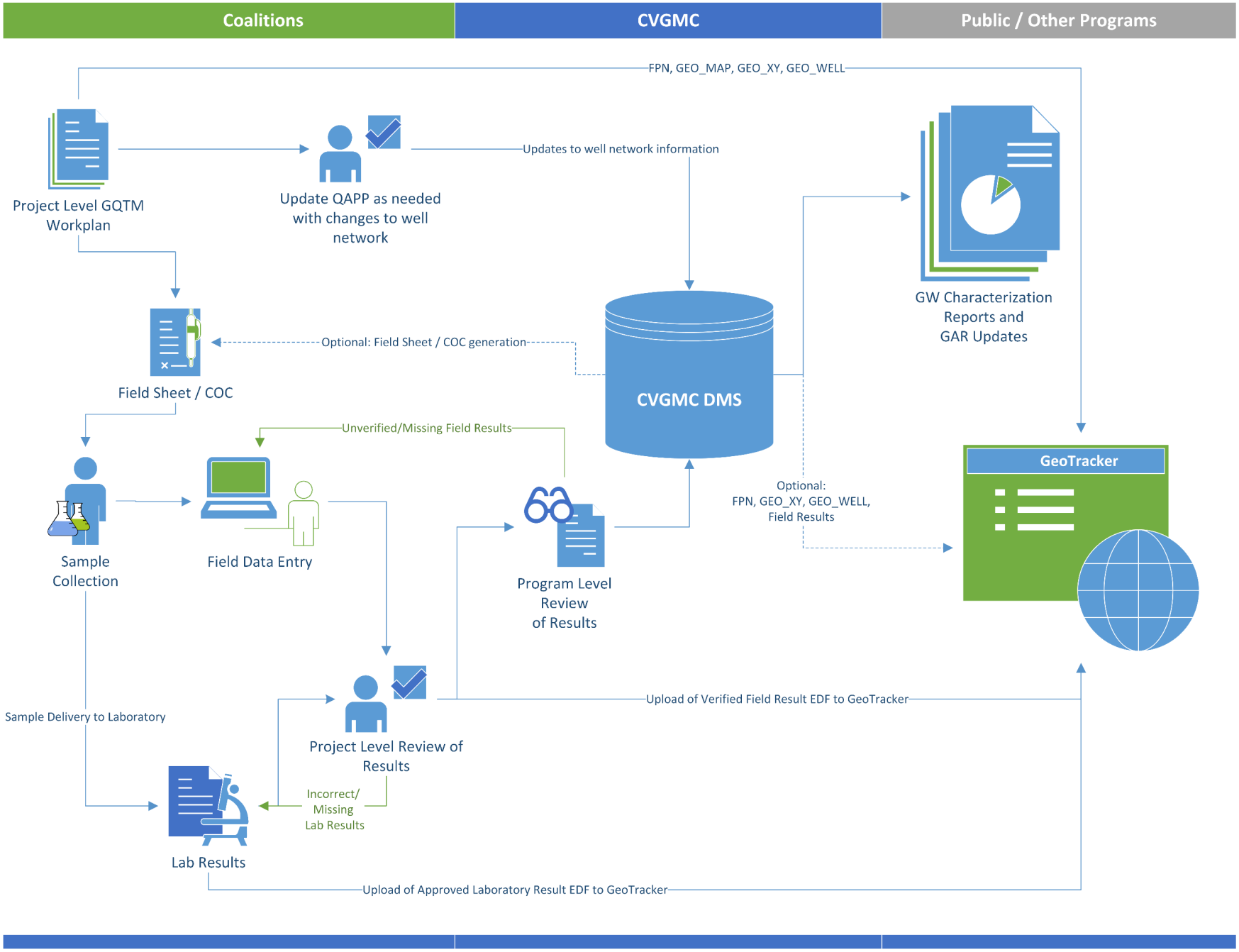
Field results and sample collection information must be provided to the Project Manager and meet minimum data usability requirements. Field sheets or further information should be requested whenever possible. Attempts to obtain available field measurement and sample collection data and documentation should be made. If sample collection information is missing, the information should be entered as Not Recorded into the DMS and flagged according to the procedures in Section III.

Data deliverables received from laboratories should be processed according to the procedures outlined in Section IV.

B. EXISTING DATA

Occasionally, supplementary data may be obtained from public data repositories or external agencies (e.g., downloaded from GeoTracker). In these cases, neither the sample collection, nor the data processing will have occurred under the CVGMC QAPrP. These data may be used for overall groundwater quality assessments in coordination with the trend monitoring results. The data will be included in the database and associated with the original source of the data; if QC data are not available, the data will be flagged to note this.

Figure 1. CVGMC Data Flow Diagram.



APPENDIX III – FIELD SAMPLING SOPS

Proprietary – Do Not Distribute

Appendix III – Field Sampling SOPs

- Appendix III-A – Buena Vista Coalition Standard Operating Procedures for the Collection of Groundwater Quality Data
- Appendix III-B – Cawelo Water District Coalition Standard Operating Procedures for the Collection of Groundwater Quality Data
- Appendix III-C – Kaweah Basin Water Quality Association Standard Operating Procedures for the Collection of Groundwater Quality Data
- Appendix III-D – Kern River Watershed Coalition Authority Standard Operating Procedures for the Collection of Groundwater Quality Data
- Appendix III-E – KRWQC Groundwater Trend Monitoring Standard Operating Procedures 2.0: Recommended Methods for Field Sample Collection
- Appendix III-F – Luhdorff & Scalmanini Sample Collection and Quality Assurance Procedures for Groundwater and Surface Water Samples
- Appendix III-G – MLJ Environmental Standard Operating Procedures for Groundwater Sampling
- Appendix III-H – Wood Protocol for Sampling of Groundwater Monitoring Wells and Water Supply Wells

Appendix III-A – Buena Vista Coalition Standard Operating Procedures for the Collection of Groundwater Quality Data

Appendix III-B – Cawelo Water District Coalition Standard Operating Procedures for the Collection of Groundwater Quality Data

Appendix III-C – Kaweah Basin Water Quality Association Standard Operating Procedures for the Collection of Groundwater Quality Data

Appendix III-D – Kern River Watershed Coalition Authority Standard Operating Procedures for the Collection of Groundwater Quality Data

Appendix III-E – KRWQC Groundwater Trend Monitoring Standard Operating Procedures 2.0: Recommended Methods for Field Sample Collection

Appendix III-F – Luhdorff & Scalmanini Sample Collection and Quality Assurance Procedures for Groundwater and Surface Water Samples

Appendix III-G – MLJ Environmental Standard Operating Procedures for Groundwater Sampling

Appendix III-H – Wood Protocol for Sampling of Groundwater Monitoring Wells and Water Supply Wells

APPENDIX IV – LABORATORY SOPS

Proprietary – Do Not Distribute

Appendix IV-A – BSK Associates Standard Operating Procedures
- A.1 – Solids Testing by SM 2540B, C, D, E, G
- A.2 – Automated Determination of Alkalinity, pH, EC and Fluoride by PC-Titrate
- A.3 – Determination of Inorganic Anions by Ion Chromatography Using Metrohm 930 Compact IC EPA Method 300.0
- A.4 – MT-SP-0007-01 ICP SOP

Appendix IV-B – Caltest Laboratories Standard Operating Procedures
- B.1 –Total Dissolved Solids, Fixed & Volatile Dissolved Solids
- B.2 – SM 2320 B (Titrametric, pH 2.4) (1997) Alkalinity
- B.3 –The Determination of Inorganic Anions by Ion Chromatography
- B.4 –Nitrate + Nitrite as N
- B.5 –Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry (3 Mode)

Appendix IV-C – Eurofins Eaton Analytical Standard Operating Procedures
- C.1 – 2540C: Total Dissolved Solids (TDS) in water
- C.2 – 310.1/ 2320B: Alkalinity
- C.3 – 300.0: Determination of Anions and Inorganic Disinfectant By-Products by Ion Chromatography
- C.4 – ICP EPA 200.7

Appendix IV-D – Fruit Growers Laboratory Standard Operating Procedures
- D.1 – Total, Fixed and Volatile Dissolved Solids Dried at 180°C in Drinking Water and Wastewater by Gravimetric Analysis
- D.2 – Alkalinity in Drinking Water and Wastewater by Automated Titration
- D.3 –Anions in Drinking Water, Wastewater and Solids by Ion Chromatography
- D.4 –Nitrate, Nitrite, NO3+NO2 as N in Drinking Water and Wastewater
- D.5 –Trace Metals in DW, WW, HW Liquids, Extracts and Solids by ICP-OES

Appendix IV-A – BSK Associates Standard Operating Procedures

A.1 – SOLIDS TESTING BY SM 2540B, C, D, E, G

A.2 – AUTOMATED DETERMINATION OF ALKALINITY, PH, EC AND FLUORIDE BY PC-TITRATE

A.3 – DETERMINATION OF INORGANIC ANIONS BY ION CHROMATOGRAPHY USING METROHM 930 COMPACT IC EPA METHOD 300.0

A.4 – MT-SP-0007-01 ICP SOP

Appendix IV-B – Caltest Laboratories Standard Operating Procedures

B.1 –TOTAL DISSOLVED SOLIDS, FIXED & VOLATILE DISSOLVED SOLIDS

B.2 – SM 2320 B (TITRAMETRIC, PH 2.4) (1997) ALKALINITY

B.3 –THE DETERMINATION OF INORGANIC ANIONS BY ION CHROMATOGRAPHY

B.4 –NITRATE + NITRITE AS N

B.5 –DETERMINATION OF TRACE ELEMENTS IN WATERS AND WASTES BY INDUCTIVELY COUPLED PLASMA-MASS SPECTROMETRY (3 MODE)

Appendix IV-C – Eurofins Eaton Analytical Standard Operating Procedures

C.1 – 2540C: TOTAL DISSOLVED SOLIDS (TDS) IN WATER

C.2 – 310.1/ 2320B: ALKALINITY

C.3 – 300.0: DETERMINATION OF ANIONS AND INORGANIC DISINFECTANT BY-PRODUCTS BY ION CHROMATOGRAPHY

C.4 – ICP EPA 200.7

Appendix IV-D – Fruit Growers Laboratory Standard Operating Procedures

D.1 – TOTAL, FIXED AND VOLATILE DISSOLVED SOLIDS DRIED AT 180°C IN DRINKING WATER AND WASTEWATER BY GRAVIMETRIC ANALYSIS

D.2 – ALKALINITY IN DRINKING WATER AND WASTEWATER BY AUTOMATED TITRATION

D.3 –ANIONS IN DRINKING WATER, WASTEWATER AND SOLIDS BY ION CHROMATOGRAPHY

D.4 –NITRATE, NITRITE, NO3+NO2 AS N IN DRINKING WATER AND WASTEWATER

D.5 –TRACE METALS IN DW, WW, HW LIQUIDS, EXTRACTS AND SOLIDS BY ICP-OES