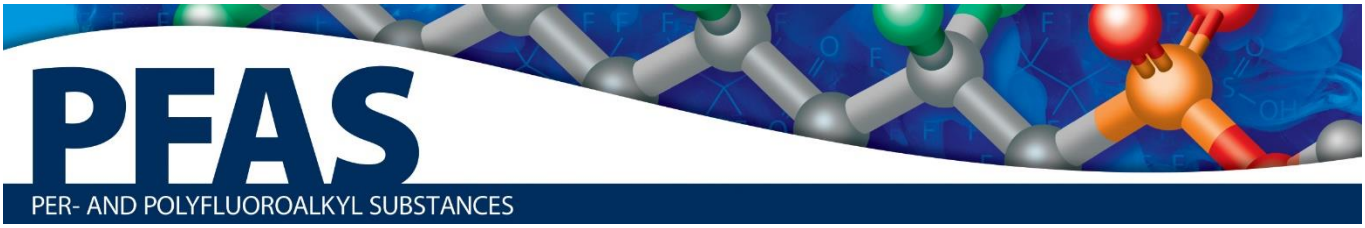


CHARACTERIZATION OF PER- AND POLYFLUOROALKYL SUBSTANCES IN CALIFORNIA'S DRINKING WATER AT DISADVANTAGED COMMUNITIES GENERAL ORDER NO. DW-2024-0002-DDW

QUALITY ASSURANCE PROJECT PLAN

September 2024

CALIFORNIA
Water Boards

A. PROJECT MANAGEMENT

A.1. TITLE AND APPROVAL SHEET

Project Title: Characterization of PFAS in California's Drinking Water Quality Assurance Project Plan at Disadvantaged Communities

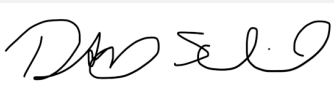
Lead Organization: California State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

Primary Contact: Daniel Newton
Assistant Deputy Director
Division of Drinking Water
State Water Resources Control Board
Daniel.Newton@Waterboards.ca.gov

Effective Date: September 2024

Version: Version 1.0

A 2. APPROVAL SIGNATURES

NAME	ORGANIZATION	ROLE	SIGNATURE	DATE
DANIEL NEWTON	State Water Board	Project Director		7/30/2024
ANDREW HAMILTON	State Water Board	QA Officer		7/30/2024
WENDY LINCK	State Water Board	Project Manager		7/30/2024
ERICA KALVE	State Water Board	Project Coordinator & PFAS Technical Lead		7/30/2024
TBD	State Water Board	Data Manager		
RACHEL CAHILL	Babcock Laboratories	Laboratory Technical Director		9/5/2024
DAVID SCHIESSEL	Babcock Laboratories	Organics Technical Manager		9/5/2024
JULIA SUDDS	Babcock Laboratories	Laboratory QA Officer		9/5/2024
BRIAN CURRIER	CSUS Office of Water Programs (OWP)	Sampling Project Manager		9/6/2024
CAITLYN LEO	CSUS OWP	Sampling Coordinator		9/8/2024
ELISABETH HAWLEY	Geosyntec Consultants, Inc.	Sampling Subcontractor - Project Manager		7/30/2024

A.3. TABLE OF CONTENTS

QAPP REVISION HISTORY

QAPP ID Number	Prepared By	Date of Revision	Description of Change
	State Water Board		Initial version

A.4. DISTRIBUTION LIST

Table 1: Distribution List

NAME	ORGANIZATION	ROLE	EMAIL
DANIEL NEWTON	State Water Board	Project Director	Daniel.Newton@waterboards.ca.gov
ANDREW HAMILTON	State Water Board	Quality Assurance Officer	Andrew.Hamilton@waterboards.ca.gov
WENDY LINCK	State Water Board	Project Manager	Wendy.Linck@waterboards.ca.gov
ERICA KALVE	State Water Board	Project Coordinator & PFAS Technical Lead	Erica.Kalve@waterboards.ca.gov
TBD	State Water Board	Data Manager	TBD
MANOELA ROMANO DE ORTE	State Water Board	Project Coordinator	Manoela.RomanoDeOrte@waterboards.ca.gov
MATT SMALL	US EPA Region 9	PFAS Liaison	small.matthew@epa.gov
JAMES MCCORD	US EPA ORD	Technical Advisor	mccord.james@epa.gov
JON SOBUS	US EPA ORD	Technical Advisor	sobus.jon@epa.gov
JACKIE BANGMA	US EPA ORD	Technical Advisor	bangma.jacqueline@epa.gov
RACHEL CAHILL	Babcock Laboratories	Laboratory Technical Director	rcahill@bababs.com
DAVID SCHIESSEL	Babcock Laboratories	Organics Technical	dschiessel@babcocklabs.com
JULIA SUDDS	Babcock Laboratories	Laboratory Quality Assurance Officer	jsudds@babcocklabs.com
BRIAN CURRIER	CSUS Office of Water Programs	Sampling Project Manager	brian.currier@owp.csus.edu
CAITLYN LEO	CSUS Office of Water Programs	Sampling Coordinator	caitlyn.leo@owp.csus.edu
ELISABETH HAWLEY	Geosyntec Consultants, Inc.	Sampling Subcontractor - Project Manager	EHawley@Geosyntec.com

CSUS = California State University, Sacramento
State Water Board = California State Water Resources Control Board
US EPA = US Environmental Protection Agency
US EPA ORD = US EPA Office of Research and Development

A.5. PROJECT ORGANIZATION

A.5.1. Involved Parties and Roles

The California State Water Resource Control Board (State Water Board) is the lead agency for the Characterization of Per- and Polyfluoroalkyl Substances (PFAS) in California's Drinking Water (Project). The State Water Board Project Director is responsible for overseeing the project strategy, project budget, allocation of project funds, and the implementation of all project activities. The State Water Board Project Manager will support the State Water Board Project Director in the day-to-day management of the Project and coordination with consultants and contractors of the Project. The State Water Board Project Technical Lead, State Water Board Project Coordinator, and Sampling Project Managers will support the State Water Board Project Director and State Water Board Project Manager with development of the Project's experimental design and sampling strategy, as well as support in the analysis and assessment of collected data. The State Water Board Data Manager will oversee the management of data files associated with sampling and analytical testing activities that are submitted by the Project consultants and contractors, as well as manage an intermediary database used to store and track project data and transmit project data to legacy data systems for the Water Boards, if necessary. The State Water Board Data Manager will also help develop data visualization tools that will be used for internal data assessment or release of data to the public.

A.5.2. Project Consultants and Contractors

The State Water Boards is contracting with the Office of Water Programs at California State University, Sacramento (OWP) to provide sampling and education services. The Sampling Coordinator from OWP is responsible for community education outreach including the development of education materials that will support this Project and coordinating with and supporting their subcontractor. OWP's contractor is responsible for the collection of well samples, shipment of samples to the contract laboratory, and delivery of education materials to communities.

Other supporting team members for the Project include the Laboratory Technical Director and the Organics Technical Manager from the State Water Board's contract laboratory, Babcock Laboratories Inc. The Technical Director is responsible for overseeing all technical operations of the laboratory and ensuring that the laboratory has the necessary resources to provide quality services for the Project. The Organics Technical Manager is responsible for overseeing all analyses and services provided for the Project and providing guidance on method performance and method requirements to align with Project objectives. The Laboratory Quality Assurance Officer (Laboratory QAO) is responsible for ensuring the laboratory's quality management system is implemented and always followed for this Project.

The OWP Sampling Coordinator and Field Project Manager will coordinate with the Laboratory Technical Director on number of samples not to exceed laboratory testing capacity, sampling schedule, shipping of sample kits, and tracking receipt of samples.

A.5.3. Quality Assurance Officer Role

The State Water Board Quality Assurance Officer (State Water Board QAO) reviews the Quality Assurance Project Plan (QAPP) to ensure that the quality assurance (QA) policies and procedures implemented in the Project are consistent with QA principles of the State Water Board and conform to the State Water Board's Quality Management Plan. The State Water Board QAO also provides general guidance on QA issues that arise during implementation of the Project.

A.5.4. Technical Advisors and Support

This Project is implemented in coordination with the US Environmental Protection Agency (EPA) Office of Research and Development (EPA ORD). Technical elements related to non-targeted analyses (NTA) included in this QAPP are the outcomes of collaboration with EPA ORD, three states (Maryland, Minnesota, and California), and their respective EPA regional offices as part of the EPA's Regional-ORD Applied Research (ROAR) Program. EPA's ORD Technical Advisors provided expertise in NTA experimental design, data collection, data processing, and interpretation for the State Water Board to consider for this QAPP. A separate QAPP was developed and maintained by EPA ORD for the California project associated with the ROAR Program that highlights California's coordination with the EPA and includes project objectives that are relevant to the needs of the three participating states.

Separately, the State Water Board reached an agreement with EPA ORD to provide technical support and guidance on data interpretation and processing of the NTA data for the Project. The EPA Region 9 PFAS Liaison will be a point of contact to coordinate meetings and knowledge sharing between Project leads and EPA Technical Advisors.

A.5.5. Persons Responsible for QAPP Update and Maintenance

Project Task Coordinators in coordination with the Project Technical Lead and Project Manager are responsible for maintaining and updating the QAPP including updates to addendums or referenced materials. Updates will be submitted to the QA Officer for review and approval to ensure updates remain consistent with the State Water Board's QA principles and conform to the State Water Board's Quality Management Plan.

A.6. PROJECT BACKGROUND

PFAS are a family of synthetic, fluorinated chemicals with unique physical and chemical properties that have wide uses in various industries because of their thermal stability, friction reduction, and ability to repel water, oil, soil, and stains. Products containing PFAS have been used in aerospace, automotive, aviation, medical, electronic, and

construction industries, as well as found in consumer products and firefighting applications. PFAS are highly persistent contaminants that can accumulate in living organisms and in the environment. The main sources of PFAS to the aquatic environment include discharge from wastewater treatment plants, emissions from manufacturing facilities, industrial factories, and landfill leachate. Insufficient removal of PFAS in wastewater treatment plants and direct discharge from surface runoff may affect drinking water sources and threaten drinking water safety. Therefore, drinking water is considered a significant contributor to PFAS human exposure.

A.6.1. State-wide PFAS Investigation

To assess the presence of PFAS in California's waters, in 2019, the State Water Board's Division of Water Quality (DWQ) and Division of Drinking Water (DDW), in coordination with Regional Water Boards, developed an investigative approach to monitor PFAS across the state. DWQ sent statewide investigation orders to commercial airports, municipal solid waste landfills, chrome plating facilities, wastewater treatment plants, bulk fuel terminals and oil refineries to establish targeted monitoring at facilities of that were known or suspected PFAS sources[1]. Subsequently, DDW sent orders to hundreds of public water systems (PWS), selected based on proximity to the facilities targeted by DWQ investigative orders or based on prior detection of PFAS in the public water system and a need for continued monitoring[2]. This coordinated effort was the Water Boards initial approach to characterize PFAS across the state.

A.6.2. 2021 PFAS Methods Comparison Pilot Study

In 2021, the State Water Board performed a pilot study to compare and understand the utility of different methodologies and approaches to detect PFAS in PWS well samples. This pilot study was designed to enhance the knowledge gained from the 2019 efforts by utilizing multiple different methodologies and analytical approaches to characterize PFAS in water samples and to inform future monitoring efforts. Samples were collected from nine PWS wells that are located near airports or landfills where elevated PFAS concentrations were suspected or an area where elevated PFAS concentrations had been detected. The samples were analyzed for PFAS using EPA Methods 537.1 (18 analytes) and 533 (25 analytes) and a performance-based approach included in the Department of Defense's Quality System Manual 5.3, Table B-15 (DoD QSM, 35 analytes). Split samples were also analyzed using the Total Oxidizable Precursor (TOP) assay method to investigate the presence of PFAS precursors in the samples, and Adsorbable Organic Fluorine using Combustion Ion Chromatography (AOF-CIC), which was used as a proxy for total organic fluorine content in the samples. The comparison

[1] For more information on DWQ investigative order, see:
https://www.waterboards.ca.gov/pfas/non_drinking_water.html
[2] For more information on DDW investigative order, see:
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/pfas_ddw_general_order/

between targeted analytical data to the AOF-CIC data revealed that the concentrations of organofluorine compounds present in the PWS wells were higher than the sum of PFAS concentrations measured using targeted analytical methods.

To understand the uncharacterized organofluorine identified by AOF-CIC, the State Water Board enlisted the help of a contracted laboratory to perform suspect screening analysis (SSA) of sample extracts of the nine well samples. The SSA was performed by analyzing the extracts with a high-resolution mass spectrometer (HRMS) in full scan mode and comparing the molecular features in the samples to the molecular features of known PFAS, utilizing a chemical library of 435 PFAS chemicals (referred to as "suspects"). While the SSA can identify specific masses and their molecular formulas, it is unable to provide quantitated concentrations. However, an estimated relative abundance of the PFAS compound was determined by SSA based on the signal strength of the molecular features. The SSA revealed that the most abundant PFAS in the nine samples were matched with known short-chain (C4-C6) and ultra-short chain (C1-C3) PFAS (Table 2), which are PFAS not included in targeted analytical methods.

Table 2: PFAS Identified in 2021 Pilot Study using Suspect Screening Analysis

PFAS Compound Name (acronym)	Class	Chemical Formula
Trifluoromethane sulfonic acid (TFMS)	Ultra-short chain Perfluorosulfonate	CHF3O3S
Perfluoroethane sulfonic acid (PFES)	Ultra-short chain Perfluorosulfonate	C2HF5O3S
Perfluoropropane sulfonic acid (PFPS)	Ultra-short chain Perfluorosulfonate	C3HF7O3S
Perfluoropropionic acid (PFPrA)	Ultra-short chain Carboxylate	C3HF5O2
Triflimidic acid (TFMSA)	Ultra-short chain Perfluorosulfonamide	CH2F3NO2S
Perfluoroethane sulfonamide (PFESA)	Ultra- short chain Perfluorosulfonamide	C2H2NO2F5S
Perfluoropropane sulfonamide (PFPSA)	Ultra- short chain Perfluorosulfonamide	C3H2F7NO2S
Perfluorobutane sulfonamide (PFBSA)	Ultra- short chain Perfluorosulfonamide	C4H2F9NO2S
Bistriflimide (TFSI)	Ultra- short chain Perfluorosulfonamide	C2HF6NO4S2
Perfluorohexacyclohexane sulfonic acid (PFChS)	Perfluorinated cyclohexane sulfonate	C6HF13O3S
Perfluoroheptacyclohexane sulfonic acid (PFMeChS)	Perfluorinated cyclohexane sulfonate	C7HF13O3S
Perfluorooctocyclohexane sulfonic acid (PFetChS)	Perfluorinated cyclohexane sulfonate	C8HF15O3S
Oxo-Perfluoropentanoic acid (4-oxo-PFPeA)	Oxo-Perfluorinated Carboxylate/Sulfonate	C5HF7O3
Oxo-Perfluorohexanoic acid (5-oxo-PFHxA)	Oxo-Perfluorinated Carboxylate/Sulfonate	C6HF9O3
Oxo-Perfluoroheptanoic acid (6-oxo-PFHpA)	Oxo-Perfluorinated Carboxylate/Sulfonate	C7HF11O3

PFAS Compound Name (acronym)	Class	Chemical Formula
Oxo-Perfluoropentane sulfonic acid (5-oxo-PFHxS)	Oxo-Perfluorinated Carboxylate/Sulfonate	C6HF11O4S
6-Chlorohexane sulfonic acid (6Cl-PFHxS)	Chlorine substituted Perfluorosulfonate	C6HClF12O3S

Overall, the study results demonstrated that targeted analytical testing methods are limited and not able to fully characterize PFAS in water samples. Additionally, other methodologies to characterize and detect PFAS should be utilized in conjunction with targeted analyses to gain better understanding of PFAS in water. The information and knowledge gained from the pilot study are the foundation for the current Project.

A.6.3. 2023 PFAS Methods Comparison Study

In October and November 2023, samples were collected from nine PWS wells by the State Water Board, Division of Drinking Water (DDW) branch staff and submitted to Babcock Laboratories. All but one of the wells were also sampled during the 2021 PFAS Methods Comparison Pilot Study. The one well not sampled during this most recent study was located close to the original well sampled in 2021 and is within the same public water system.

The primary objective of this 2023 Study was to identify the most appropriate broad-spectrum analytical method for characterizing the occurrence of “total PFAS” in drinking water. The most appropriate broad-spectrum analytical method will be reproducible, robust, with high potential to support feasible ongoing monitoring. A secondary objective of this study was to characterize the chemical space that is captured by available broad-spectrum analytical methods. The broad-spectrum test will be an analytical testing methodology to measure organic fluorine within the broadest chemical space possible using commercially viable technology, including several subgroups of PFAS that are not measured using USEPA Method 533 (the analytical method required in California for monitoring PFAS in drinking water).

The study included broad-spectrum organic fluorine methods that are commercially viable (i.e., AOF-CIC and extractable organic fluorine by combustion ion chromatography [EOF-CIC]), and other methods that are primarily available through academic partnerships. In addition to field sample analysis, the study included several laboratory control spike experiments to evaluate the analytical fate of analytical standards that represent a range of inorganic fluorine compounds and ultrashort-chain, volatile, and cationic PFAS over a range of concentrations. The results from the PFAS method comparison study are summarized in a memorandum to DDW management dated March 29, 2024 (State Water Board, 2024).

In comparing the chemical space that was captured by AOF-CIC using an extraction procedure modeled after USEPA Method 1621 versus EOF-CIC following a procedure modeled after USEPA Method 533, the findings for inorganic fluorine, many sulfonamides, volatile PFAS, and cationic PFAS demonstrate that AOF-CIC using an extraction procedure modeled after USEPA Method 1621 captures a broader organic fluorine chemical space while also minimizing interference from inorganic fluorine compounds.

At this time, due to observed limitations with the USEPA 533 extraction process such as losses of sulfonamides and inclusion of at least one inorganic fluorine compound, it is recommended that the selected broad-spectrum method not include those methods that extract organic fluorine using procedures modeled after USEPA 533. As such, AOF-CIC following sample extraction procedures modeled after USEPA Method 1621 has been identified as the optimal broad-spectrum method available at this time and is included in this QAPP.

A.7. PROJECT DESCRIPTION

The State Water Board will significantly expand the scope of the 2021 and 2023 studies by sampling approximately 3,800 drinking water supply wells serving disadvantaged communities (DACs) and severely disadvantaged communities (SDACs)[3] throughout the state. To characterize the PFAS content in these source wells, both targeted and non-targeted analyses for PFAS will be performed, as well as a broad-spectrum test method[4] to evaluate the organofluorine content of the drinking water source water (Section A.7.4 Monitoring Parameters). This multifaceted monitoring approach will be used to elucidate patterns and trends in the PFAS content of drinking water source water across the state and investigate whether specific PFAS content profiles are associated with regional areas, community types, or known PFAS-generating industries or activities.

The multifaceted monitoring approach will also be used to investigate the removal and pass-through of PFAS in commonly used public water system (PWS) treatment technologies used in California. The investigation of pilot to full-scale drinking water treatment systems will be used to inform treatment optimization and needs to manage PFAS in drinking waters of the state to develop treatment-based regulations for PFAS.

[3] Funding for this Project was included in California's Assembly Bill 178 (Budget Act of 2022), which included a directive for the State Water Board to monitor PFAS content in the community public water systems serving disadvantaged and severely disadvantaged communities.
[4] In accordance with expectations of AB 178, a method comparison study will be carried out prior to the initiation of sampling for this Project to determine the most effective broad-spectrum approach for estimating and quantifying the organofluorine content in these water samples.

On March 4, 2024, the State Water Board's Division of Drinking Water (DDW) issued General Order DW-2024-0002-DDW (2024 Order)[5] to public water systems to comply with the testing requirements included in this QAPP. The sampling is state funded and as a result at no cost to the water system. After the 2024 Order is issued there could be some adjustments to the number of water systems included in the project (e.g. a water system could be added to the 2024 Order if they provide information that they qualify as a DAC, or a water system may be removed from the 2024 Order because it is federal agency and is not eligible for this state funded program). As such, approximates for numbers of water systems and wells are provided in this QAPP.

A.7.1. Intended Use of Data

The goal of the Project is to support the development of statewide monitoring design that includes targeted analyses and a broad spectrum PFAS analytical approach to characterize PFAS in drinking water sources, before and after treatment. Information gained from the data collected will be used to support the design of a treatment-based MCL for public water systems to remove as much PFAS as economically and technically feasible while continuing to adhere to compliance standards for contaminant-specific MCLs. The Project will also provide an indication of the likely PFAS chemicals that could pass through commonly used treatment media or resins (e.g., granular activated carbon, ion exchange resins) based on chemical structure.

A.7.2. Project Objectives

The Project includes a sampling and analysis effort that aims to accomplish two main objectives and address the following questions:

Understand and characterize PFAS composition in the supply wells of PWS servicing DAC/SDAC in California utilizing a multifaceted monitoring approach.

- Which PFAS or PFAS types are commonly identified in untreated drinking water of DACs/SDACs?
- Are there PFAS or PFAS types that are present in distinct PWS groupings (e.g., geographic area)
- Can PFAS commonly identified by NTA in California be added to the scope of EPA Method 533?

Utilize multifaceted monitoring design to inform PFAS removal and pass-through in commonly used water treatment technologies in California to inform the development of a treatment-based regulation for PFAS as a class.[6]

[5] The 2024 Order is available at the following website: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/pfas_ddw_general_order/.
[6] Activities aimed at the second objective of the Project will not proceed until data collected for the first objective are analyzed and assessed to inform best pre-and post-treatment monitoring design. Therefore, procedures and design elements for the second objective are not included in this QAPP but will be added to the QAPP in a future revision following the process outlined in Section A.5.5.

- How effective are water treatment technologies at removing total PFAS mass and specific PFAS types?
- How can a broad spectrum PFAS testing approach (absorbable organofluorine and an analyte-specific list) be used for monitoring public water system compliance?
- Based on the most used water treatment technologies (GAC, Ion exchange) in California, which ones are more feasible in removing PFAS as a class?

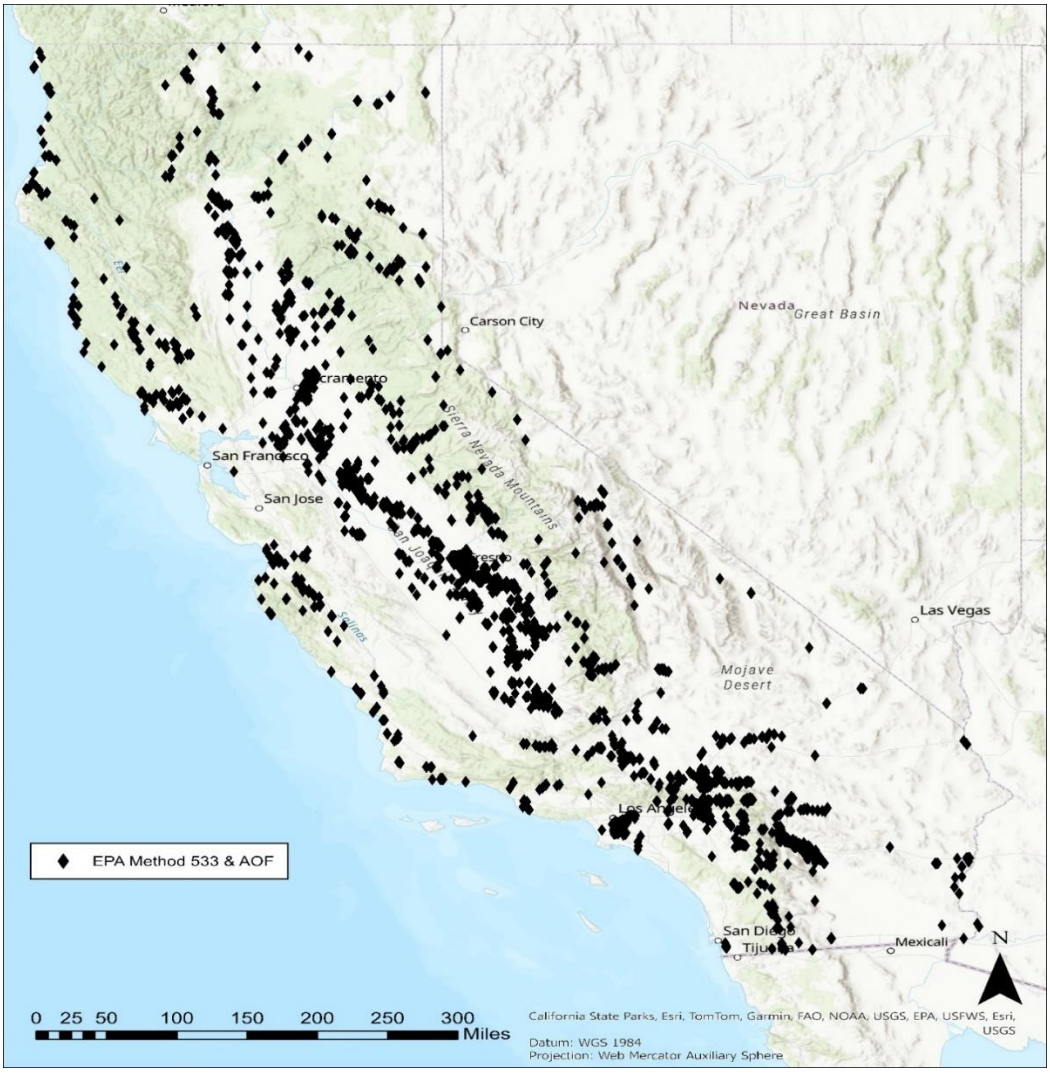


Figure 1: Map of Project Locations of Public Water Supply Wells servicing DAC/SDACs in California

A.7.3. Geographic Distribution of Sampling Locations

The public water supply wells servicing DAC/SDACs for this project are geographically

distributed between 53 counties across California (Figure 1), with most of the DAC/SDAC communities located in rural and agricultural areas and a smaller fraction in urban areas. San Bernardino County, in the Southern portion of the state, presents the highest density of wells (approximately 508 wells), followed by Fresno (approximately 363 wells) and Kern (approximately 346 wells) counties in the Central Valley. Table 3 shows the number of supply wells servicing DAC/SDACs that are included in each represented county. The list of the planned public water supply wells with associated locational information is provided in Appendix A of the 2024 Order[7].

Table 3: Number of DAC/SDAC Water Supply Wells per County

COUNTY NAME	NUMBER OF WELLS	COUNTY NAME	NUMBER OF WELLS
Alameda	1	Orange	7
Alpine	5	Placer	8
Amador	12	Plumas	46
Butte	51	Riverside	268
Calaveras	12	Sacramento	200
Colusa	19	San Benito	3
Contra Costa	15	San Bernardino	508
Del Norte	19	San Diego	85
El Dorado	10	San Joaquin	78
Fresno	363	San Luis Obispo	29
Glenn	27	Santa Barbara	39
Humboldt	47	Santa Cruz	4
Imperial	20	Shasta	72
Inyo	60	Sierra	7
Kern	346	Siskiyou	33
Kings	31	Solano	2
Lake	30	Sonoma	71
Lassen	21	Stanislaus	131
Los Angeles	203	Sutter	9
Madera	117	Tehama	65
Mariposa	30	Trinity	22
Mendocino	76	Tulare	218
Merced	88	Tuolumne	68
Modoc	11	Ventura	30
Mono	10	Yolo	18
Monterey	76	Yuba	37
Nevada	11	**Grand Total**	**3,769**

[7] The list of supply wells sampled for this Project is public information and being posted on the webpage. This information will be made available upon request if the link is broken or unable to be viewed.

A.7.4. Monitoring Parameters

This project will identify and characterize the PFAS composition in the supply wells of public water systems using both targeted and non-targeted analytical methods (Table 4) as described below.

A.7.4.1. EPA Method 533

The concentrations of 25 PFAS analytes will be measured in the source water of each supply well using EPA Method 533. These 25 PFAS were included as target analytes in the published method based on their known or suspected persistence in the environment, their ability to bioaccumulate in living organisms, and their potential for toxicity. Options and processes to expand the scope of EPA Method 533 to include more PFAS analytes are discussed in Section B.3.2.

Table 4: List of Targeted PFAS and Non-Target Analytes for Well Samples

Analyte	Acronym	Unit	Target RL[1]	Analytical Method	Laboratory SOP[2]
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	ng/L	2	EPA 533	T-760-EPA-533
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	ng/L	2	EPA 533	T-760-EPA-533
4,8-Dioxa-3*H*-perfluorononanoic acid	ADONA	ng/L	2	EPA 533	T-760-EPA-533
Hexafluoropropylene oxide dimer acid	HFPO-DA	ng/L	2	EPA 533	T-760-EPA-533
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	ng/L	2	EPA 533	T-760-EPA-533
Perfluorobutanoic acid	PFBA	ng/L	2	EPA 533	T-760-EPA-533
Perfluorobutane sulfonic acid	PFBS	ng/L	2	EPA 533	T-760-EPA-533
1*H*,1*H*, 2*H*, 2*H*-Perfluorodecane sulfonic acid	8:2FTS	ng/L	2	EPA 533	T-760-EPA-533
Perfluorodecanoic acid	PFDA	ng/L	2	EPA 533	T-760-EPA-533
Perfluorododecanoic acid	PFDoA	ng/L	2	EPA 533	T-760-EPA-533
Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	ng/L	2	EPA 533	T-760-EPA-533
Perfluoroheptane sulfonic acid	PFHpS	ng/L	2	EPA 533	T-760-EPA-533
Perfluoroheptanoic acid	PFHpA	ng/L	2	EPA 533	T-760-EPA-533
1*H*,1*H*, 2*H*, 2*H*-Perfluorohexane sulfonic acid	4:2FTS	ng/L	2	EPA 533	T-760-EPA-533
Perfluorohexane sulfonic acid	PFHxS	ng/L	2	EPA 533	T-760-EPA-533
Perfluorohexanoic acid	PFHxA	ng/L	2	EPA 533	T-760-EPA-533
Perfluoro-3-methoxypropanoic acid	PFMPA	ng/L	2	EPA 533	T-760-EPA-533
Perfluoro-4-methoxybutanoic acid	PFMBA	ng/L	2	EPA 533	T-760-EPA-533

Analyte	Acronym	Unit	Target RL[1]	Analytical Method	Laboratory SOP[2]
Perfluorononanoic acid	PFNA	ng/L	2	EPA 533	T-760-EPA-533
1*H*,1*H*, 2*H*, 2*H*-Perfluorooctane sulfonic acid	6:2FTS	ng/L	2	EPA 533	T-760-EPA-533
Perfluorooctanesulfonic acid	PFOS	ng/L	2	EPA 533	T-760-EPA-533
Perfluorooctanoic acid	PFOA	ng/L	2	EPA 533	T-760-EPA-533
Perfluoropentanoic acid	PFPeA	ng/L	2	EPA 533	T-760-EPA-533
Perfluoropentanesulfonic acid	PFPeS	ng/L	2	EPA 533	T-760-EPA-533
Perfluoroundecanoic acid	PFUnA	ng/L	2	EPA 533	T-760-EPA-533
Trifluoroacetic acid	TFA	ng/L	50	IC-MS/MS	T-765-PFAS
Perfluoropropanoic acid	PFPrA	ng/L	25	IC-MS/MS	T-765-PFAS
Triflouromethanesulfonic acid	TFMS	ng/L	25	IC-MS/MS	T-765-PFAS
Perfluoroethanesulfonic acid	PFEtS	ng/L	25	IC-MS/MS	T-765-PFAS
Perfluoropropanesulfonic acid	PFPrS	ng/L	25	IC-MS/MS	T-765-PFAS
Bistriflimide	Bistrif	ng/L	25	IC-MS/MS	T-765-PFAS
Hexafluorophosphate	PF6	ng/L	25	IC-MS	T-765-PFAS
Absorbable organofluorine by combustion ion chromatography	AOF-CIC	ng/L	800	CIC[3]	T-763-AOF-DW

[1] RL = Reporting Limit; this value is the quantitation limit of the contract laboratory and is used as the Target RL for the project.

[2] Laboratory SOPs are proprietary information and are not included as attachments in this QAPP. All Laboratory SOPs have been reviewed by the Project Manager and QA Officer to determine they meet the performance and quality needs of the project.

[3] Method selected based on results from PFAS Methods Comparison Pilot Study (see Section A.6.3 for more details).

A.7.4.2. Ultra-Short Chain PFAS by IC-MS/MS

The Project will employ an analysis (Laboratory SOP: T-765-PFAS by ICMSMS) to assess the presence of ultra-short chain PFAS analytes (Table 4) by ion chromatography tandem mass spectrometry (IC-MS/MS) that fall outside the scope of EPA Method 533. Due to cost and time restraints of the Project, ultra-short chain PFAS analysis will only be performed on a subset of the total samples being analyzed for NTA within the Project. The total number of samples analyzed for ultra-short chain PFAS will be set at the same frequency as NTA samples. The distribution of the planned pre-selected source wells for ultra-short PFAS is depicted in Figure 2 and the list of planned source wells can be found in Appendix A.

A.7.4.3. Adsorbable Organofluorine by CIC

Measurements of absorbable organofluorine (AOF) content in each sample will also be performed using Laboratory SOP T-763-AOF-DW. As summarized in the 2023 Methods Comparison Study (Section A.6.3), limitations in the AOF method indicate low

to no recovery for ultra-short chain PFAS. However, this Project is supplementing the analysis with ultra-short chain PFAS along with Method 533 analytes to provide a better estimate of the total PFAS in the Project well samples.

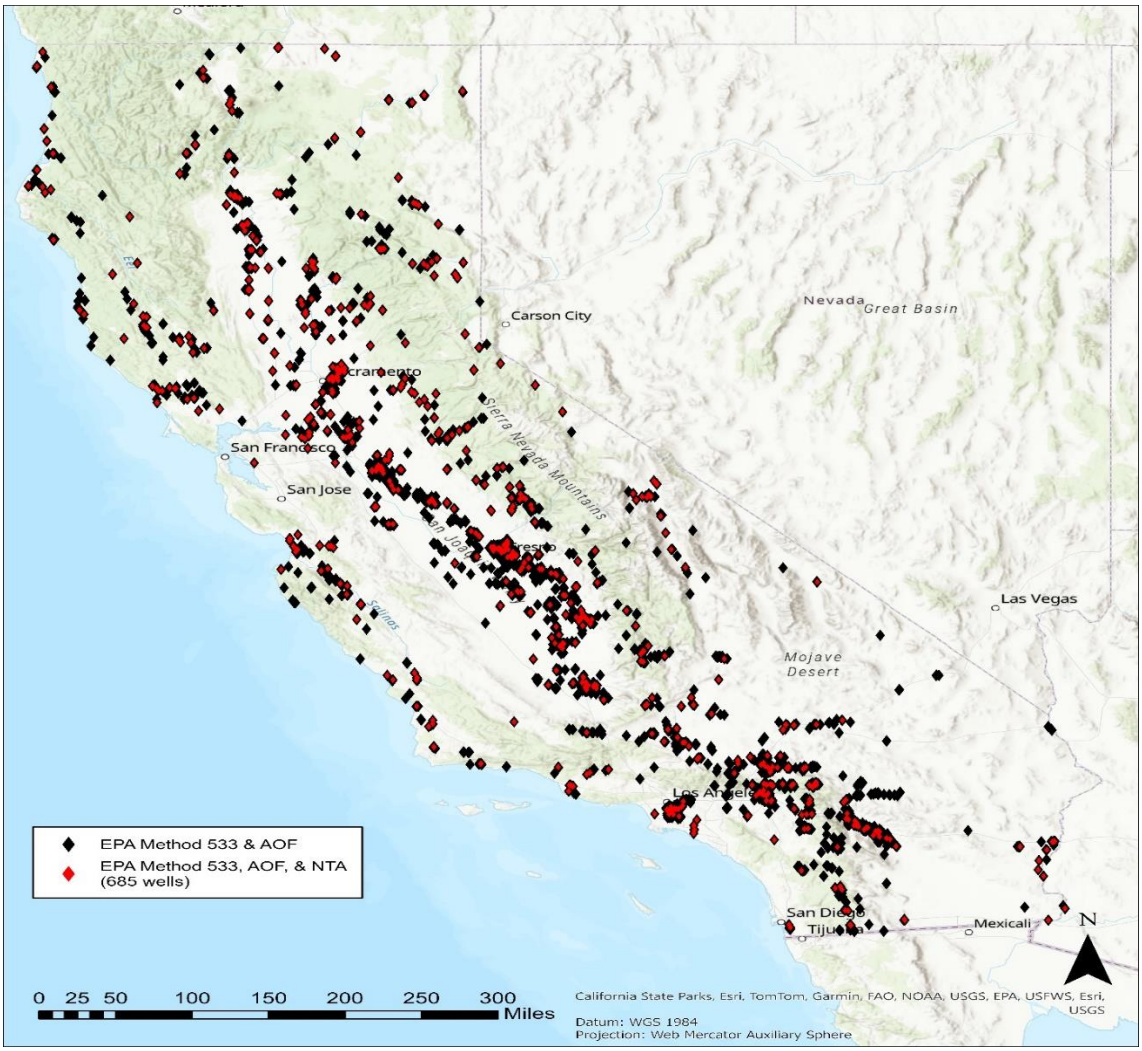


Figure 2: Distribution of sample locations preselected for non-target analyses (red). These preselected sample locations are a subset of the project.

A.7.4.4. Non-targeted Analyses

NTA (Laboratory SOP: T-764-NTA by HRMS) will be used to assess the presence and relative abundance of PFAS analytes that fall outside the scope of the targeted analyses. Due to cost and time restraints of the Project, NTA will only be performed on a subset of the total samples of the Project. NTA will be performed on samples collected at pre-selected sample locations (see Section B.1.2). If there is budget remaining, NTA analysis will be performed on samples where elevated concentrations of targeted PFAS

analytes are detected and/or samples that exhibit large differences in the total mass from the organofluorine analysis compared to the total mass from the sum of concentrations measured using EPA Method 533. The distribution of the planned pre-selected source wells for NTA is depicted in Figure 2 and listed in Appendix A. The exact number of additional samples that will be selected for NTA (and ultra-short PFAS) based on the results of targeted analyses is unknown. However, the total number of NTA (and ultra-short PFAS) will be limited to no more than 700 samples or less based on the Project budget, which is approximately 18% of the Project wells.

A.7.5. Project Schedule

Samples for targeted and non-targeted analyses will be collected once from the public water supply wells serving DAC/SDACs across the state (see Figure 2). Samples will be collected over a 2-year period starting in 2024 and completing in 2026 (Table 5). Lab data analysis and reporting of the well samples will extend into 2027. A well summary report will be drafted in 2027 and finalized in 2028.

Table 5: Projected Project Timeline

DAC/SDAC Well Sampling

	2024-Q1	2024-Q2	2024-Q3	2024-Q4	2025-Q1	2025-Q2	2025-Q3	2025-Q4	2026-Q1	2026-Q2	2026-Q3	2026-Q4	2027-Q1	2027-Q2	2027-Q3	2027-Q4	2028-Q1	2028-Q2	2028-Q3	2028-Q4
Sampling		X	X	X	X	X	X	X	X	X	X	X								
Sample Analysis		X	X	X	X	X	X	X	X	X	X	X	X							
Lab Reporting		X	X	X	X	X	X	X	X	X	X	X	X	X						
Draft Summary Report													X	X	X					
Final Summary Report																	X			

Treatment System Sampling*

	2024-Q1	2024-Q2	2024-Q3	2024-Q4	2025-Q1	2025-Q2	2025-Q3	2025-Q4	2026-Q1	2026-Q2	2026-Q3	2026-Q4	2027-Q1	2027-Q2	2027-Q3	2027-Q4	2028-Q1	2028-Q2	2028-Q3	2028-Q4
Sampling						X	X	X	X	X	X	X								
Sample Analysis						X	X	X	X	X	X	X	X	X						
Lab Reporting							X	X	X	X	X	X	X	X	X	X				
Draft Summary Report																	X	X	X	
Final Summary Report																				X

* Initiation of the treatment system sampling will be based on available funding and systems installing treatment.

A.8. QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

A.8.1. Data Quality Objectives

Data quality objectives (DQOs) are developed as part of a systematic planning process designed to assist investigators in the development of a sound and defensible project. DQOs are the qualitative and quantitative statements that clarify the study's objectives, define the appropriate type, quantity, and sensitivity of data to collect, and specify the tolerable levels of potential error that will be used to establish the level of quality needed to support decisions (US EPA QA/G-5, 2002).

DQOs for this Project were developed to ensure data are supportive of project goals and useable in terms of EPA's general assessment factors:

- **Soundness** - The extent to which the scientific and technical procedures, measures, methods, or models employed to generate the information are reasonable for, and consistent with, the intended application.
- **Applicability and Utility** - The extent to which the information is relevant for the intended use.
- **Clarity and Completeness** - The degree of clarity and completeness of provided tools and workflows, assumptions, methods, and quality assurance.
- **Uncertainty and Variability** - The extent to which the variability and uncertainty (quantitative and qualitative) in the information or in the procedures, measures, methods, or models are evaluated and characterized.
- **Evaluation and Review** - The extent of validation and review of the information, procedures, methods, or models.

A.8.2. Data Quality Indicators

Data Quality Indicators (DQIs) are the quantitative measures and qualitative descriptors used to set the limits of acceptable levels of data error. The main data quality indicators for this project are precision, bias/accuracy, representativeness, comparability, completeness, and sensitivity. DQIs are a means to establish Measurement Quality Objectives (MQOs) for each matrix, analyte group, or analyte for the Project, which, if achieved, will provide an indication that the resulting data are of sufficient quality to meet the Project DQOs (US EPA QA/G-5, 2002). This system of characterizing quality and setting performance criteria for project data allows for assessment of project performance and establishes confidence in the quality of the results.

A.8.2.1. Precision

Precision is the measure of agreement between repeated measurements of the same property tested under identical or substantially similar conditions. For the targeted analyses in this Project, precision will be monitored using quality control samples including field duplicates and matrix spike duplicates. A field duplicate will be collected

to determine the precision of the field and laboratory activities. Matrix spike duplicates will be analyzed to determine precision of the analytical process.

For NTA, system stability (i.e., accessing instrument performance over time) will be assessed by reproducibility of internal standard compounds and repeated analysis with % Relative Standard Deviation (RSD) below a threshold criterion selected based on its appropriateness for the data set. Additionally, precision will be assessed by the detection, identification, and relative abundance of authentic reference standards in spiked QC samples across the analytical batch.

A.8.2.2. Bias & Accuracy

Bias is a systematic error that can be introduced by the method, equipment, or an artifact causing consistent error relative to the "true value". Accuracy refers to the agreement between an observed experimental measurement and its true (target or reference) value. Accuracy can be described as a combination of both random error (precision) and systematic error (bias), so accuracy for this Project will be evaluated in terms of the combined influence of both observational errors.

In this Project, bias from contamination will be evaluated by collecting and analyzing blank samples. First, field reagent blanks will be collected alongside samples for both adsorbable fluorine and EPA Method 533. Additionally, blanks will be analyzed as part of laboratory batch QC for all analyses. For EPA Method 533, one batch blank is required with each analytical batch. At least two method blanks will be analyzed with each analytical batch for adsorbable fluorine, IC-MS/MS, and NTA to demonstrate freedom from contamination. For NTA, the true presence of any chemical features will be evaluated by comparison to the batch method blanks, with true features having an abundance that exceeds the blank by a specified fold-change selected based on its appropriateness for the data set.

For NTA, all extracts will be analyzed in triplicate and a feature may only be reported if it is detected in at least 2 of the 3 replicate injections. Additionally, tracers must be detected in 2 of the 3 replicate injections to report any results from the sample to prevent false negatives of NTA features. For each NTA sample, 90% of the 24 tracers must be detected to accept the analysis.

The accuracy of the analyses performed in this Project will be improved by calibrating instrumentation prior to analysis or assessing the calibration of the instrument by analyzing initial or continuing calibration verification samples in each analytical batch.

Accuracy of the targeted analyses will be evaluated based on the percent recovery measured in matrix spike and matrix spike samples (See Table 6 for reference). For NTA, an assessment of the mass error associated with tracer compounds will be utilized prior to sample analysis to determine instrument suitability. Additionally, instrument performance will be assessed by the detection and identification of authentic reference standards in a spiked QC sample.

A.8.2.3. Representativeness

Representativeness is a qualitative term that expresses the degree to which the data generated by the project accurately represents the characteristics of the environmental condition. Assuring that the data is representative of the project objectives is addressed primarily by selecting appropriate locations, methods, times, and by maintaining the integrity of the sample after collection. The rationale for the selection of sampling locations is outlined in Section B.1. The expectation is that all samples will be obtained, transferred, and processed in accordance with the methods indicated in this QAPP, including specified QC samples (see Section B.4)

The representativeness of the tools used to describe identification confidence is a determining factor in assessing confidence levels for NTA. Best practices for the reporting of novel and NTA identified compounds are still in development by the scientific community. Currently, the scale of Schymanski *et al*[8]. will be used to describe confidence in identifications (Appendix B). Reported chemicals should meet the minimum data necessary to achieve the reported confidence level. Efforts will be made to complete study objectives without the need for absolute concentration estimates where possible (e.g., modeling with relative abundances). If necessary, concentration estimates will be made using defensible literature methods for NTA, through application of standards to assess response factors with similar chemical structures.

A.8.2.4. Comparability

Comparability expresses the measure of confidence that one dataset can be compared to and combined with another for a decision(s) to be made (US EPA QA/G-5, 2002). This Project will utilize standardized methodology, data reporting procedures and standards, and have similar expectations for the level of quality needed for decision making purposes. The State Water Board will achieve comparability of NTA data by employing study design, NTA instrument methods, data analysis methods, modeling, and statical analyses that are used and supported by EPA ORD and partner states in the ROAR program.

A.8.2.5. Completeness

Completeness describes the success of sample collection and laboratory analysis, which should be sufficient to fulfill the statistical criteria of the project. Completeness is measured as the percentage of the data that must be collected which is valid. The completeness goal for each analysis and test parameters is 90%.

[8] Schymanski, E.L., J. Jeon, R Gulde, K. Fenner, M. ruff, H.P. Singer, J. Hollender. Identifying small molecules via high resolution mass spectrometry: communicating confidence. Env. Sci. Tech. 2014, 48,2097-2098. Dx.doAi.org/10.1021/es5002105.

A.8.2.6. Sensitivity

Analytical sensitivity refers to the lowest value an instrument or method can detect with a reasonable degree of certainty. This is important to evaluate the appropriateness of a method or instrument for the requirements of a given project. Reporting limits must be equal to or lower than the required project action limit to be appropriate for the project.

A.8.3. Measurement Quality Objectives

Measurement Quality Objectives (MQOs) are the individual performance criteria or acceptance goals that correspond to each of the DQIs. The minimum requirements of this project in terms of performance criteria consist of an initial demonstration of laboratory capability, analysis of samples spikes to evaluate data quality, and analysis of standards and blanks as tests of continued performance. Laboratory performance is compared to established performance criteria to determine if the results of analyses meet the performance characteristics of the methods. The MQOs for this project are described in Table 6.

Table 6: Measurement Quality Objectives for Targeted Analyses

Parameter	Blank Bias	Precision	Lab Control Spike Accuracy/ Recovery	Matrix Spike and Matrix Spike Duplicate Accuracy/ Recovery	Completeness
PFAS Analytes	< RL	RPD < 50 %	50- 150 %	50- 150 %	90%
Absorbable Organofluorine by Combustion Ion Chromatography (AOF-CIC)	< RL	RPD < 20 %	70- 130 %	50- 150 %	90%
Ultra-short chain PFAS by IC-MS/MS and IC-MS	<RL	RPD<50%	50-150%	50-150%	90%

A.9. SPECIAL TRAINING OR CERTIFICATION

All personnel performing field, laboratory, data entry, and data quality assurance procedures in this Project will be trained to ensure the work performed is conducted in accordance with procedures described in this QAPP. All staff performing sampling will receive training from the State Water Board on PFAS specific sample collection and handling procedures. Training includes a review of standard operating procedures (SOPs) that contain detailed information regarding proper decontamination or contamination prevention protocols, sample collection techniques, sample handling processes for field and quality control (QC) samples.

Laboratory personnel performing work for this Project will be trained in accordance with Babcock's Laboratories' QA Manual and laboratory accreditation requirements. Babcock Laboratories holds CA ELAP accreditation (Cert # 2698) and NELAP accreditation (Cert # 4035) in the analysis of PFAS using EPA Method 533. Additionally, Babcock Laboratories holds Department of Defense (DoD) accreditation for the analysis of PFAS in non-potable waters using a performance-based approach in compliance DoD QSM 5.3, Table B-15. Accreditation in the analysis of organofluorine content or NTA is either not required or not offered for accreditation through laboratory accreditation bodies at this time.

A.10. DOCUMENTS AND RECORDS

A.10.1. Field Records

Daily Field Checklists (Appendix C) are to be filled out prior to sampling and after sampling events by each sampling crew. The Daily Field Checklists are used to prepare sampling crews for the upcoming sampling event and ensure that all the necessary supplies and material are present for the sampling activities. Observations or field data gathered at the time of sample collection will be recorded on the Sample Field Form (Appendix D). Completed field checklists and forms shall be sent electronically via a project website to OWP and the Project Manager and Project Coordinator within seven calendar days of sampling events. Originals or electronic copies of all field forms shall be filed or stored with all project records by the Project Sampling Coordinator. Chain of Custody (COC) forms (Appendix E) will accompany the samples collected and shipped to the laboratory. Copies of the signed, completed COC forms shall be included in the laboratory reports submitted by Babcock Laboratories. Babcock Laboratories will also submit a copy of the completed COC electronically to the project website.

A.10.2. Laboratory Records

All analytical procedural steps must be detailed in the laboratory research notebook or equivalent documentation log, including but not limited to extraction and preparation of sample for analysis, preparation of standard solutions and spiked samples, calibration of equipment, and reagents and methods used. The date and time of each of these procedures must be specified in the notebook.

Laboratory reports and electronic data deliverables (EDDs) generated for this project shall follow formatting requirements stated in Section B.9 of this QAPP. All data and records used to generate the laboratory reports and EDDs must be retained by Babcock and made available to the State Water Board upon request.

A.10.3. Record Retention Policy

All data, records, and other products created for this project will be retained by the participating entities and contract laboratories for a minimum of 10 years. The documents may be held as electronic copies of the original documents or records. Any

records or data held by the sampling or laboratory contractors shall be released to the State Water Board upon request.

A.10.4. QAPP Distribution

The Program Manager will distribute the official, approved QAPP and any necessary subsequent revisions to all parties documented above in the distribution list. It is the responsibility of the identified person in the distribution list to distribute the QAPP to personnel that they oversee or supervise. Any future amendments to the QAPP will be distributed in a similar fashion.

A.11. PROJECT COMMUNICATIONS PLAN

Communication of the data, information, and findings of this Project in a clear, easy to understand, timely, accurate and relevant manner is a primary focus for this Project. Communications for this Project will be delivered in accordance with the Project's Communication Plan. The Communication Plan describes the point of contacts for this project, how communications to stakeholders will be delivered and the expected outcomes from communications in practical, tangible terms.

B. DATA GENERATION AND ACQUISITION

B.1. SAMPLING EXPERIMENTAL DESIGN

This Project is a statewide investigation of PFAS content in source wells of water systems servicing DAC/SDAC utilizing a multifaceted analytical approach that includes use of a published analytical method for PFAS analysis, a novel broad-spectrum analysis to estimate organofluorine content, and NTA. The information and data collected from this multifaceted analytical approach will be used to evaluate the effectiveness of existing, full-scale drinking water treatment technologies deployed in California to remove PFAS.

B.1.1. DAC/SDAC Well Sampling

Samples from drinking water supply wells will be collected by a sampling team contracted by OWP for this Project (see Figure 1). This project utilizes the DAC/SDAC designation based on the California legislative definition in SB-200[9]. EPA Method 533 and broad-spectrum organofluorine analysis will be performed on all samples collected. However, NTA will only be performed on a subset of the total samples collected (see Figure 2). NTA will be performed on samples collected at pre-selected sample locations

[9] SB 200 requires the identification of DAC and SDAC systems that meet the Affordability Threshold. Disadvantaged Community (DAC) means the entire service area of a community water system, or a community therein, in which the Median Household Income (MHI) is less than 80% of the statewide annual MHI level. Severely Disadvantaged Community (SDAC) means the entire service area of a community water system in which the MHI is less than 60% of the statewide MHI.

and if budget allows samples where elevated concentrations of targeted PFAS analytes are detected and/or samples that exhibit large differences in the total mass from the organofluorine analysis compared to the total mass from the sum of concentrations measured using EPA Method 533. The total number of NTA will be limited to 700 samples or less based on the Project budget.

B.1.2. Pre-selected sample locations for NTA and Ultra-short PFAS

The pre-selection of locations for NTA and ultra-short PFAS enables efficient planning of sampling events to distribute laboratory workloads and prevent workflow bottlenecks caused by delayed initiation of these analyses after targeted analyses are complete.

The selection design used to pre-select a subset of sample locations to perform NTA and ultra-short PFAS aimed to achieve an equitable distribution of site locations across the state with minimum representation from each county as well as proportional representation from areas that have a high density of source wells that service DACs/SDACs. The pre-selection design was developed to have approximately 700 pre-selected locations for NTA and ultra-short PFAS. To achieve equitable representation, a minimum of five source well locations were pre-selected from each county in Table 3 except in cases where the county did not have five identified DACs/SDAC source wells. In such cases, NTA and ultra-short PFAS will be performed on samples from all identified source wells in the county. This initial selection criteria resulted in a selection of 259 of the 700 desired locations. The remaining wells were selected using a random selection process. This process involved calculating the number of wells to be selected from each county proportional to the total number of wells in the Project. Once the number of wells to select from each county was determined, the wells to sample were randomly selected until the predetermined number was reached.

B.1.3. Evaluation of Drinking Water Treatment Technologies

The experimental design and information on the evaluation of drinking water technologies will be included in an amendment to this QAPP.

B.2. SAMPLE COLLECTION

The integrity of the sample collection process is important for generating quality data. Sampling methods for this project will follow the State Water Resources Control Board Drinking Water Sample Collection Guidance for Per and Poly-Fluoroalkyl Substances (PFAS)[10]. Any deviation to the procedures outlined in this sampling guidance document or this QAPP must be approved prior to implementation (if anticipated) or reported to the Project Manager within 7 days of occurrence (if unanticipated). Deviations shall be documented in a corrective action report (Appendix F). The sampling guidance document contains instructions for reducing cross-contamination during sample

[10] https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/pfos_and_pfoa/ddw-pfas-sampling-guidance-nov-2022.pdf

collection and provides information on delivering samples for analysis. These methods are summarized below.

B.2.1. Sample Procedure

Samples should be collected directly from a sample tap on the well discharge line at a location prior to any treatment. The sample should not be taken from a hose. The well must be in operation and active at the time of sampling. The well should be allowed to flow either to the system or to waste (if it has not been in operation recently) for at least 15 minutes prior to sample collection. Field duplicates will be collected for each analysis performed for this Project as described in Table 9 and Appendix G. Field duplicates must be collected in the same manner as the field sample. PFAS-free deionized water in a clean sampling container will be provided by the laboratory to the sampling crew and used for the collection of a field blank. Refer to Section B.4.3 for the frequency of field QC sample collection.

B.2.2. Daily Field Checklist

A Daily Field Checklist must be completed prior to each sampling event and after completing all sampling activities (Appendix C). The Daily Field Checklist is designed to ensure that sampling crews have reviewed all the necessary sampling protocols, calibrated field equipment, and have the necessary sampling supplies for the sampling event and the materials needed to ship samples to the contract laboratory. The post-sampling elements of the checklist are established to properly document the end of the current sampling event, as well as prepare for the next sampling event.

B.2.3. Contamination Preventative Measures

Due to the presence of PFAS in commonly used sampling materials and personal protective equipment, as well as in clothing, food packaging and personal care products, appropriate procedures must be taken into consideration to avoid contaminating the samples during collection and ensure the sample is representative of the source water.

In addition, to avoid sample cross-contamination samplers should take the efforts to implement the following recommendations:

- Minimize use of cosmetics, moisturizers, sun-blocks, insect repellants, fragrances, creams, or other personal care products (including hair products) (except products known to be 100% natural) on the day of the sample event, preferably 24 hours prior to the event.
- Other items that are likely to contain PFAS and to be avoided include paper packaging for food or fast food; new or unwashed clothing; clothing washed with fabric softeners or dried with anti-static sheets; synthetic water-resistant/or stain-resistant materials (such as waterproof clothing and shoes such as Gore-Tex),

waterproof or coated Tyvek® material (special attention to boots);Teflon® and other fluoropolymer-containing materials (e.g., polyvinylidene fluoride [PVDF], Kynar®, Neoflon®, Tefzel®); waterproof /treated paper on field notebooks and waterproof markers (such as Sharpie®, etc.); chemical or blue ice.

- Avoid sampling in the rain if possible (if necessary, please use vinyl or polyvinyl chloride [PVC] rain gear).
- Fill the vehicle with gasoline the day before sampling.
- Avoid consuming food or beverages in the sample site area. If food, drink, or other activities, such as smoking, are necessary during the sampling event, first move away from the sample site. Before returning to the sampling site, wash hands thoroughly and put on fresh powderless nitrile gloves.
- Wash hands before and after each sampling event.
- Wear powderless nitrile gloves while filling and sealing the sample bottles, using a new pair of nitrile gloves at each sample site.

B.2.4. Sample Field Form

Field observations, water quality information, and results from field tests (temperature, pH, conductivity) will be documented on a Sample Field Form (Appendix D). This form must be completed in the field for each sampling location.

B.2.5. Water Quality Field Parameters

Water quality field parameters will be measured of the purge water using a portable multiparameter meter equipped with sensors for pH, conductivity, temperature, and turbidity. Precision and accuracy for each parameter required for this project is provided in Table 7.

Field meter measurements will be collected using an aliquot of the purge water while the well pump is operating. This aliquot of purge water will be collected in a separate container from the lab sample container. This container for field meter readings can be used at multiple well locations. The field meter probe will not be in contact with the sample or containers used for the lab sample.

Up to three measurements will be taken while the well is being purged and recorded on the field form. Those measurements will be taken at the beginning of purging the well, midway during purging, and just before sampling. These readings will be documented on the Sample Field Form (Appendix D). The last measurements (just before sample collection) for pH, conductivity, and turbidity will also be recorded on the chain of custody for that sample for the laboratory's use.

Table 7: Precision and Accuracy for the Field Multiparameter Meter

Parameter	Precision	Accuracy
pH	0.01 units	±0.2 units
Temperature	0.1°C	±0.2°C
Specific conductivity	±0.5% of reading or 0.001 mS/cm, whichever is greater	0 to 100 mS/cm (±0.5% of reading or 0.001 mS/cm, whichever is greater) 100 to 200 mS/cm (±1% of reading)
Turbidity	0.1 NTU	0 to 999 (0.3 or ±2% of reading, whichever is greater) 1000 to 4000 (±5% of reading)

B.2.5.1 Turbidity

Turbidity measurements provide an indication of the relative clarity of the water. Sediment in the well may get disturbed during the purging of the well. The water may appear cloudy, murky or grayish. The amount of dissolved or suspended sediment in the sample bottle may reduce flow rate or plugging of the analytical preparatory cartridges and thereby, impact the laboratory's ability to prepare the sample properly for analysis. As result, the following instructions are required before the sample is collected based on turbidity readings.

- After purging the well for the initial 15 minutes, if turbidity reading < 5 NTU
  - Collect sample
  - Record turbidity reading on Sample Field Form and on COC.
- If turbidity reading > 5 NTU - purge well for another 10 minutes (total purge time = 25 minutes)
  - If turbidity reading < 5 NTU
    - Collect sample
    - Record turbidity reading on Sample Field Form and COC and add a notation of the total purge time.
  - If turbidity reading is 5 to 10 NTU
    - Purge well for another 5 minutes (total purge time = 30 minutes)
  - If after a total purge time of 30 minutes, turbidity reading > 5 NTU
    - Collect sample
    - Record turbidity reading on Sample Field Form and on COC and add a notation of the total purge time
    - Notify the lab

B.2.6. Additional Field Data Collection (One-Time)

At each well location, one-time additional field data will be collected to document the surrounding conditions (i.e., surface pavement, well security, surface water drainage) and details about the well (i.e., casing diameter and geographic coordinates). The Global Positioning System (GPS) receiver must have submeter accuracy. Additionally,

samplers will take photographs at each sampling location. These observations and measurements will be recorded on the Sample Field Form (Appendix D).

B.2.7. Sample Handling

B.2.7.1. Sample Labelling

All sample bottles are to be labelled with an indelible marker (PFAS-free) clearly with sample ID, sample date, collection date and time, requested analytical tests, and sampler's name or initials.

The sample ID system used for this Project is as follows:

PS Code[11]*_Identifying Letter_Analysis*

Where:

Identifying Letter = field sample (S), field duplicate (D), field blank (FB), matrix spike/matrix spike duplicate (MSMSD)

Analysis = Target, AOF-CIC (organofluorine analysis), LC-HRMS and IC-MS/MS

Examples:

Field Samples

CA3610001_013_013_S_533
(PS Code *CA3610001_013_013*, field sample, EPA Method 533)

CA3610001_013_013_S_AOF
(PS Code *CA3610001_013_013*, field sample, organofluorine analysis)

CA3610001_013_013_S_QSM
(PS Code *CA3610001_013_013*, field sample, NTA/Ultra-short PFAS [LC-HRMS and IC-MS/MS])

Field Duplicate

CA3610001_013_013_D_533
(*CA3610001_013_013*, field duplicate, EPA Method 533)

CA3610001_013_013_S_AOF
(PS Code *CA3610001_013_013*, field duplicate, organofluorine analysis)

[11] "PS Code" for the purpose of the Project is the same as the "New PS Code" used by the Division of Drinking Water for upload of data to their legacy databases. The "New PS Code" is a concatenation of the old PS Code, facility ID, and sample point ID of each location separated by an underscore symbol.

CA3610001_013_013_D_QSM
(PS Code *CA3610001_013_013*, field duplicate, NTA/Ultra-short PFAS [LC-HRMS and IC-MS/MS])

Field Blank

CA3610001_013_013_FB_533
(*CA3610001_013_013*, field blank, EPA Method 533)

CA3610001_013_013_FB_AOF
(*CA3610001_013_013*, field blank, organofluorine analysis)

CA3610001_013_013_FB_QSM
(*CA3610001_013_013*, field blank, NTA/Ultra-short PFAS [LC-HRMS and IC-MS/MS])

Matrix Spike/Matrix Spike Duplicate

CA3610001_013_013_MSMSD_533
(*CA3610001_013_013*, matrix spike/matrix spike duplicate, EPA Method 533)

CA3610001_013_013_MSMSD_AOF
(*CA3610001_013_013*, matrix spike/matrix spike duplicate, organofluorine analysis)

CA3610001_013_013_MSMSD_QSM
(*CA3610001_013_013*, matrix spike/matrix spike duplicate, NTA/Ultra-short PFAS [LC-HRMS and IC-MS/MS])

B.2.7.2. Sample Containers, Preservatives and Holding Times

Samples will be collected using certified-clean containers with preservatives as shown in Table 8. Sample containers will be filled at each site location. All samples must be collected in a wide mouth 250 milliliter (mL) polypropylene, or high-density polyethylene (HDPE) container fitted with a polypropylene or HDPE screw cap. Samples collected for AOF-CIC, LC-HRMS, and IC-MS/MS analysis must use a clean, unpreserved container.

Samples collected for EPA Method 533 analysis must use containers pre-preserved with enough ammonium acetate to achieve a 1g/L concentration of ammonium acetate in the sample. Bottles must be filled to 250 mL, and gently agitated to dissolve preservative. Refer to Appendix G for the number of containers required for each analysis per site.

Table 8: Sample Containers, Preservative, and Holding Times

Analysis	Sample Container and Volume	Preservation/ Storage Requirements	Extraction/ Prep Holding Time	Analysis Holding Time
EPA Method 533	250 mL polypropylene or HDPE	Ammonium Acetate / Store at <6°C without freezing	28 days	28 days
Adsorbable Organofluorine Analysis by Combustion Ion Chromatography (AOF-CIC)	250 mL polypropylene or HDPE	None / Store at <6°C without freezing	28 days	90 days
LC-HRMS – DoD QSM extract	250 mL polypropylene or HDPE	None / Store at <6°C without freezing	NA	90 days
IC-MS/MS and IC-MS– DoD QSM extract				

After sample collection, samples must be kept on ice and maintained at <10°C (but not frozen) and must arrive at the laboratory within 48 hours of sampling. If samples will be received at the laboratory more than 48 hours after sampling but no more than 3 days after sampling, they should be kept consistently at <6°C (but not frozen) until delivered. Samples must be resampled if the required storage temperature requirements were not met (at or below 10°C (not frozen) within 48 hours or at or below 6°C (not frozen) within 3 days of sample collection) or arriving at the laboratory 3 days or more after sample collection.

Samples for EPA Method 533 analysis must be stored at <6°C in the laboratory (but not frozen) and extracted within 28 days of collection. Sample extracts for EPA Method 533 and AOF-CIC must be analyzed within 28 days of extraction. Samples for organofluorine analysis should be analyzed as soon as possible but may be held for up to 90 days if stored in an area protected from light. Extracts for NTA and IC-MS/MS must be stored in a freezer unless being analyzed. All samples being analyzed for NTA will have a corresponding extract aliquot for Ultra-shorts that must be stored and held until analysis is requested.

B.2.8. Sample Chain of Custody

Sampling staff will be responsible for coordinating the collection and transport of samples to Babcock Laboratory for analysis. Custody of all samples is documented and traceable from collection time to submittal to laboratory through a Chain of Custody (COC) form (Appendix E). The samples will be the responsibility of the field crew upon collection of the samples and any change in custody of the samples must be recorded on the COC with signatures of both the relinquishing party and receiving party, as well as the date and time the samples changed custody.

B.2.9. Sample Documentation, Retention and Disposal

Babcock Laboratory must maintain custody logs sufficient to track all samples submitted to the laboratory and analyze samples within prescribed holding times. Babcock laboratory will retain the samples for a minimum of 60 days unless otherwise instructed by the State Water Board. Sample extracts for EPA Method 533 must be archived indefinitely for possible NTA analysis and refrigerated until authorization for disposal has been received from the State Water Board. After the retention period, it is the responsibility of the laboratory to dispose of samples in accordance with federal, state, and local regulations.

B.3. ANALYTICAL METHODS

B.3.1 Targeted Analyses

All samples for this Project will be analyzed by Babcock Laboratories, Inc. PFAS analytes will be analyzed according to EPA Method 533[12], AOF-CIC, and IC-MS/MS Babcock Laboratories is accredited by the California Environmental Laboratory Accreditation Program (ELAP) to perform EPA Method 533 in drinking water matrices and is developing and validating a method for the analysis of organofluorine content by AOF-CIC.

B.3.2 Adding Scope to EPA Method 533

If additional PFAS analytes showing high relative abundance and occurrence are identified via NTA in the Project samples and the analytes are amenable to analysis using EPA Method 533, then they may be added to the Project as a separate analysis with the target PFAS list in EPA Method 533 performed as prescribed (no additional analytes will be added). Addition of target PFAS analytes shall conform to the following workflow:

1. Proposed expansions of the project target PFAS analyte list (i.e., the analyte list of EPA Method 533) must be approved by the Project Director before utilizing Project resources for method development and validation.
2. The Project laboratory must complete a method validation study to demonstrate that the identified PFAS analyte(s) can be measured using EPA Method 533 within the specified performance criteria of the method. The method validation study shall be consistent with method validation requirements in EPA's Protocol for the Evaluation of Alternate Test Procedures for Organic and Inorganic Analytes in Drinking Water[13].

[12] Method 533: Determination of Per- and Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry | US EPA
[13] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100MERX.txt

3. Method validation packages shall be submitted to Project Coordinators and QA Officer for review and approval prior to expanding the Project target analyte list.

B.3.3 Ultra-Short PFAS Analysis

To capture ultra-short chain PFAS, a small but exact aliquot of extract will be taken from the NTA extraction (SOP T-758-QSM-PFAS) prior to evaporation. This aliquot is approximately 5% of the NTA extract. Prior to extraction, an isotopically labeled TFA ($^{13}C_2$-TFA) and PFPrA ($^{13}C_3$-PFPrA) will be added to facilitate accurate quantitation of TFA and PFPrA. Targeted analytes will be detected using MS/MS except for PF6 which can only be analyzed using LC-SIM (Selected Ion Monitoring). This analysis is described in detail within Babcock Labs SOP T-765-PFAS by IC-MS/MS. If $^{13}C_2$-TFA or $^{13}C_3$-PFPrA recovers lower than 20%, results may be reported if the native analyte is present. The justification for this allowance is that the isotopologue response is highly correlated with the native analyte response and used for quantification.

B.3.4 Non-targeted Analyses

NTA processes were developed by Babcock Laboratories in coordination with Project Technical Advisors from the US EPA ORD. NTA processes used in this Project are consistent with the processes utilized in EPA's ROAR Program. Babcock will follow the standardized processes and workflows detailed in the lab's NTA SOP, T-764-NTA by HRMS. A summary of the NTA workflow is described below:

Samples will be extracted following SOP T-758-QSM-PFAS which is compliant with DoD QSM 5.3/Table B-15. Briefly, 250 mL of sample is extracted using a weak anion exchange SPE device and concentrated down to 2 mL In addition to the 24 isotopically labeled PFAS added to all samples prior to extraction, seven isotopically labeled PFAS will be added after extraction. Laboratory Control Samples and Matrix Spike/Matrix Spike Duplicate samples will be spiked with a suite of PFAS spanning the chemical space. The full tentative list of compounds is listed in Appendix H and is subject to change in coordination with the lab and the project coordinator. The table identifies compounds tentatively identified as system performance check (SPC) compounds.

Reverse-Phase Liquid Chromatography (RPLC) will be used to separate compounds within the extract and interfaced with a high-resolution mass spectrometer (HRMS). A moderate gradient for the mobile phase will be used over approximately 20 minutes to provide sufficient separation of unknown compounds. Data will be acquired in full scan with a minimum resolving power of 50,000, a m/z range of 100 to 1400, and using dual polarity switching for positive and negative electrospray ionization. Additionally, data-dependent MS/MS (ddMS2) will be acquired simultaneously using a threshold low enough to capture MS2 data on most spiked compounds. This threshold is also applied to unknown compounds. The collision energy used to acquire ddMS2 data will be stepped from 10 to 100eV to provide sufficient fragmentation coverage across the PFAS chemical space.

Mass spectrometry data obtained from the sample extracts will be processed using Compound Discoverer software (Thermo Fisher Scientific) to identify and characterize unknown compounds. The software can compare the mass spectral data to databases of known compounds or generate new identifications of unknown compounds based on spectral features.

Review, annotation, and rejection of features will be done as applicable by qualified staff with experience in interpreting high-resolution mass spectrometry data. In addition, R software will be used in combination with Compound Discoverer in a multiple stage filtering process with the goal of identifying the true features. After the filtering process the data will be restructured and exported to an excel file that will include key attributes of each feature like the confidence level and DSSToxID .

Criteria for Secondary Data: All chemicals and related data will be referenced to the DSSTox database, when available, to ensure mapping to, and availability of DTXSID identifiers for linking back to public resources (e.g., the Dashboard). Spectral data obtained by download, or provided for registration, will be accepted *as is* from the public resources, collaborators, and EPA scientists. Rigorous manual validation of the chemical identifiers and structures will be applied to ensure that the mapped PFAS substances (and associated structures) are correct.

B.4. QUALITY CONTROL (QC) REQUIREMENTS

B.4.1. Instrument Performance

Prior to the analysis of samples for this Project, the laboratory must demonstrate that instrument sensitivity, background levels, and calibration linearity and fit meet the performance needs of the Project.

To assess whether technology is performing as expected during NTA, mass error analysis of tracer compounds will be utilized. Average mass error for each individual tracer across batch should be less than or equal to 10ppm. If values exceed this threshold, a manual review will be conducted to determine sample data acceptability and the cause of initial threshold exceedance corrective action, such as redoing the mass calibration, will be taken if necessary.

B.4.2. Quality Control (QC) Samples

The QC samples that are collected, prepared, and analyzed in this Project include field blanks, method blanks, field duplicate samples, laboratory control spikes, matrix spike, and matrix spike duplicate samples. Refer to Table 9 for frequency and acceptance criteria information for this Project. QC samples collected and prepared for this Project will be analyzed using all three method approaches.

B.4.2.1. Field Reagent Blanks

To assess the potential PFAS cross-contamination introduced during the sampling process, field reagent blanks must be collected. Field reagent blanks are prepared by utilizing a sample container holding only the preservative and another filled by the laboratory with PFAS-free water brought to the site with the other sampling supplies. Sampling containers should be labeled according to the specifications detailed in Section B.2.7.1. At the sample site, the sampler will create the field reagent blank by opening the container with the unpreserved PFAS-free water and pouring it into the preserved sample container. After collection, the field reagent blank shall be placed in the ice chest used to store and transport samples. The number and size of sample bottles for a field reagent blank for each planned analysis is provided in Appendix G.

B.4.2.2. Field Duplicates

Field duplicates are to be collected in the same manner as field samples. A separate field duplicate must be collected for each targeted method in this Project (EPA Method 533 and organofluorine content method). The containers utilized for the collection of field duplicates should be appropriately labeled in accordance with the specifications outlined in Section B.2.7.1. The number and size of sample bottles for a field duplicate sample for each planned analysis is provided in Appendix G.

B.4.2.3. Method Blanks

The laboratory will prepare method blanks using PFAS-free, laboratory water. Method blanks shall go through all preparation and processing steps of the analytical method. Method blanks shall meet the acceptance criteria highlighted in Table 9. If method blanks exhibit contamination above acceptance criteria, then analyses must be halted, and a corrective action process initiated to address the contamination problem. Analysis of samples cannot proceed unless the contamination issue has been addressed.

B.4.2.4. Laboratory Control Spikes

Laboratory control spike samples are to be prepared consistent with the laboratory SOP. The spike concentration of lab controls spikes shall be at a concentration at or below the mid-point of the calibration.

B.4.2.5 Matrix Spike and Matrix Spike Duplicate Samples

Extra sample volume must be collected at a site location for the matrix spike and matrix spike duplicate samples. A separate container shall be collected for each targeted method in this Project. The spike concentration of matrix spike and matrix spike duplicate samples shall be at a concentration at or below the mid-point of the calibration. The number and size of sample bottles for a matrix spike and matrix spike duplicate sample for each planned analysis is provided in Appendix G.

B.4.2.6. Reagent Source Water

Water used to collect field reagent blanks must be analyzed for background target analytes prior to transferring in the field. Reagent source water must be free of target analytes which are set at a level below the reporting limit. For EPA Method 533, this level is set by the reference method at 1/3 the reporting limit. For the IC-MS/MS method, the highest background level allowed is set at ½ the target reporting limits. The reporting limit for this analysis may need to be raised if background levels of ultra-short PFAS cannot be maintained below ½ the target reporting limit set in Table 4.

B.4.3. Frequency of QC Samples

Field blanks, field duplicates, and containers for matrix spike samples will be collected at a frequency of 1 per 20 well locations at a minimum. Additional samples may be collected to confirm that the laboratory has enough samples to meet this criterion.

Detailed information regarding the frequency of continuing calibration verification samples, method blanks, isotope dilution analogues, non-extracted internal standards, and lab control spikes, and matrix spikes samples, as well as acceptance criteria are described in Table 9. EPA Method 533 requires non-extracted internal standards Instrument Performance Standards (IPS).

Table 9: Quality Control Samples and Frequency for Project

Sample Type	Frequency	Acceptance Criteria	Purpose
FIELD QUALITY CONTROL			
Field Blank	1 per 20 field samples; minimum once per sampling event[1]	AOF-CIC: < MRL LC-HRMS: Analyte Ratio IC-MS/MS: < MRL	Evaluation of contamination from sampling activities and sampling site
Field Blank	1 per well	533: < MRL	Evaluation of contamination from sampling activities and sampling site
Field Duplicate	1 per 20 field samples; minimum once per sampling event	533: RPD ≤ 30 % (≤ 50% if analyte concentration ≤ 2x the MRL). AOF-CIC: RPD ≤ 20 % LC-HRMS: NA IC-MS/MS: RPD ≤ 50 %	Assess reproducibility of sampling activities
LABORATORY QUALITY CONTROL			
Continuing Calibration Verification (CCV) Samples – NOT NTA ANALYSIS	Beginning, middle, and end of analytical batch	533: 50–150% if analyte ≤ MRL, 70–130% > MRL AOF-CIC: 80 – 120% IC-MS/MS: 70-130 %	Evaluation of stability of instrument across batches/Instrument drift

Sample Type	Frequency	Acceptance Criteria	Purpose
Isotope Dilution Analogues (IDA)[2] – NOT FOR AOF-CIC ANALYSIS	Every sample extract	533: 50-200 % recovery of IDA LC-HRMS: 100% identification of IDA compounds IC-MS/MS: >20%	Assess matrix effects of sample on extraction.
Non-Extracted Internal Standard (NIS or IPS) - NOT FOR AOF-CIC and IC-MS/MS ANALYSIS	Every sample extract	533 (IPS): 50-150 % recovery of IS LC-HRMS(NIS): 100% identification of reference compounds	Assess matrix effects of extract on instrumental analysis
Method Blank	533: 1 per analytical batch[3] AOF-CIC: 2 per analytical batch LC-HRMS: 2 per analytical batch IC-MS/MS: 2 per analytical batch	533 & AOF-CIC: < 1/3 MRL IC-MS/MS: < MRL LC-HRMS: Analyte Ratio	Evaluation of contamination from sample preparation / establish sample background
Laboratory Control Spike	1 per analytical batch	533: 50-150 % AOF-CIC: 70-130 % IC-MS/MS: 50-150 % LC-HRMS: 100% identification of SPC compounds	533, AOF-CIC, IC-MS/MS: Accuracy of Analysis LC-HRMS: Accurate identification of spiked standards in reagent water, validation of LC-MS method
Matrix Spike & Matrix Spike Duplicate (Accuracy)	1 per analytical batch	533: 50-150 % if analyte concentration ≤ 2x the MRL; 70-130% if analyte concentration > 2x MRL AOF-CIC: 50-150% IC-MS/MS: 40-150 % LC-HRMS: 100% identification of SPC compounds	533, AOF-CIC, IC-MS/MS: Matrix Interference/ Accuracy of Analysis LC-HRMS: Accurate identification of spiked standards in samples, validation of LC-MS method
Matrix Spike Duplicate (Precision)	1 per analytical batch	533: RPD ≤ 30 % (≤ 50% if analyte concentration ≤ 2x the MRL). AOF-CIC: RPD < 20% IC-MS/MS: <50% LC-HRMS: 100% identification of SPC compounds	533, AOF-CIC, IC-MS/MS: Precision of Analysis LC-HRMS: Reproducibility for the identification of spiked standards, validation of LC-MS method

Sample Type	Frequency	Acceptance Criteria	Purpose
Reagent Source Water	1 per lot date	IC-MS/MS: 100% identification of reference compounds	Evaluation of contamination from source water / establish background
NTA SPECIFIC QUALITY CONTROL			
Technical Replication of Field Samples	Triplicate injections of all batch extracts/standards	Identified Features must be present in 2/3 injections. %CV must be <125% Identified Tracers must be present in 2/3 injections.	Assess reproducibility of feature detection / Minimize false positive/negatives
PFAS Batch Verification Sample[4]	Beginning, middle, and end of analytical batch of 20 field samples	100% identification SPC compounds	Evaluation of stability of instrument across batches/Instrument drift
Matrix Matched Calibration	Minimum once during the study OR after major instrument maintenance	For Future Use (ie: qNTA)	Assess matrix effects of analytes across concentration ranges

[1] Analysis of these QC samples are required for the Project and not contingent upon PFAS analyte concentrations in the field samples as directed in EPA Method 533.
[2] Isotope Dilution Analogues are also referred to as Extractable Internal Standards.
[3] An analytical batch contains up to 20 field samples; field and laboratory QC samples are not included in the field sample count.
[4] This is a CCV-equivalent sample that contains additional PFAS analytes beyond those that are measured in EPA Method 533.

Calibration of analytes will be performed in accordance with the laboratory's QA Manual which includes a calibration point at the Reporting limit. For IC-MS/MS method, while there is no strict requirement for Isotope Dilution Analog (IDA) Recovery, non-detect results must be qualified (NISm) when the IDA is below 20%. Preliminary control limits for accuracy in a matrix sample will be 50-150% and can be evaluated to determine statistically derived control limits once enough data is available and on an individual analyte basis.

B.4.4. QC Sample Calculations

B.4.4.1. Precision

Precision in this Project is assessed based on the relative percent difference (RPD) between the measured concentrations in a parent sample and an associated duplicate. This includes RPD calculations between the concentrations measured in a field sample and field duplicate airs and matrix spike and matrix spike duplicate sample pairs, The RPD is calculate as follows:

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

Where:

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

B.4.4.2. Accuracy

Accuracy will be assessed using the percent recovery measured in laboratory control spike samples and matrix spike samples. The percent recovery for the laboratory control spike samples are calculated as follows:

$$\%\ Recovery = \left(\frac{V_{LBF}}{V_{spike}}\right) \times 100$$

Where:

V_{LBF}= The measured concentration of the laboratory control sample
V_{spike}= The spike concentration

The percent recovery for the matrix spikes samples are calculated as follows:

$$\%\ Recovery = \left(\frac{V_{MS} - V_s}{V_{spike}}\right) \times 100$$

Where:

V_{MS}= The measured concentration of the matrix spike sample
V_{spike}= The spike concentration
V_S= The measured concentration of the parent (unspiked) sample

B.4.4.3. Completeness

Completeness in this project should be calculated as follows:

$$\%\ Completeness = \frac{Usable\ Data}{Total\ Data\ generated} \times 100$$

B.5. INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

B.5.1 Field Equipment

Sample collection will be conducted by the contractor of OWP. This contractor is responsible for testing, inspecting, and maintaining all field equipment according to manufacturer specifications. In the event of filed equipment failure, the source of the failure must be identified and rectified prior to sampling samples. If possible, back-up

field equipment shall be brought by the sampling crew to minimize loss of field data during sampling events. Any field equipment that fails to meet the calibration criteria must be recalibrated or replaced prior to use.

For this project, a multiparameter meter equipped with sensors for pH, conductivity, temperature, and turbidity is being used to collect readings during the purging of the well (refer to Section B.2.5). Refer to the manufacturer's recommendations for cleaning the probe. Any rinsate water can be disposed of in the same area as the discharge water from the well.

B.5.1 Laboratory Instrumentation

Laboratory instrumentation is maintained by a qualified technician. Routine preventative maintenance is conducted to minimize the occurrence of instrument failure and other systems malfunctions. Babcock Laboratories is responsible for testing, inspecting, and maintaining all analytical instrumentation according to manufacturer specifications. Frequency and procedures for maintenance of analytical instrumentation shall be documented in accordance with the laboratory's Quality Assurance Manual. In the event of instrumentation failure, the source of the failure must be identified and rectified, the equipment must be recalibrated, and any samples analyzed outside of calibration limits must be reanalyzed.

B.6. INSTRUMENT/EQUIPMENT CALIBRATION

B.6.1 Field Equipment Calibration

Equipment must be calibrated before sampling at the beginning of the day before sampling. The field crews must follow calibration procedures according to manufacturer specifications.

B.6.2 Laboratory Instrument Calibration

Babcock Laboratories is responsible for calibrating all laboratory equipment according to manufacturer specifications. Records of pre and post calibration results are logged and maintained by the laboratory. Calibration records shall be made available to the State Water Board upon request. If instrument maintenance has been performed, the instrument must be recalibrated. Information regarding calibration verifications can be described in Table 9.

B.7. INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

Integrity and consumables, standards reagents, and analytical supplies are the responsibility of Babcock Laboratories. Consumables are rejected for use if obvious signs of contamination or tampering exist. Standards must be NIST traceable, or

standards must be prepared using Certified American Chemical Society reagent grade chemicals appropriate to the specific analytical equipment.

B.8. NON-DIRECT MEASUREMENTS

No secondary/existing data will be used for this Project.

B.9. DATA MANAGEMENT

This section describes the steps in managing generated and collected data during the execution of this project. The purpose is to show the data management life cycle, consisting of these elements:

- The handling of field entry data and analytical data during and after the project.
- What types of data will be collected, processed, or generated.
- What methodology and standards can be applied.
- The accessibility of the data (shared/internal).
- Where the data will be stored during and after conclusion of the project.

The types of data collected for this project include sample forms, sample Chain of Custody forms, analytical data packages from the laboratory, and consolidated target and NTA data worksheets. A process flow diagram for the field and analytical electronic data is provided in Figure 3.

B.9.1 Data Entry Methods

Submission of data will occur by: 1) form entry, and 2) batch loading. Once loaded, these data will reside in the database. Completeness checks will be accomplished in part by comparing the loaded data with the Work Order. Projects are considered complete when all results are entered in the database for a specific sample standard operating procedure.

The draft data is then verified for quality assurance checks. Once this process has been completed the data is certified complete and will be transferred to the permanent side of the database. The data is now considered “final” data.

B.9.2 Well Data

As part of the planning portion of this project, data was queried from the Division of Drinking Water’s data systems to identify public water systems that are designated as SDAC and DAC along with their associated wells that are active or on standby mode. Other information included in this query includes name of regulatory agency, location of well, PWS population, number of service connections, well name, available well construction (diameter, top of screen, screen length), elevation, and other tracking information (Appendix I). Periodic updates of this data could occur during this project as information from the public water system is gathered.

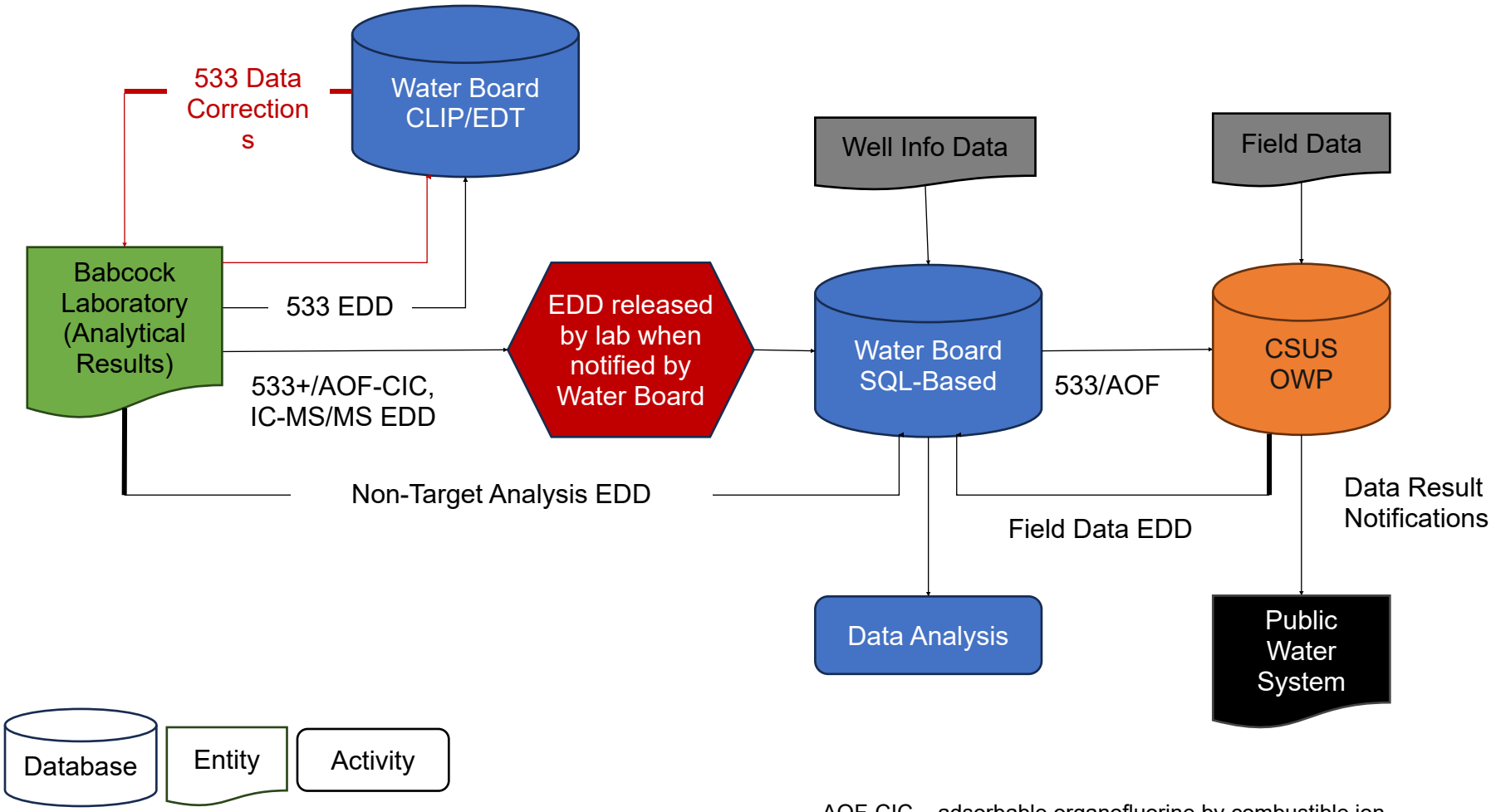


Figure 3. Field and Analytical Electronic Data Process Flow

AOF-CIC – adsorbable organofluorine by combustible ion chromatography
IC-MS/MS – Ion chromatography tandem mass spectrometry
CLIP/EDT - California Laboratory Intake/Electronic Data Transfer Process
CSUS OWP – Office of Water Programs at California State University, Sacramento

B.9.2 Daily Field Checklist and Field Data Entry

The daily field checklist (Appendix C) and the Sample Field Form (Appendix D) will be used by the sampling crew to document preparedness for that day of sampling activities and information regarding the site location, date, and time of sampling, as well as any other relevant information regarding the specific sampling event and the site. One checklist will be prepared each day and one sampling field data will be completed form per well.

The data from the checklist and the sampling field form will be entered into OWP website and then will be compiled into a flat file for batch upload to the Water Boards SQL database. Field crews will check the entered data for typos and errors. Original field sheets will be retained in a logbook.

B.9.3 Electronic Data

Electronic data will be stored on a Water Boards network drive. All data generated will be maintained by the State Water Board until the completion of the project. Upon completion, data will be retained in accordance with Water Boards' record management policy along with other supporting data and related correspondence. Printed data will be referenced in research notebooks, signed, and dated.

B.9.4 Analytical Data

Analyst notes will be recorded in laboratory notebooks, worksheets, or equivalent documentation procedures. These notes may include procedure details, sample processing information and any method deviations. These entries will give a full and complete understanding of sample processing throughout the method procedure. Data from the analyses will be recorded in the instruments and transmitted to the Laboratory Information Management System (LIMS) or converted into a flat file for review and validation.

Analytical data will be submitted by analytical batch to the Water Boards and stored in the SQL-based database for this project.

B.9.5 Submitting Data – Data Uploads

B.9.5.1 Field Data Submittals

Field data forms will be emailed to the State Water Board in PDF format by the State Water Board's technical assistance contractor, OWP. OWP will also compile field data entries into one consolidated Microsoft Excel file for submittal to the State Water Board to be used in the data analysis. Data entered on the field forms will be entered into OWP's platform. A resultant EDD of this information will be provided to State Water Board. The field names with descriptions to be included in the EDD from the field form data is provided in Appendix J.

B.9.5.1 Analytical Data Submittals – EDD

Babcock Laboratories will provide Excel files to the Water Board in the form of EDDs. EDD data dictionaries for sample analyses will include EPA Method 533 (Appendix K), EPA Method 533+, AOF-CIC, and IC-MS/MS (Appendix L) and NTA (Appendix M). Each data dictionary provides a list of field names, definitions, and requirements of that element for use in a relational database. Additional specifics for the use of specialized software for the submittal of the EPA Method 533 data are provided below.

The EDD data format received by CLIP is limited to essential fields for reporting results. Additional data fields will be submitted by Babcock Lab in a separate flat file, referred to in Figure 3 as "533+" to supplement QA/QC information (e.g., recovery) (EDD Data Dictionary provided in Appendix L). The AOF-CIC data will be in the same format as the 533+ EDD.

B.9.5.1.1 CLIP for EPA Method 533

State Water Board DDW's California Laboratory Intake Portal (CLIP)[14] is single point of access for laboratories for drinking water quality data reporting requirements. CLIP includes data validation while ensuring quality control elements; this allows laboratories to demonstrate submission of data with known and documented quality. The analytical laboratory will upload EPA Method 533 results into CLIP.

CLIP quality control checker will be assessing each EDD for out of compliance issues. Any data issues will be resolved with the lab and the EDD re-uploaded into CLIP. Not until that data is approved by the system and by DDW staff is the EPA Method 533 data released and accepted into the Project's database.

CLIP software, instructions, reference values, example files, technical documentation, and forms can be accessed at the State Water Board's webpage for CLIP at https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/clip.html. This webpage will be frequently updated as needed and will be the source of the latest files for CLIP.

Data is uploading using the EDT (Electronic Data Transfer) process in accordance with Section 64469 of Title 22 of the California Code of Regulations. As such, analytical results must be reported no later than the 10th day of the month following the month in which laboratory analysis was completed in.

B.9.5.2 Analytical Data Submittals – PDF Reports

Laboratory analytical reporting shall include communication of results via e-mail to the State Water Board. A standard Level 2 Laboratory Report will be submitted, as outlined

[14] https://earthsoft.com/products/edp/edp-format-for-caswrcb-ddw/

below, in PDF format for target analysis.

a) Case narrative
b) Requestor
c) Project Code/Region
d) COC form
e) Sample ID/number
f) Date and time samples were collected
g) Date and time samples were received by the laboratory
h) Analytical, extraction/preparation methods (include United States Environmental Protection Agency or Standard Method numbers where applicable)
i) Analytical results for all laboratory determinations
j) Dilution factors, if used
k) Sample matrix and fraction (total or dissolved)
l) Date and time samples were prepared/extracted and analyzed
m) Names and initials of analysts
n) Analytical results (including detections between the Reporting Limit [RL] and Method Detection Limit [MDL])
o) RL and MDL
p) Quality Control Samples and results:
    - Method Blank
    - Laboratory Control Sample (LCS)
    - Laboratory Control Duplicate
    - Matrix Spike (MS) & Duplicate (MSD), where appropriate
    - Sample Replicate, where appropriate
    - Field Quality Control Samples (when included)
q) Quality Control Performance Criteria
r) Result qualifiers/flags and definitions (where applicable)
s) Discussion of any deviations from approved methods
t) Subcontractor laboratory reports (when applicable).

B.9.6 Data Modification

After the data has been uploaded into the database, the data can be modified only by these parties.

- The ELAP certified laboratory (who submitted the original data).
- The Project chemistry reviewer, QA Manager, or Project Manager for approval of requested changes.
- The database gatekeeper(s) to make the approved changes to the database.

B.9.6.1 Data Modification Process

The data modification process includes these steps.

1) **Identification of Error** - The data error can be identified by any party (the lab, district/LPA, ELAP, etc.), but the data modification request will have to be performed by the laboratory that submitted the erroneous data.
2) **Data Modification Request Form(s)** - The data modification request must include:
    a. Documentation of the original errors as well as the new data.
    b. The request must be signed by authorized laboratory personnel (preferably the lab manager) and must be accompanied by electronic copies of lab reports.
3) **Error Types** - Data modification may be necessary if the EDD had a valid file structure with valid field codes, but the field codes are incorrect due to issues with:
    a. Incorrect labeling or assignment of data fields or typographical errors
    b. Problems with Lab Methodology/Procedure or Lab Instrumentation
4) **Laboratory will send request to the appropriate approver**. The type of error will dictate where to route the request.
5) **Approver (Project chemistry reviewer, QA Manager, or Project Manager) will forward to the database gatekeeper(s) for changes to the database**. Upon completion of the request, a confirmation email will be sent to the requesting laboratory and all involved parties (ELAP, District/LPAs).

C. ASSESSMENT AND OVERSIGHT

C.1. ASSESSMENT

Quality assurance review will be performed by the laboratory manager or designee and by the Water Boards' QA officer. The quality of data will be reviewed routinely to determine if field or analytical changes are necessary to improve data quality. The project manager and technical adviser will assess problems that arise in the field and if necessary, modifications to technical procedures may be considered. Babcock laboratory will perform self-audits and institute corrective actions in accordance with their respective written records. Babcock laboratory must inform the project manager any time logistical and analytical issues arise that may affect the quality of the data.

C.2. REPORTS TO MANAGEMENT

Personnel involved in these tasks may encounter unforeseen issues at any time. It is important that staff report issues to the project manager when they are identified. The project manager will meet with team members as needed to discuss project status and take corrective action. The project manager is responsible for collating data and ensuring validation is performed on data received from all sources. The project manager is also responsible for contacting the analytical laboratory if there are problems with data quality or completeness in the data received and resolving any recurring data problems. If project resolutions require changes to approved documents, the project director will be contacted, and the appropriate actions will be taken to have changes approved.

Model Appropriateness (Soundness): Any modeling used for interpretation of NTA results, or data reduction of raw data, will adhere to peer reviewed approaches and controls appropriate for validating the modeling performed (e.g., cross-validation of models) and quality assurance procedures should be included with the results.

D. DATA VALIDATION AND USABILITY

D.1. DATA REVIEW, VALIDATION AND USABILITY

Data provided by the contract laboratory will be reviewed against the acceptance criteria outlined in Section B.4. of this QAPP. The Water Boards' QA officer will review any data that fails the stated quality objectives and make final determinations as to the acceptability and usability of the data. The decision to accept or reject data will be based on the impact of the data quality failure.

D.2. VERIFICATION AND VALIDATION METHODS

Data verification is essential to ensure that analytical information is complete and accurate for all samples analyzed in the laboratory. The data verification in this project

is performed in two steps. The first review is performed by the primary analyst upon completion of each analytical run. The reviewer will verify the raw data to ensure that all quality control parameters fall within acceptance limits and will check for calculation errors and inconsistencies. The QA/QC is reviewed as follows:

- Verifying calibration compliance with the project criteria,
- Verifying if quality control parameters were analyzed at a proper frequency and results were within acceptance criteria,
- Checking if holding times were met and reporting units and quantitation limits are correct,
- Checking if all project and quality control sample results were properly reported and flagged,
- Checking if any corrective action was performed, and control re-established and documented before restarting analysis.

Babcock Laboratories is responsible for the reduction of the raw data generated by the analytical instrument to a format determined by agreement between the laboratory and the State Water Board. Completeness checks will begin with an accuracy check between the Work Order and the loaded data. The first step will be in draft form and ready for the next step when all results for a specific sample are entered in the database. Quality assurance checks of the draft data will then be performed. Once this process has been completed the data is certified complete and will be transferred to the permanent side of the database. The data will then be considered “final” data. The primary analyst should verify if data transfer is made accurately and completely once the chemical measurement data has been exported.

After this first review, the laboratory manager or designee reviews the project data to check that data is consistent with project requirements, verify that all samples were analyzed and to verify that no anomalies associated with the transport and receipt of samples exists. The laboratory manager or designee may assign data validation qualifiers during the review of the chemical analytical data if the data does not meet data quality objectives of the project. A list of data validation qualifiers is provided in Appendix N.

D.3. RECONCILIATION WITH PROJECT REQUIREMENTS

Chemical analyses of all samples collected in this project will be summarized in a final report that will provide information regarding the range of PFAS analytes levels as well as Total PFAS found in the samples. Further details regarding the exact report format will be determined by the project team.

E. REFERENCES

Department of Defense (DoD) and Department of Energy (DOE). 2009. Consolidated Quality Systems Manual (QSM) for Environmental Laboratories. Available at: https://www.denix.osd.mil/edqw/denix-files/sites/43/2019/05/QSM-Version-5.3-FINAL.pdf (Access Date1/4/2024)

USEPA. 2002. Guidance for Quality Assurance project Plans (EPA QA/G5). Available at: https://www.epa.gov/sites/default/files/2015-06/documents/g5-final.pdf (Access Date 1/4/2024)

USEPA. 2015. Protocol for the Evaluation of Alternate Test Procedures for Organic and Inorganic Analytes in Drinking Water. Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100MERX.txt (Access date 1/4/2024)

USEPA. 2018. Method 537.1: Determination of Selected Per- and Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS). Available at: https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=343042&Lab=NERL (Access date 1/4/2024)

USEPA. 2019. Method 533: Determination of Per- and Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry. Available at: https://www.epa.gov/dwanalyticalmethods/method-533-determination-and-polyfluoroalkyl-substances-drinking-water-isotope (Access date 1/4/24)

Schymanski, E.L., J. Jeon, R Gulde, K. Fenner, M. ruff, H.P. Singer, J. Hollender. Identifying small molecules via high resolution mass spectrometry: communicating confidence. Env. Sci. Tech. 2014, 48,2097-2098. https://doi.org/10.1021/es5002105

State Water Resources Control Board. 2022. Drinking Water Sample Collection Guidance for Per and Poly-Fluoroalkyl Substances (PFAS). Available at: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/pfos_and_pfoa/ddw-pfas-sampling-guidance-nov-2022.pdf (Access Date 1/4/2024)

State Water Resources Control Board. 2024. Broad-Spectrum Per- and Polyfluoroalkyl Substances (PFAS) Method Comparison Study Results and Selection of Broad-Spectrum Methods to Support Statewide Monitoring for the Class of PFAS. March 29, 2024.

APPENDIX A: PRE-SELECTED WELLS FOR NTA AND ULTRA-SHORT PFAS ANALYSIS

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA0103041_001_001	CA0103041	TRAILER HAVEN MOBILE HOME PARK	WELL 01	ALAMEDA
CA0210002_002_002	CA0210002	KIRKWOOD MEADOWS PUBLIC UTILITY DISTRICT	WELL 02 - RAW	ALPINE
CA0210002_005_005	CA0210002	KIRKWOOD MEADOWS PUBLIC UTILITY DISTRICT	WELL 03R - RAW	ALPINE
CA0210002_006_006	CA0210002	KIRKWOOD MEADOWS PUBLIC UTILITY DISTRICT	WELL 04 - RAW	ALPINE
CA0210002_007_007	CA0210002	KIRKWOOD MEADOWS PUBLIC UTILITY DISTRICT	WELL 05 - RAW	ALPINE
CA0202522_001_001	CA0202522	SIERRA PINES MOBILE HOME PARK	WELL 01	ALPINE
CA0310019_001_001	CA0310019	AWA LA MEL HEIGHTS #3	WELL NO. 01 - RAW	AMADOR
CA0310019_003_003	CA0310019	AWA LA MEL HEIGHTS #3	WELL NO. 02 - RAW	AMADOR
CA0300019_003_003	CA0300019	FIDDLETOWN COMMUNITY SERVICE	FIDDLETOWN CSD WELL 02	AMADOR
CA0310004_005_005	CA0310004	PLYMOUTH, CITY OF	HAWKSVIEW WELL - STANDBY	AMADOR
CA0310006_009_009	CA0310006	RIVER PINES PUD	WELL 06R - REPLACEMENT	AMADOR
CA0300016_001_001	CA0300016	VOLCANO COMMUNITY SERVICE DIST	VOLCANO CSD WELL 01	AMADOR
CA0400016_002_002	CA0400016	BERRY CREEK COMMUNITY SERVICE DIST	WELL #2	BUTTE
CA0400016_003_003	CA0400016	BERRY CREEK COMMUNITY SERVICE DIST	WELL #3	BUTTE
CA0409181_002_002	CA0409181	BLUE OAK TERRACE MUTUAL	WELL 002	BUTTE
CA0410001_004_004	CA0410001	CITY OF BIGGS	WELL 03 - HENRY	BUTTE
CA0410004_003_003	CA0410004	CITY OF GRIDLEY	SPRUCE ST. WELL	BUTTE
CA0405001_007_007	CA0405001	DEL ORO WATER CO.-LIME SADDLE MARINA	WELL 01	BUTTE
CA0410009_002_002	CA0410009	DEL ORO WATER CO.-MAGALIA	WELL 01 - INDIAN	BUTTE
CA0410011_005_005	CA0410011	DEL ORO WATER CO.-PARADISE PINES	WELL 04	BUTTE
CA0400023_001_001	CA0400023	GOLDEN OAKS MOBILE ESTATES	ONLY WELL	BUTTE
CA0400026_001_001	CA0400026	MEADOWBROOK OAKS	ONLY WELL	BUTTE
CA0410007_004_004	CA0410007	PARADISE IRRIGATION DISTRICT	WELL AT D TANK	BUTTE
CA0500068_002_002	CA0500068	DUNROVIN MOBILE HOME VILLAGE	WELL 02 - BIG WELL	CALAVERAS

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA0500075_004_004	CA0500075	LAKESIDE MOBILE ESTATES	WELL 04 - PRIMARY WELL	CALAVERAS
CA0500027_001_001	CA0500027	LILI VALLEY WATER CO.	WELL 01	CALAVERAS
CA0500027_002_002	CA0500027	LILI VALLEY WATER CO.	WELL 02	CALAVERAS
CA0500019_003_003	CA0500019	MINERAL MOUNTAIN MUTUAL WATER	WELL 03	CALAVERAS
CA0500091_001_001	CA0500091	RITE OF PASSAGE/SIERRA RIDGE	WELL 01 - PRODUCTION WELL	CALAVERAS
CA0610001_002_002	CA0610001	ARBUCKLE PUBLIC UTILITY DISTRICT	WELL 02	COLUSA
CA0610001_004_004	CA0610001	ARBUCKLE PUBLIC UTILITY DISTRICT	WELL 03A	COLUSA
CA0610002_002_002	CA0610002	CITY OF COLUSA	WELL 02 - 8TH & WEBSTER	COLUSA
CA0600012_012_012	CA0600012	COLUSA CO. SERVICE AREA #1-CENTURY RANCH	WELL 07 - RAW	COLUSA
CA0600013_001_001	CA0600013	COLUSA CO. WWD #2 - PRINCETON	WELL 01	COLUSA
CA0600013_002_002	CA0600013	COLUSA CO. WWD #2 - PRINCETON	WELL 02	COLUSA
CA0610003_003_003	CA0610003	MAXWELL PUBLIC UTILITY DISTRICT	WELL 04	COLUSA
CA0707588_002_002	CA0707588	BIG OAK MOBILE HOME PARK WATER	WELLHEAD- EAST WELL	CONTRA COSTA
CA0707594_001_001	CA0707594	CASA MEDANOS WATER SYSTEM	WELL HEAD	CONTRA COSTA
CA0707573_001_001	CA0707573	DELTA MUTUAL WATER COMPANY	EAST WELL	CONTRA COSTA
CA0707547_001_001	CA0707547	KNIGHTSEN COMMUNITY WATER SYSTEM	WELL HEAD	CONTRA COSTA
CA0707577_001_001	CA0707577	RIVERVIEW WATER ASSOCIATION	WELL 1 BEACON HARBOR	CONTRA COSTA
CA0707577_002_002	CA0707577	RIVERVIEW WATER ASSOCIATION	WELL 2 END OF WILLOW RD	CONTRA COSTA
CA0707597_001_001	CA0707597	SANDY POINT MOBILE HOME PARK	WELL HEAD	CONTRA COSTA
CA0800552_002_002	CA0800552	NORTHCREST TRAILER CITY	NEW SECTION WELL - REPRESENTS OLD & NEW	DEL NORTE
CA0800526_001_001	CA0800526	REDWOOD PARK C.S.D.	WELL 01 XCLD	DEL NORTE
CA0800526_003_003	CA0800526	REDWOOD PARK C.S.D.	WELL 03 - OUTSIDE - REPRESENTATIVE	DEL NORTE
CA0810002_001_001	CA0810002	SMITH RIVER C.S.D.	WELL 01 XCLD	DEL NORTE
CA0810002_002_002	CA0810002	SMITH RIVER C.S.D.	WELL 02	DEL NORTE
CA0810002_003_003	CA0810002	SMITH RIVER C.S.D.	WELL 03 XCLD	DEL NORTE
CA0810002_004_004	CA0810002	SMITH RIVER C.S.D.	WELL 04 XCLD	DEL NORTE
CA0901217_003_003	CA0901217	BEAR STATE WATER WORKS	WELL 2-DENNEY PARCEL	EL DORADO

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA0900112_001_001	CA0900112	CANDLELIGHT VILLAGE MUTUAL WATER CO.	WELL 1 = 16 GPM	EL DORADO
CA0900112_002_002	CA0900112	CANDLELIGHT VILLAGE MUTUAL WATER CO.	WELL 2 = 10 GPM	EL DORADO
CA0900112_003_003	CA0900112	CANDLELIGHT VILLAGE MUTUAL WATER CO.	WELL 3 = 10.5 GPM	EL DORADO
CA0910007_001_001	CA0910007	LUKINS BROTHERS WATER COMPANY	WELL 01	EL DORADO
CA0900404_001_001	CA0900404	OAKLANE MOBILE VILLAGE, LLC.	WELL	EL DORADO
CA1010001_007_007	CA1010001	BAKMAN WATER COMPANY	WELL 08 - BEFORE_GAC-DBCP & IX-NITRATE	FRESNO
CA1010001_011_011	CA1010001	BAKMAN WATER COMPANY	WELL 11	FRESNO
CA1010007_010_010	CA1010007	CITY OF FRESNO	WELL 205 RAW	FRESNO
CA1010007_017_017	CA1010007	CITY OF FRESNO	WELL 209 - RAW	FRESNO
CA1010007_057_057	CA1010007	CITY OF FRESNO	WELL 245 - RAW	FRESNO
CA1010007_072_072	CA1010007	CITY OF FRESNO	WELL 257 - RAW	FRESNO
CA1010007_136_136	CA1010007	CITY OF FRESNO	WELL 013A - RAW	FRESNO
CA1010007_160_160	CA1010007	CITY OF FRESNO	WELL 031A - RAW	FRESNO
CA1010007_167_167	CA1010007	CITY OF FRESNO	WELL 035A - RAW	FRESNO
CA1010007_178_178	CA1010007	CITY OF FRESNO	WELL 044A - RAW	FRESNO
CA1010007_212_212	CA1010007	CITY OF FRESNO	WELL 078 - RAW	FRESNO
CA1010007_223_223	CA1010007	CITY OF FRESNO	WELL 089A RAW	FRESNO
CA1010007_226_226	CA1010007	CITY OF FRESNO	WELL 092 - RAW	FRESNO
CA1010007_234_234	CA1010007	CITY OF FRESNO	WELL 100-1 - RAW	FRESNO
CA1010007_260_260	CA1010007	CITY OF FRESNO	WELL 130 - RAW	FRESNO
CA1010007_274_274	CA1010007	CITY OF FRESNO	WELL 147 - RAW	FRESNO
CA1010007_282_282	CA1010007	CITY OF FRESNO	WELL 148-1 (RAW)	FRESNO
CA1010007_293_293	CA1010007	CITY OF FRESNO	WELL 153-2 INF	FRESNO
CA1010007_310_310	CA1010007	CITY OF FRESNO	WELL 289-2 INF	FRESNO
CA1010007_325_325	CA1010007	CITY OF FRESNO	WELL 176 - RAW	FRESNO
CA1010007_335_335	CA1010007	CITY OF FRESNO	WELL 192 - RAW	FRESNO
CA1010007_344_344	CA1010007	CITY OF FRESNO	WELL 169 - RAW	FRESNO
CA1010007_345_345	CA1010007	CITY OF FRESNO	WELL 181 - RAW	FRESNO
CA1010007_349_349	CA1010007	CITY OF FRESNO	WELL 180-2 - INF	FRESNO
CA1010007_356_356	CA1010007	CITY OF FRESNO	WELL 199 - RAW	FRESNO
CA1010007_392_392	CA1010007	CITY OF FRESNO	WELL 171-2 RAW	FRESNO
CA1010007_395_395	CA1010007	CITY OF FRESNO	WELL 145 - RAW	FRESNO
CA1010007_596_596	CA1010007	CITY OF FRESNO	WELL 069A - RAW	FRESNO
CA1010007_642_642	CA1010007	CITY OF FRESNO	WELL 327 - RAW	FRESNO
CA1010025_012_012	CA1010025	CITY OF PARLIER	WELL 09A - RAW	FRESNO
CA1010029_007_007	CA1010029	CITY OF SANGER	WELL 06 - RAW	FRESNO
CA1010024_023_023	CA1010024	CWS - SELMA	WELL 20-01 - RAW	FRESNO
CA1010035_004_004	CA1010035	DEL REY COMMUNITY SERV DIST	WELL 04	FRESNO
CA1010035_007_007	CA1010035	DEL REY COMMUNITY SERV DIST	WELL 07 - SRF WELL	FRESNO

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA1000021_002_002	CA1000021	FCSA #05/WILDWOOD ISLAND	FSCA #5 WELL 02 - RAW	FRESNO
CA1010013_004_004	CA1010013	HUME LAKE CHRISTIAN CAMPS, INC	WELL 03 - RAW - ACTIVATED FEB 2007	FRESNO
CA1010013_006_006	CA1010013	HUME LAKE CHRISTIAN CAMPS, INC	WELL 05 - ACTIVE RAW	FRESNO
CA1010018_017_017	CA1010018	KERMAN, CITY OF	WELL 17 - RAW	FRESNO
CA1000063_003_003	CA1000063	NEW AUBERRY WATER ASSOCIATION	WELL 03 - SOUTH WELL - RAW	FRESNO
CA1010026_006_006	CA1010026	PINEDALE COUNTY WATER DISTRICT	WELL 06 - RAW	FRESNO
CA1010027_008_008	CA1010027	REEDLEY, CITY OF	WELL 06A - RAW	FRESNO
CA1010027_025_025	CA1010027	REEDLEY, CITY OF	WELL14 - BEFORE TRT_GAC-123TCP-DBCP	FRESNO
CA1000075_001_001	CA1000075	TRACT 1199 WATER SYSTEM	WELL 01	FRESNO
CA1010030_009_009	CA1010030	TRANQUILLITY IRRIGATION DISTRICT	WELL A-11 - RAW	FRESNO
CA1000369_002_002	CA1000369	ZONNEVELD DAIRY - CEDAR	WELL 02 (CEDAR) - RAW	FRESNO
CA1100203_002_002	CA1100203	ARTOIS COMMUNITY S.D.	NORTH WELL	GLENN
CA1110002_001_001	CA1110002	CAL-WATER SERVICE CO.- HAMILTON CITY	WELL 01-01	GLENN
CA1110002_003_003	CA1110002	CAL-WATER SERVICE CO.- HAMILTON CITY	WELL 02-02	GLENN
CA1110003_003_003	CA1110003	CAL-WATER SERVICE CO.- WILLOWS	WELL 04-01	GLENN
CA1110003_005_005	CA1110003	CAL-WATER SERVICE CO.- WILLOWS	WELL 06-01 STANDBY RAW	GLENN
CA1110003_009_009	CA1110003	CAL-WATER SERVICE CO.- WILLOWS	WELL 10-01 STANDBY RAW	GLENN
CA1110001_005_005	CA1110001	CITY OF ORLAND	WELL 04 - WOODWARD AVE.	GLENN
CA1100413_002_002	CA1100413	COUNTRY LEISURE MOBILE ESTATES	WELL 02	GLENN
CA1200591_001_001	CA1200591	BIG LAGOON PARK WATER CO.	PARK WELL 01 - RAW	HUMBOLDT
CA1210006_010_010	CA1210006	FORTUNA, CITY OF	WELL 01B (NEW WELL) - RAW	HUMBOLDT
CA1210006_012_012	CA1210006	FORTUNA, CITY OF	WELL 05 - RAW	HUMBOLDT
CA1210013_007_007	CA1210013	HUMBOLDT BAY MWD	RANNEY WELL 02 - RAW	HUMBOLDT
CA1210009_006_006	CA1210009	HUMBOLDT C.S.D.	SPRUCE POINT WELL - RAW	HUMBOLDT
CA1210019_002_002	CA1210019	HYDESVILLE CO. W.D.	WELL 02 - RAW	HUMBOLDT
CA1210022_041_041	CA1210022	RESORT IMPROVEMENT DISTRICT #1	GREENBRIAR WELL	HUMBOLDT
CA1210012_004_004	CA1210012	RIO DELL, CITY OF	WELL #3 - RAW	HUMBOLDT
CA1200518_006_006	CA1200518	RIVERSIDE CSD	WELL 06 - RAW	HUMBOLDT
CA1210024_004_004	CA1210024	WESTHAVEN C.S.D.	4TH AVE WELL - RAW	HUMBOLDT

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA1300514_002_002	CA1300514	COYOTE VALLEY MUTUAL WATER CO	WELL NO. 2 WEST	IMPERIAL
CA1300588_001_001	CA1300588	IID VILLAGE	WELL 1	IMPERIAL
CA1300555_001_001	CA1300555	MITCHELLS CAMP FAMILY ASSOC.	WELL #1	IMPERIAL
CA1300513_003_003	CA1300513	OCOTILLO MUTUAL WATER CO	OMUC NW1	IMPERIAL
CA1300616_001_001	CA1300616	PALO VERDE COUNTY WATER DIST.	NORTH WELL	IMPERIAL
CA1300664_001_001	CA1300664	RIVERFRONT MUTUAL WATER COMPANY	WELL 1	IMPERIAL
CA1300009_003_003	CA1300009	WINTERHAVEN COUNTY WATER DISTRICT	WELL 03	IMPERIAL
CA1400020_001_001	CA1400020	ABERDEEN WATER SYSTEM	WELL 01	INYO
CA1410001_001_001	CA1410001	BISHOP, CITY OF	WELL 01 - STANDBY	INYO
CA1410007_004_004	CA1410007	HIGHLAND MOBILE HOME PARK	WELL 04	INYO
CA1410005_001_001	CA1410005	INDIAN CREEK CSD	WELL 01	INYO
CA1410004_003_003	CA1410004	LADWP - BIG PINE	WELL 03 - W415	INYO
CA1410002_001_001	CA1410002	LADWP - INDEPENDENCE	WELL 357	INYO
CA1410003_002_002	CA1410003	LADWP - LONE PINE	WELL 346	INYO
CA1410505_002_002	CA1410505	NPS - DEATH VALLEY, FURNACE CREEK	WELL 01	INYO
CA1400045_001_001	CA1400045	PRIMROSE LANE APARTMENTS	WELL 01 SE - ACTIVE	INYO
CA1400024_002_002	CA1400024	ROCKING K RANCH ESTATES MUTUAL WATER CO.	WELL 02 S	INYO
CA1400002_008_008	CA1400002	STARLITE COMMUNITY SERVICE DISTRICT	WELL 08 - ACTIVE	INYO
CA1502744_001_001	CA1502744	60TH STREET ASSOC. WATER SYSTEM	WELL 01	KERN
CA1510001_029_029	CA1510001	ARVIN COMMUNITY SERVICES DIST	WELL 12 - RAW	KERN
CA1500289_005_005	CA1500289	ATHAL MUTUAL WATER SYSTEM	WELL 03 - RAW	KERN
CA1510032_016_016	CA1510032	CALIFORNIA CITY, CITY OF	WELL 16	KERN
CA1500443_002_002	CA1500443	CANYON MEADOWS MUTUAL WATER	WELL 02	KERN
CA1510003_006_006	CA1510003	CWS - BAKERSFIELD	WELL 010-02 - RAW	KERN
CA1510003_024_024	CA1510003	CWS - BAKERSFIELD	WELL 047-02 - RAW	KERN
CA1510003_055_055	CA1510003	CWS - BAKERSFIELD	WELL 085-02 - RAW	KERN
CA1510003_059_059	CA1510003	CWS - BAKERSFIELD	WELL 089-01 - RAW	KERN
CA1510003_091_091	CA1510003	CWS - BAKERSFIELD	WELL 125-01 - BEFORE_GAC-TCP	KERN
CA1510003_143_143	CA1510003	CWS - BAKERSFIELD	WELL 177-01 - RAW	KERN
CA1500333_001_001	CA1500333	CWS - FREMONT VALLEY	WELL 01-01	KERN
CA1510033_040_040	CA1510033	CWS - KERNVILLE	ARDEN WELL 14	KERN
CA1510005_021_021	CA1510005	DELANO, CITY OF	WELL 24 - BEFORE AS TRT	KERN

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA1510005_033_033	CA1510005	DELANO, CITY OF	WELL 25 - RAW	KERN
CA1510005_036_036	CA1510005	DELANO, CITY OF	WELL 30 - BEFORE_GAC-TCP	KERN
CA1510005_041_041	CA1510005	DELANO, CITY OF	WELL 35 - BEFORE_NO3_FXBR	KERN
CA1510005_056_056	CA1510005	DELANO, CITY OF	WELL 40 - RAW	KERN
CA1510006_029_029	CA1510006	EAST NILES CSD	WELL 21 - BEFORE_GAC-TCP & AS-TRT	KERN
CA1500449_002_002	CA1500449	FOURTH STREET WATER SYSTEM	WELL 02 - STANDBY	KERN
CA1500449_004_004	CA1500449	FOURTH STREET WATER SYSTEM	WELL 04	KERN
CA1500398_002_002	CA1500398	FRONTIER TRAILS HOMEOWNERS ASSOC INC.	WELL 02 (SCODIE AVE)	KERN
CA1500296_001_001	CA1500296	FULLER ACRES MUTUAL WATER COMPANY	WELL 02 - RAW	KERN
CA1510024_009_009	CA1510024	GREENFIELD COUNTY WD	BERKSHIRE WELL - BEFORE_AS-TRT	KERN
CA1510024_011_011	CA1510024	GREENFIELD COUNTY WD	BANNOCK WELL - RAW	KERN
CA1510040_022_022	CA1510040	KERN COUNTY WATER AGENCY	WELL ID4-12	KERN
CA1500252_002_002	CA1500252	KERN VALLEY MUTUAL WATER COMPANY	WELL 03	KERN
CA1510023_005_005	CA1510023	LAKE OF THE WOODS MWC	WELL 01 - CARDON WELL	KERN
CA1510046_003_003	CA1510046	LOST HILLS UTILITY DISTRICT	WELL 04(NORTH)- BEFORE AS TRT	KERN
CA1510014_016_016	CA1510014	MOJAVE PUD	WELL 21A	KERN
CA1510052_002_002	CA1510052	NORTH EDWARDS WD	WELL 02 - STANDBY	KERN
CA1500465_001_001	CA1500465	OAK KNOLLS MUTUAL WATER COMPANY	WELL 03	KERN
CA1500585_003_003	CA1500585	OASIS PROPERTY OWNERS ASSOCIATION	WELL 03 - RAW	KERN
CA1510015_015_015	CA1510015	OILDALE MWC	WELL 23 - STANDBY	KERN
CA1510015_016_016	CA1510015	OILDALE MWC	WELL 25 - STBY	KERN
CA1503226_008_008	CA1503226	QVWD-WEST & EAST COMBINED WATER SYSTEM	MONTCLAIRE WEST WELL (#2)	KERN
CA1510016_001_001	CA1510016	RAND COMMUNITIES WATER DISTRICT	PRATHER WELL 01-STANDBY	KERN
CA1500426_001_001	CA1500426	ROSE VILLA APARTMENTS	WELL 01	KERN
CA1510019_017_017	CA1510019	SHAFTER, CITY OF	WELL 17- BEFORE_GAC-TCP	KERN
CA1510020_002_002	CA1510020	TEHACHAPI, CITY OF	DENNISON WELL	KERN
CA1510020_007_007	CA1510020	TEHACHAPI, CITY OF	CURRY STREET WELL	KERN
CA1500478_002_002	CA1500478	VALLEY ESTATES POA, INC.	WELL 01 - MARJORIE (OLD)	KERN
CA1500231_002_002	CA1500231	VICTORY MUTUAL WATER COMPANY	WELL 01(MARION) - BEFORE_GAC-TCP	KERN
CA1510022_017_017	CA1510022	WEST KERN WATER DISTRICT	WELL NW-2 - RAW	KERN

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA1610001_007_007	CA1610001	ARMONA COMMUNITY SERVICES DIST	WELL 02 - RAW_STBY2019	KINGS
CA1610004_001_001	CA1610004	CORCORAN, CITY OF	WELL 01A - BEFORE NITRATE BLND & AS TRT	KINGS
CA1610004_002_002	CA1610004	CORCORAN, CITY OF	WELL 02A - BEFORE NITRATE BLND & AS TRT	KINGS
CA1610004_029_029	CA1610004	CORCORAN, CITY OF	WELL 11 - BEFORE AS TRT	KINGS
CA1610003_028_028	CA1610003	HANFORD, CITY OF	WELL 35 - RAW	KINGS
CA1610003_031_031	CA1610003	HANFORD, CITY OF	WELL 38	KINGS
CA1610003_043_043	CA1610003	HANFORD, CITY OF	WELL 49 - RAW	KINGS
CA1610006_001_001	CA1610006	STRATFORD PUD	WELL 05 - RAW	KINGS
CA1700610_002_002	CA1700610	BELLA LAGO MOBILE HOME PARK	WELL 01	LAKE
CA1710007_003_003	CA1710007	KELSEYVILLE CO WATERWORKS DISTRICT 3	WELL 06	LAKE
CA1710007_006_006	CA1710007	KELSEYVILLE CO WATERWORKS DISTRICT 3	WELL 07	LAKE
CA1710007_007_007	CA1710007	KELSEYVILLE CO WATERWORKS DISTRICT 3	WELL 08	LAKE
CA1710007_010_010	CA1710007	KELSEYVILLE CO WATERWORKS DISTRICT 3	WELL 02 - STANDBY (FINLEY SYS)	LAKE
CA1700554_001_001	CA1700554	LAKE COUNTY CSA 13 - KONO TAYEE	WELL 02 - STANDBY	LAKE
CA1700518_006_006	CA1700518	LOCH LOMOND MUTUAL WATER CO	WELL 03	LAKE
CA1710010_018_018	CA1710010	LOWER LAKE COUNTY WATER DISTRICT	WELL-06A	LAKE
CA1810001_003_003	CA1810001	CITY OF SUSANVILLE	WELL 01	LASSEN
CA1810001_005_005	CA1810001	CITY OF SUSANVILLE	WELL 03	LASSEN
CA1800522_001_001	CA1800522	HONEY LAKE CAMPGROUND	WELL 01	LASSEN
CA1810003_001_001	CA1810003	LASSEN COUNTY WATER DISTRICT #1	WELL 01	LASSEN
CA1810003_002_002	CA1810003	LASSEN COUNTY WATER DISTRICT #1	WELL 02	LASSEN
CA1800534_004_005	CA1800534	SPAULDING EAGLE LAKE MWC	WELL 03 - NEW WEST WELL	LASSEN
CA1800503_001_001	CA1800503	SUSAN RIVER PARK WATER CO.	WELL 01	LASSEN
CA1910045_010_010	CA1910045	ANTELOPE VALLEY EAST KERN WATER AGENCY	WELL EW-6	LOS ANGELES
CA1910045_019_019	CA1910045	ANTELOPE VALLEY EAST KERN WATER AGENCY	WELL BR-3	LOS ANGELES
CA1910045_022_022	CA1910045	ANTELOPE VALLEY EAST KERN WATER AGENCY	WELL ES-4	LOS ANGELES
CA1910023_001_001	CA1910023	AVERYDALE MWC	WELL 01	LOS ANGELES
CA1910013_027_027	CA1910013	BELLFLOWER - SOMERSET MWC	WELL 884	LOS ANGELES
CA1910050_008_008	CA1910050	COMMERCE-CITY, WATER DEPT.	WELL 07-01	LOS ANGELES

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CA1900649_002_002	CA1900649	GOLDEN SANDS MOBILE HOME PARK	WELL 02	LOS ANGELES
CA1910011_007_007	CA1910011	GSWC - BELL, BELL GARDENS	GAGE WELL 02	LOS ANGELES
CA1910011_036_036	CA1910011	GSWC - BELL, BELL GARDENS	BISSELL WELL #3	LOS ANGELES
CA1910077_004_004	CA1910077	GSWC - FLORENCE/GRAHAM	MIRAMONTE WELL 02	LOS ANGELES
CA1910077_007_007	CA1910077	GSWC - FLORENCE/GRAHAM	NADEAU WELL 03	LOS ANGELES
CA1910223_004_004	CA1910223	GSWC-SOUTH SAN GABRIEL	SAN GABRIEL WELL 01 - ACTIVE	LOS ANGELES
CA1910047_004_004	CA1910047	HAWTHORNE-CITY WATER DEPT.	WELL 13-01	LOS ANGELES
CA1910049_004_004	CA1910049	HUNTINGTON PARK-CITY, WATER DEPT.	WELL 12	LOS ANGELES
CA1910203_005_005	CA1910203	LOS ANGELES CWWD 40, R 24,27,33-PEARBLSM	WELL 27-3	LOS ANGELES
CA1910203_020_020	CA1910203	LOS ANGELES CWWD 40, R 24,27,33-PEARBLSM	WELL 27-7	LOS ANGELES
CA1910081_002_002	CA1910081	LYNWOOD PARK MUTUAL WATER CO.	WELL 02 - SOUTH	LOS ANGELES
CA1910079_005_005	CA1910079	LYNWOOD-CITY, WATER DEPT.	WELL 05 - ACTIVE	LOS ANGELES
CA1910079_011_011	CA1910079	LYNWOOD-CITY, WATER DEPT.	WELL 11 - ACTIVE	LOS ANGELES
CA1910086_004_004	CA1910086	MAYWOOD MUTUAL WATER CO. #3	DISTRICT WELL 04	LOS ANGELES
CA1900785_001_001	CA1900785	MITCHELL'S AVENUE E MOBILE HOME PARK	WELL 01	LOS ANGELES
CA1910091_004_004	CA1910091	MONTEBELLO LAND & WATER CO.	WELL 09	LOS ANGELES
CA1910091_007_007	CA1910091	MONTEBELLO LAND & WATER CO.	WELL 11A	LOS ANGELES
CA1910152_017_017	CA1910152	SOUTH GATE-CITY, WATER DEPT.	WELL 27	LOS ANGELES
CA1910153_003_003	CA1910153	SOUTH MONTEBELLO IRRIGATION DIST.	WELL 03	LOS ANGELES
CA1900154_001_001	CA1900154	TIERRA BONITA MUTUAL WATER	WELL 01	LOS ANGELES
CA1910159_005_005	CA1910159	TRACT 180 MUTUAL WATER CO.	WELL 06	LOS ANGELES
CA1910167_013_013	CA1910167	VERNON-CITY, WATER DEPT.	WELL 19	LOS ANGELES
CA2010003_001_001	CA2010003	BASS LAKE WATER COMPANY	SCHOOL ROAD (GOVNMT CTR) - RAW	MADERA
CA2000521_006_006	CA2000521	BROADVIEW TERRACE MUTUAL WATER COMPANY	WELL 06 - STANDBY	MADERA
CA2010014_005_005	CA2010014	CAL AM - GOLDSIDE	HILLVIEW WELL 01 - RAW	MADERA
CA2010012_006_006	CA2010012	CAL AM - RAYMOND	WELL 08	MADERA
CA2010012_018_018	CA2010012	CAL AM - RAYMOND	WELL 12	MADERA
CA2010012_020_020	CA2010012	CAL AM - RAYMOND	WELL 14	MADERA
CA2010002_020_020	CA2010002	CITY OF MADERA	WELL 24 - RAW	MADERA
CA2010002_050_050	CA2010002	CITY OF MADERA	WELL 38 - RAW	MADERA

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CA2000530_001_001	CA2000530	CRASS MUTUAL WATER COMPANY	SOURCE WELL 1	MADERA
CA2000688_001_001	CA2000688	ECCO	SOURCE WELL 1	MADERA
CA2010006_001_001	CA2010006	MADERA CO SA3-PARKSDALE	WELL 01	MADERA
CA2010006_003_003	CA2010006	MADERA CO SA3-PARKSDALE	WELL 03 (CHAVEZ SCHOOL)	MADERA
CA2000851_004_004	CA2000851	MD 40 SUNSET RIDGE ESTATES	SOURCE SHAH LANE WELL/WELL 3	MADERA
CA2000737_002_002	CA2000737	MD 42 STILL MEADOW	SOURCE WELL 2 LOWER	MADERA
CA2000775_002_002	CA2000775	OAK CREEK MOBILE HOME PARK	SOURCE WELL 5	MADERA
CA2000506_002_002	CA2000506	SIERRA LINDA MUTUAL WATER CO	SOURCE WELL 2	MADERA
CA2000592_001_001	CA2000592	TWO TWENTY FOUR MOBILE HOME PK	SOURCE WELL #1 BACK WELL	MADERA
CA2210900_004_004	CA2210900	CEDAR LODGE RESORT	WELL 05 - RAW	MARIPOSA
CA2210900_020_020	CA2210900	CEDAR LODGE RESORT	WELL 10 IF-RAW	MARIPOSA
CA2210903_003_003	CA2210903	FISHCAMP MUTUAL WATER COMPANY	WELL 01 (TRIANGLE WELL)	MARIPOSA
CA2210903_004_004	CA2210903	FISHCAMP MUTUAL WATER COMPANY	WELL 04 (MILLER WELL) STANDBY	MARIPOSA
CA2210001_015_015	CA2210001	MARIPOSA PUBLIC UTILITY DIST	MPUD WELL 06	MARIPOSA
CA2210002_010_010	CA2210002	PONDEROSA BASIN MUTUAL WTR CO	WELL 09	MARIPOSA
CA2210002_011_011	CA2210002	PONDEROSA BASIN MUTUAL WTR CO	WELL 10	MARIPOSA
CA2210002_012_012	CA2210002	PONDEROSA BASIN MUTUAL WTR CO	WELL 11	MARIPOSA
CA2300507_001_001	CA2300507	CALPELLA COUNTY WATER DISTRICT	WELL 01	MENDOCINO
CA2300731_001_001	CA2300731	CITY OF 10,000 BUDDHAS	WELL 01	MENDOCINO
CA2300892_001_001	CA2300892	COVELO MOBILE HOME PARK	WEST WELL	MENDOCINO
CA2300832_009_009	CA2300832	HILLS RANCH MUTUAL WATER COMPANY	WELL 13	MENDOCINO
CA2300606_004_004	CA2300606	LAKE VIEW MUTUAL WATER CO.	WELL 04 - MONTALVO	MENDOCINO
CA2310011_001_001	CA2310011	LAYTONVILLE COUNTY WATER DISTRICT	WELL 01	MENDOCINO
CA2300506_003_003	CA2300506	MEADOW ESTATES MUTUAL	WELL 03	MENDOCINO
CA2300591_004_004	CA2300591	PINE MOUNTAIN MUTUAL WATER CO.	WELL 01	MENDOCINO
CA2300591_012_012	CA2300591	PINE MOUNTAIN MUTUAL WATER CO.	WELL 06	MENDOCINO
CA2300604_003_003	CA2300604	POINT OF VIEW MUTUAL WATER CO	WELL 03	MENDOCINO
CA2310002_010_010	CA2310002	ROGINA WATER COMPANY INC.	SANFORD WELL	MENDOCINO
CA2310003_004_004	CA2310003	UKIAH, CITY OF	WELL 03	MENDOCINO

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CA2300667_001_001	CA2300667	WOODS, THE (MENDOCINO)	SOUTH WELL	MENDOCINO
CA2410003_005_005	CA2410003	CITY OF GUSTINE	WELL 04B - RAW	MERCED
CA2410003_006_006	CA2410003	CITY OF GUSTINE	WELL 05 - RAW	MERCED
CA2410003_007_007	CA2410003	CITY OF GUSTINE	WELL 06 - RAW	MERCED
CA2410005_005_005	CA2410005	CITY OF LOS BANOS	WELL 05	MERCED
CA2410005_027_027	CA2410005	CITY OF LOS BANOS	WELL 15	MERCED
CA2410009_011_011	CA2410009	CITY OF MERCED	WELL 05B - RAW	MERCED
CA2410009_019_019	CA2410009	CITY OF MERCED	WELL 11 - RAW	MERCED
CA2410009_020_020	CA2410009	CITY OF MERCED	WELL 13 - RAW	MERCED
CA2410009_049_049	CA2410009	CITY OF MERCED	WELL 18 - RAW	MERCED
CA2410009_054_054	CA2410009	CITY OF MERCED	WELL 19 - RAW	MERCED
CA2410006_018_018	CA2410006	DELHI CWD	WELL 6A - RAW	MERCED
CA2410012_006_006	CA2410012	HILMAR COUNTY WATER DISTRICT	WELL 06 (JAKE) - RAW	MERCED
CA2410011_005_005	CA2410011	LE GRAND COMM SERVICES DIST	WELL 04	MERCED
CA2410007_001_001	CA2410007	PLANADA CSD	WELL 01-A	MERCED
CA2410007_014_014	CA2410007	PLANADA CSD	WELL 07	MERCED
CA2500503_005_005	CA2500503	CALIFORNIA PINES C.S.D.	WELL 04 - VICEROY	MODOC
CA2510001_004_004	CA2510001	CITY OF ALTURAS	WELL 07	MODOC
CA2500911_009_009	CA2500911	I'SOT WELL #3 & #15	WELL 06 - RAW	MODOC
CA2500801_001_001	CA2500801	NEWELL COUNTY WATER DISTRICT	WELL 01 - TANKS	MODOC
CA2500801_002_002	CA2500801	NEWELL COUNTY WATER DISTRICT	WELL 03 - RAILROAD	MODOC
CA2610003_002_002	CA2610003	BRIDGEPORT PUD	WELL 02 (TWIN LAKES)	MONO
CA2600699_002_002	CA2600699	CHALFANT VALLEY WEST M.W.C.	WELL 2	MONO
CA2600733_002_002	CA2600733	COLD WATER CANYON MWC	WELL 02	MONO
CA2600622_001_001	CA2600622	SIERRA EAST HOA	WELL 1	MONO
CA2600622_002_002	CA2600622	SIERRA EAST HOA	WELL 2	MONO
CA2600621_001_001	CA2600621	WHITE MOUNTAIN MUTUAL WATER COMPANY	WELL	MONO
CA2701202_004_004	CA2701202	CAL AM WATER COMPANY - CHUALAR	WELL 04	MONTEREY
CA2710005_009_009	CA2710005	CASTROVILLE COMMUNITY SERVICES DISTRICT	WELL 05 - RAW	MONTEREY
CA2710009_007_007	CA2710009	CWSC KING CITY	WELL 07-01 - RAW	MONTEREY
CA2710009_015_015	CA2710009	CWSC KING CITY	WELL 14-01 RAW	MONTEREY
CA2700548_001_001	CA2700548	DOLAN RD MWC	WELL 01	MONTEREY
CA2710008_001_001	CA2710008	GREENFIELD, CITY OF	WELL 01 - RAW	MONTEREY
CA2700606_001_001	CA2700606	HIDDEN VIEWS MHP WS	WELL 01 (NEAR SPACE 11)	MONTEREY
CA2702816_001_001	CA2702816	MERRILL GARDENS IRIS CANYON WS	WELL 01	MONTEREY
CA2702816_002_002	CA2702816	MERRILL GARDENS IRIS CANYON WS	WELL 02	MONTEREY

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CA2702816_005_005	CA2702816	MERRILL GARDENS IRIS CANYON WS	WELL 05	MONTEREY
CA2701515_001_001	CA2701515	MOSS LANDING HARBOR WS	WELL 01 (BACKUP)	MONTEREY
CA2702466_002_002	CA2702466	SAN VICENTE MWC	WELL 02 (SOUTH)-STANDBY	MONTEREY
CA2710011_014_014	CA2710011	SOLEDAD, CITY OF	WELL 11 - RAW	MONTEREY
CA2700771_001_001	CA2700771	SPRINGFIELD WATER COMPANY	WELL 01	MONTEREY
CA2701589_006_006	CA2701589	SUNNY ACRES MWS	WELL 05 OFF CHUALAR CYN RD	MONTEREY
CA2900562_005_005	CA2900562	ANANDA VILLAGE	BADRINATH WELL	NEVADA
CA2900531_001_001	CA2900531	CREEKSIDE VILLAGE	PRIMARY WELL #3 (BELOW TANK) DRILLED 1997	NEVADA
CA2900529_002_002	CA2900529	GOLD COUNTRY HOME PARK - WATER SYSTEM	WELL 02 ("OLD WELL")	NEVADA
CA2900529_003_003	CA2900529	GOLD COUNTRY HOME PARK - WATER SYSTEM	WELL 03 ("NEW WELL")	NEVADA
CA2900511_001_001	CA2900511	SHADY LAKE WATER ASSOCIATION	WELL1: 12734 SHADYCREEK DR	NEVADA
CA3010008_004_004	CA3010008	EASTSIDE WATER ASSOCIATION	WELL 04	ORANGE
CA3000519_001_001	CA3000519	HYNES ESTATES MUTUAL WATER CO.	WELL 01 (NORTH)	ORANGE
CA3000519_005_005	CA3000519	HYNES ESTATES MUTUAL WATER CO.	SOUTH WELL NO. 3	ORANGE
CA3000618_001_001	CA3000618	LIBERTY PARK WATER ASSOCIATION	WELL 01	ORANGE
CA3000585_001_001	CA3000585	PAGE AVENUE MUTUAL WATER COMPANY	WELL 01	ORANGE
CA3000825_002_002	CA3000825	SOUTH MIDWAY CITY MUTUAL WATER CO.	NORTH WELL	ORANGE
CA3100069_001_001	CA3100069	AUBURN RIDGE WOODS	WELL 01 DRILLED 1987	PLACER
CA3100014_001_001	CA3100014	BAKER RANCH WATER CORP	WELL 01	PLACER
CA3110022_001_001	CA3110022	MCKINNEY WATER DISTRICT	WELL 01 - OLD WELL - STANDBY	PLACER
CA3110022_002_002	CA3110022	MCKINNEY WATER DISTRICT	WELL 02 - NEW WELL	PLACER
CA3100538_001_001	CA3100538	ROSECREST MUTUAL	WELL	PLACER
CA3110011_009_009	CA3110011	TAHOE CITY PUD - MCKINNEY/QUAIL	CRYSTAL WAY WELL - RAW	PLACER
CA3210004_004_004	CA3210004	AMERICAN VALLEY CSD	HIGH SCHOOL WELL #4	PLUMAS
CA3210004_011_011	CA3210004	AMERICAN VALLEY CSD	SUNSET WELL #6	PLUMAS
CA3210004_013_013	CA3210004	AMERICAN VALLEY CSD	BOYLE WELL #7	PLUMAS
CA3210004_019_019	CA3210004	AMERICAN VALLEY CSD	WELL 09	PLUMAS
CA3210003_006_006	CA3210003	CITY OF PORTOLA	COMMERCIAL ST WELL - STBY	PLUMAS
CA3200148_002_002	CA3200148	FEATHER RIVER RV & MHP	WELL 02	PLUMAS

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CA3205003_004_004	CA3205003	GOLD MOUNTAIN CSD	WELL 29A (REPLACED WELL 29 IN 2007)	PLUMAS
CA3205006_002_002	CA3205006	GRIZZLY RANCH CSD	WELL 3P2	PLUMAS
CA3200138_001_001	CA3200138	MEADOW EDGE MHP	WELL 01	PLUMAS
CA3205001_001_001	CA3205001	WALKER RANCH CSD	WELL 01 (INSTALLED 1994)	PLUMAS
CA3301990_001_001	CA3301990	AMEZCUA - GARCIA WATER	WELL #1	RIVERSIDE
CA3310006_018_018	CA3310006	BANNING, CITY OF	WELL C-06	RIVERSIDE
CA3310006_026_026	CA3310006	BANNING, CITY OF	WELL M-10	RIVERSIDE
CA3310003_006_006	CA3310003	BLYTHE - CITY OF	WELL 11	RIVERSIDE
CA3310003_010_010	CA3310003	BLYTHE - CITY OF	WELL 15	RIVERSIDE
CA3310003_030_030	CA3310003	BLYTHE - CITY OF	WELL 18	RIVERSIDE
CA3310802_003_003	CA3310802	CHUCKAWALLA VALLEY STATE PRISON	WELL 03	RIVERSIDE
CA3310001_011_011	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 4504-1	RIVERSIDE
CA3310001_022_022	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 4521-1	RIVERSIDE
CA3310001_105_105	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 5658-1	RIVERSIDE
CA3310001_125_125	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 6701-1	RIVERSIDE
CA3310001_155_155	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 4562-2	RIVERSIDE
CA3310001_168_168	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 5677-1	RIVERSIDE
CA3310001_177_177	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 5680-1	RIVERSIDE
CA3310001_201_201	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 4527-1	RIVERSIDE
CA3310001_207_207	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 5718-1	RIVERSIDE
CA3310001_222_222	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 4528-1	RIVERSIDE
CA3310001_249_249	CA3310001	COACHELLA VWD: COVE COMMUNITY	WELL 6734-1	RIVERSIDE
CA3301577_002_002	CA3301577	CSA 62	WARMINGTON #4 (STANDBY WELL)	RIVERSIDE
CA3301209_001_001	CA3301209	DESERT VIEW TRAILER PARK	WELL 01 SOUTH	RIVERSIDE
CA3310005_023_023	CA3310005	DESERT WATER AGENCY	WELL 21	RIVERSIDE
CA3310005_028_028	CA3310005	DESERT WATER AGENCY	WELL 26	RIVERSIDE
CA3310005_029_029	CA3310005	DESERT WATER AGENCY	WELL 27	RIVERSIDE
CA3310046_002_002	CA3310046	FARM MUTUAL W.C. (THE)	WELL 02	RIVERSIDE
CA3310016_012_012	CA3310016	HEMET, CITY OF	WELL 12	RIVERSIDE
CA3310020_007_007	CA3310020	INDIO WATER AUTHORITY	WELL 02-C	RIVERSIDE

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CA3310020_026_026	CA3310020	INDIO WATER AUTHORITY	WELL Z	RIVERSIDE
CA3310020_027_027	CA3310020	INDIO WATER AUTHORITY	WELL AA	RIVERSIDE
CA3310022_054_054	CA3310022	LAKE HEMET MWD	MOUNTAIN WELL	RIVERSIDE
CA3310008_013_013	CA3310008	MISSION SPRINGS WD	WELL 27	RIVERSIDE
CA3301529_002_002	CA3301529	RAMONA WATER COMPANY	WELL #2 RED SHANK	RIVERSIDE
CA3301380_010_010	CA3301380	SAINT ANTHONY TRAILER PARK	WELL #2 (NEW WELL)	RIVERSIDE
CA3301879_002_002	CA3301879	SHARONDALE MESA HOA	WELL 02	RIVERSIDE
CA3301055_002_002	CA3301055	VILLAGE OF CHILDHELP	WELL #2	RIVERSIDE
CA3310075_004_004	CA3310075	WESTERN MWD (ARLINGTON)	WELL 04	RIVERSIDE
CA3400103_002_002	CA3400103	B & W RESORT MARINA	SECOND WATER SYSTEM-BOAT LAUNCH	SACRAMENTO
CA3410013_004_004	CA3410013	CAL AM - LINCOLN OAKS	CARRIAGE DR. WELL	SACRAMENTO
CA3410013_005_005	CA3410013	CAL AM - LINCOLN OAKS	CHIPPING WAY WELL	SACRAMENTO
CA3410013_010_010	CA3410013	CAL AM - LINCOLN OAKS	HEMLOCK WELL	SACRAMENTO
CA3410013_016_016	CA3410013	CAL AM - LINCOLN OAKS	OAK FORREST WELL	SACRAMENTO
CA3410017_006_006	CA3410017	CAL AM - PARKWAY	GERBER RD.	SACRAMENTO
CA3410017_021_021	CA3410017	CAL AM - PARKWAY	COUNTRYSIDE WELL 01	SACRAMENTO
CA3410047_001_001	CA3410047	CAL AM - WALNUT GROVE	WELL 01 - RAW	SACRAMENTO
CA3410026_003_003	CA3410026	CALIFORNIA STATE FAIR	WELL 03	SACRAMENTO
CA3400137_002_002	CA3400137	LINCOLN CHAN-HOME RANCH	SECONDARY WELL	SACRAMENTO
CA3400107_001_001	CA3400107	RIVER'S EDGE MARINA & RESORT	MAIN WELL	SACRAMENTO
CA3400296_002_002	CA3400296	SAC CITY MOBILE HOME COMMUNITY LP	SECONDARY WELL	SACRAMENTO
CA3410001_007_007	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL 09 - RAVENWOOD/EASTERN RAW	SACRAMENTO
CA3410001_020_020	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL 26 - GREENWOOD/MARCONI RAW	SACRAMENTO
CA3410001_052_052	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL 66 - EASTERN/WOODSIDE CHURCH RAW	SACRAMENTO
CA3410001_064_064	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL 71 - RIVER DRIVE/JACOB RAW	SACRAMENTO
CA3410001_070_070	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL 76 - FULTON/FAIR OAKS RAW	SACRAMENTO
CA3410001_072_072	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL 33A - AUBURN/NORRIS RAW	SACRAMENTO
CA3410001_094_094	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL N22 - RIVER COLLEGE RAW	SACRAMENTO
CA3410001_107_107	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL N34 - COTTAGE RAW	SACRAMENTO
CA3410001_130_130	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL N33 - WALERGA RAW	SACRAMENTO

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CA3410001_139_139	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL 52 - WEDDIGEN/GOTHBERG RAW	SACRAMENTO
CA3410001_250_250	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	PALM WELL N06A	SACRAMENTO
CA3410001_260_260	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL 78 - BUTANO/COTTAGE - RAW	SACRAMENTO
CA3410001_263_263	CA3410001	SACRAMENTO SUBURBAN WATER DISTRICT	WELL 79- VERNER/PANORANA - TREATED	SACRAMENTO
CA3400164_001_001	CA3400164	VIEIRA'S RESORT, INC	(OLD) MAINWELL	SACRAMENTO
CA3400164_002_002	CA3400164	VIEIRA'S RESORT, INC	WELL 2 TOTEM	SACRAMENTO
CA3400331_001_001	CA3400331	WESTERNER MOBILE HOME PARK	MAIN WELL	SACRAMENTO
CA3500830_001_001	CA3500830	FALLON ROAD LABOR HOUSING	WELL 01	SAN BENITO
CA3500556_001_001	CA3500556	MISSION FARM R.V. PARK	WELL 01 - RAW	SAN BENITO
CA3500527_001_001	CA3500527	VALENZUELA WATER SYSTEM	WELL 01	SAN BENITO
CA3610008_008_008	CA3610008	BIG BEAR CITY CSD	WELL 03A	SAN BERNARDINO
CA3610008_010_010	CA3610008	BIG BEAR CITY CSD	WELL 04A	SAN BERNARDINO
CA3610044_021_021	CA3610044	BIG BEAR LAKE DWP - BIG BEAR SYSTEM	SLANT WELL 05	SAN BERNARDINO
CA3610044_028_028	CA3610044	BIG BEAR LAKE DWP - BIG BEAR SYSTEM	SLANT WELL 12	SAN BERNARDINO
CA3610044_034_034	CA3610044	BIG BEAR LAKE DWP - BIG BEAR SYSTEM	LA CRESCENTA WELL	SAN BERNARDINO
CA3610044_038_038	CA3610044	BIG BEAR LAKE DWP - BIG BEAR SYSTEM	OAK WELL	SAN BERNARDINO
CA3610044_058_058	CA3610044	BIG BEAR LAKE DWP - BIG BEAR SYSTEM	MCALISTER WELL	SAN BERNARDINO
CA3610044_211_211	CA3610044	BIG BEAR LAKE DWP - BIG BEAR SYSTEM	MAGNOLIA WELL	SAN BERNARDINO
CA3610011_019_019	CA3610011	CEDARPINES PARK MWC	SAWPIT WELL 02	SAN BERNARDINO
CA3610014_017_017	CA3610014	COLTON, CITY OF	WELL 23	SAN BERNARDINO
CA3610015_019_019	CA3610015	CRESTLINE VILLAGE CWD - DIVISION 10	HORST WELL	SAN BERNARDINO
CA3610015_053_053	CA3610015	CRESTLINE VILLAGE CWD - DIVISION 10	PINECREST HORIZONTAL WELL 02	SAN BERNARDINO
CA3610015_085_085	CA3610015	CRESTLINE VILLAGE CWD - DIVISION 10	ELECTRA VERTICAL WELL	SAN BERNARDINO
CA3600114_001_001	CA3600114	CSA 70 W-3 HACIENDA	WELL 1	SAN BERNARDINO

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA3600388_002_002	CA3600388	DESERT VIEW MOBILE PARK	ORIGINAL WELL 01 - NON-FUNCTIONAL STBY	SAN BERNARDINO
CA3610021_003_003	CA3610021	FALLSVALE SERVICE COMPANY	BIG FALLS WELL	SAN BERNARDINO
CA3610105_003_003	CA3610105	GOLDEN STATE WATER CO - APPLE VLY NORTH	PAPAGO	SAN BERNARDINO
CA3610043_011_011	CA3610043	GOLDEN STATE WATER CO - BARSTOW	BRADSHAW WELL 04	SAN BERNARDINO
CA3610043_013_013	CA3610043	GOLDEN STATE WATER CO - BARSTOW	BRADSHAW WELL 06	SAN BERNARDINO
CA3610043_021_021	CA3610043	GOLDEN STATE WATER CO - BARSTOW	GLEN ROAD WELL 02	SAN BERNARDINO
CA3610063_004_004	CA3610063	GOLDEN STATE WATER CO - MORONGO DEL SUR	YEAGER NO 3	SAN BERNARDINO
CA3600279_001_001	CA3600279	GOLDEN STATE WATER DESERT VIEW	DESERT VIEW WELL 1	SAN BERNARDINO
CA3610023_008_008	CA3610023	GREEN VALLEY MWC	HORIZ WELL 02	SAN BERNARDINO
CA3610023_040_040	CA3610023	GREEN VALLEY MWC	STABLE WELL NO. 1	SAN BERNARDINO
CA3610024_005_005	CA3610024	HESPERIA WD	WELL 05A	SAN BERNARDINO
CA3610024_010_010	CA3610024	HESPERIA WD	WELL 14B	SAN BERNARDINO
CA3610024_014_014	CA3610024	HESPERIA WD	WELL 18	SAN BERNARDINO
CA3610024_021_021	CA3610024	HESPERIA WD	WELL 24	SAN BERNARDINO
CA3600123_002_002	CA3600123	HI DESERT MWC	WELL 02	SAN BERNARDINO
CA3600123_003_003	CA3600123	HI DESERT MWC	WELL 03	SAN BERNARDINO
CA3601182_001_001	CA3601182	HIGH DESERT DETENTION CENTER	WELL 1	SAN BERNARDINO
CA3601015_004_004	CA3601015	IRONWOOD CAMP	WELL #4	SAN BERNARDINO
CA3600222_002_002	CA3600222	JUNIPER RIVIERA CWD	WELL 2	SAN BERNARDINO
CA3600222_003_003	CA3600222	JUNIPER RIVIERA CWD	WELL 3 - STANDBY	SAN BERNARDINO
CA3600010_001_001	CA3600010	LIBERTY UTILITIES APPLE VALLEY	WELL #7	SAN BERNARDINO
CA3610118_004_004	CA3610118	LIBERTY -YERMO	MARINE WELL 01	SAN BERNARDINO

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA3600152_003_003	CA3600152	LOMA LINDA UNIVERSITY	ANDERSON WELL 3	SAN BERNARDINO
CA3600152_004_004	CA3600152	LOMA LINDA UNIVERSITY	ANDERSON WELL 4	SAN BERNARDINO
CA3610013_018_018	CA3610013	LOMA LINDA, CITY OF	RICHARDSON WELL NO. 4	SAN BERNARDINO
CA3600156_001_001	CA3600156	LUCERNE VALLEY MWC	WELL 01	SAN BERNARDINO
CA3600157_002_002	CA3600157	LUCERNE VISTA MWC	WELL 02	SAN BERNARDINO
CA3610030_001_001	CA3610030	MARIANA RANCHOS CWD	WELL 01	SAN BERNARDINO
CA3610129_004_004	CA3610129	MOJAVE WATER AGENCY	WELL 4	SAN BERNARDINO
CA3610031_003_003	CA3610031	MUSCOY MWC NO. 1	WELL 03	SAN BERNARDINO
CA3610031_005_005	CA3610031	MUSCOY MWC NO. 1	WELL 05	SAN BERNARDINO
CA3610120_003_003	CA3610120	PHELAN PINON HILLS CSD	WELL 03	SAN BERNARDINO
CA3610120_005_005	CA3610120	PHELAN PINON HILLS CSD	WELL 05	SAN BERNARDINO
CA3610120_018_018	CA3610120	PHELAN PINON HILLS CSD	WELL 8	SAN BERNARDINO
CA3610038_004_004	CA3610038	RIALTO, CITY OF	CITY WELL 02	SAN BERNARDINO
CA3610038_046_046	CA3610038	RIALTO, CITY OF	MIRO 3	SAN BERNARDINO
CA3610039_005_005	CA3610039	SAN BERNARDINO CITY	19 TH STREET WELL 02	SAN BERNARDINO
CA3610039_009_009	CA3610039	SAN BERNARDINO CITY	31 ST AND MT VIEW AVENUE	SAN BERNARDINO
CA3610039_021_021	CA3610039	SAN BERNARDINO CITY	DEVIL CANYON WELL 01	SAN BERNARDINO
CA3610039_035_035	CA3610039	SAN BERNARDINO CITY	MALLORY WELL	SAN BERNARDINO
CA3610039_051_051	CA3610039	SAN BERNARDINO CITY	VINCENT	SAN BERNARDINO
CA3610039_065_065	CA3610039	SAN BERNARDINO CITY	EPA WELL 109	SAN BERNARDINO
CA3610026_003_003	CA3610026	SBDNO COUNTY SERVICE AREA 70 CEDAR GLEN	TUNNEL	SAN BERNARDINO
CA3610854_003_003	CA3610854	SEARLES VALLEY MINERALS OPERATIONS INC	WELL 04	SAN BERNARDINO

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA3610109_008_008	CA3610109	SHEEP CREEK WATER COMPANY	WELL 04A	SAN BERNARDINO
CA3600301_001_001	CA3600301	STRAWBERRY LODGE MWC	WELL 01	SAN BERNARDINO
CA3610051_023_023	CA3610051	VALLEY OF ENCHANTMENT MWC	RIALTO WELL 05	SAN BERNARDINO
CA3610051_024_024	CA3610051	VALLEY OF ENCHANTMENT MWC	RIALTO WELL 06	SAN BERNARDINO
CA3610052_012_012	CA3610052	VICTORVILLE WATER DISTRICT	WELL 139	SAN BERNARDINO
CA3610052_050_050	CA3610052	VICTORVILLE WATER DISTRICT	WELL 204	SAN BERNARDINO
CA3700909_011_011	CA3700909	JULIAN COMMUNITY SERVICES DISTRICT	VOLCAN WELL 01	SAN DIEGO
CA3700924_002_002	CA3700924	LAKE MORENA VIEWS MWC	WELL 02	SAN DIEGO
CA3700924_005_005	CA3700924	LAKE MORENA VIEWS MWC	WELL 05	SAN DIEGO
CA3700923_005_005	CA3700923	LAKE MORENA'S OAK SHORES MWC	WELL 05	SAN DIEGO
CA3700923_006_006	CA3700923	LAKE MORENA'S OAK SHORES MWC	WELL 06	SAN DIEGO
CA3700958_001_001	CA3700958	LOS TULES MUTUAL WATER COMPANY	WELL 01	SAN DIEGO
CA3710041_004_004	CA3710041	MAJESTIC PINES COMMUNITY SD	WELL 02A WHISPERING PINES	SAN DIEGO
CA3701934_001_001	CA3701934	PINE VALLEY BIBLE CONFERENCE CENTER	WELL 01	SAN DIEGO
CA3701961_001_001	CA3701961	PINE VALLEY TRAILER PARK	WELL 01	SAN DIEGO
CA3710025_003_003	CA3710025	SWEETWATER AUTHORITY	NATIONAL CITY WELL 02	SAN DIEGO
CA3710025_014_014	CA3710025	SWEETWATER AUTHORITY	SDF 03	SAN DIEGO
CA3710025_016_016	CA3710025	SWEETWATER AUTHORITY	SDF 05	SAN DIEGO
CA3701837_007_007	CA3701837	WYNOLA WATER DISTRICT	WELL 07	SAN DIEGO
CA3900907_001_001	CA3900907	BEL AIR MOBILE ESTATE	WELL #1	SAN JOAQUIN
CA3900907_003_003	CA3900907	BEL AIR MOBILE ESTATE	WELL #3	SAN JOAQUIN
CA3910001_018_018	CA3910001	CALIFORNIA WATER SERVICE - STOCKTON	WELL 21-01 - STANDBY	SAN JOAQUIN
CA3910001_029_029	CA3910001	CALIFORNIA WATER SERVICE - STOCKTON	WELL 36-01 - RAW	SAN JOAQUIN
CA3910001_061_061	CA3910001	CALIFORNIA WATER SERVICE - STOCKTON	WELL 70-01 - RAW PRE-BLEND	SAN JOAQUIN
CA3910001_065_065	CA3910001	CALIFORNIA WATER SERVICE - STOCKTON	WELL 77-01	SAN JOAQUIN
CA3900844_001_001	CA3900844	COUNTRY MANOR MHP	WELL#1	SAN JOAQUIN
CA3900607_001_001	CA3900607	COUNTRY SQUIRE MOBILE ESTATES & WATER SY	WELL	SAN JOAQUIN
CA3900842_001_001	CA3900842	DOUBLE L MOBILE ESTATES	YARD WELL (WELL#2)	SAN JOAQUIN

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CA3910003_009_009	CA3910003	ESCALON, CITY OF	WELL NO. 09	SAN JOAQUIN
CA3901114_001_001	CA3901114	KING ISLAND TRAILER PARK WATER SYSTEM	WELL	SAN JOAQUIN
CA3910009_001_001	CA3910009	SAN JOAQUIN COUNTY - THORNTON	WELL 01	SAN JOAQUIN
CA3910009_002_002	CA3910009	SAN JOAQUIN COUNTY - THORNTON	WELL 02	SAN JOAQUIN
CA3901074_002_002	CA3901074	TWIN OAKS MOBILE PARK	EAST WELL	SAN JOAQUIN
CA3901113_001_001	CA3901113	WALNUT ACRES	WELL#1	SAN JOAQUIN
CA4010832_003_003	CA4010832	ATASCADERO STATE HOSPITAL	WELL 03 (1969)	SAN LUIS OBISPO
CA4000507_002_002	CA4000507	GARDEN FARMS C.W.D.	WELL 02	SAN LUIS OBISPO
CA4000507_003_003	CA4000507	GARDEN FARMS C.W.D.	WELL 03	SAN LUIS OBISPO
CA4010015_001_001	CA4010015	MORRO ROCK MUTUAL WATER CO	WELL 01 - STANDBY	SAN LUIS OBISPO
CA4010005_004_004	CA4010005	OCEANO COMM SERVICES DIST.	WELL 06	SAN LUIS OBISPO
CA4000653_002_002	CA4000653	RANCHO COLINA MOBILE HOME PARK	WELL 02	SAN LUIS OBISPO
CA4010025_006_006	CA4010025	SLO CWD NO. 10 - CAYUCOS WTP	WHALE ROCK WELL (1989) - CAWO	SAN LUIS OBISPO
CA4010024_005_005	CA4010024	SLO CWWD NO. 23 - SANTA MARGARITA	WELL 04 (1996)	SAN LUIS OBISPO
CA4200870_002_002	CA4200870	CASMALIA COMMUNITY SERVICES DISTRICT	CASMITE WELL #2	SANTA BARBARA
CA4210011_009_009	CA4210011	CITY OF SANTA MARIA UTILITIES DEPARTMENT	WELL 09S	SANTA BARBARA
CA4210009_002_002	CA4210009	CUYAMA COMMUNITY SERVICES DISTRICT	REHOBOTH 01 (HILL 01)	SANTA BARBARA
CA4200703_007_007	CA4200703	EL CAPITAN MUTUAL WATER COMPANY	WELL #7R	SANTA BARBARA
CA4200703_012_012	CA4200703	EL CAPITAN MUTUAL WATER COMPANY	WELL #12	SANTA BARBARA
CA4210006_006_006	CA4210006	LOMPOC-CITY WATER UTILITY DIV	WELL 03A	SANTA BARBARA
CA4210006_011_011	CA4210006	LOMPOC-CITY WATER UTILITY DIV	WELL 08 (1991)	SANTA BARBARA
CA4200842_001_001	CA4200842	SAINT MARIE MOBILE HOME PARK	WELL #1	SANTA BARBARA
CA4400763_001_001	CA4400763	BUENA VISTA MIGRANT CENTER	WELL #1	SANTA CRUZ
CA4400660_003_003	CA4400660	RANCHO SAN ANDREAS	WELL #3	SANTA CRUZ
CA4400762_001_001	CA4400762	SHERIFF'S REHAB	WELL #1	SANTA CRUZ

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CA4400557_001_001	CA4400557	ST FRANCIS TRACT WATER SYSTEM	WELL	SANTA CRUZ
CA4510001_001_001	CA4510001	CITY OF ANDERSON	WELL 09-BALLS FERRY WELL	SHASTA
CA4510016_003_003	CA4510016	CLEAR CREEK CSD-ANDERSON	WELL 01	SHASTA
CA4500009_002_002	CA4500009	CORTLAND PINES MUTUAL WATER CO	WELL 01	SHASTA
CA4500107_001_001	CA4500107	COTTONWOOD RIDGE MANUFACTURED HOUSING CO	WELL 01 - RAW	SHASTA
CA4500107_003_003	CA4500107	COTTONWOOD RIDGE MANUFACTURED HOUSING CO	WELL 03 - RAW	SHASTA
CA4500246_001_001	CA4500246	EL RIO ESTATES	WELL 01 - RAW	SHASTA
CA4510008_003_003	CA4510008	FALL RIVER VALLEY CSD	WELL 01 - MCARTHUR WELL	SHASTA
CA4500008_001_001	CA4500008	LAKESHORE VILLA MUTUAL WATER CO	WELL 01 - RAW	SHASTA
CA4500013_001_001	CA4500013	LAKESIDE WOODS MUTUAL WATER CO	WELL 01 - RAW	SHASTA
CA4510002_005_005	CA4510002	MOUNTAIN GATE C.S.D.	BASS WELL 03 - RAW	SHASTA
CA4500106_001_001	CA4500106	RIO VISTA MOBILEHOME ESTATES	WELL 01 - RAW	SHASTA
CA4510009_002_002	CA4510009	SHASTA FOREST VILLAGE M.W.C.	WELL 02 - BAMBI	SHASTA
CA4500007_001_001	CA4500007	VERDE VALE WATER COMPANY	WELL #2- RAW	SHASTA
CA4610001_004_004	CA4610001	CITY OF LOYALTON	WELL 03 - HIGH SCHOOL	SIERRA
CA4610001_008_008	CA4610001	CITY OF LOYALTON	PARK WELL	SIERRA
CA4600019_001_001	CA4600019	SIERRA CO. W.W.D #1 CALPINE	WELL 02	SIERRA
CA4600019_002_002	CA4600019	SIERRA CO. W.W.D #1 CALPINE	WELL 01	SIERRA
CA4600009_002_002	CA4600009	SIERRA CSA #5, SIERRA BROOKS	WELL 02	SIERRA
CA4600009_003_003	CA4600009	SIERRA CSA #5, SIERRA BROOKS	WELL 03	SIERRA
CA4700542_002_002	CA4700542	ABRAMS LAKE MOBILE ESTATES	WELL 01	SISKIYOU
CA4710001_001_001	CA4710001	DORRIS, CITY OF	WELL 04 - STANDBY	SISKIYOU
CA4710001_003_003	CA4710001	DORRIS, CITY OF	WELL 06	SISKIYOU
CA4700638_001_001	CA4700638	OAK VALLEY ACRES P.O.A.	WELL 01	SISKIYOU
CA4700521_002_002	CA4700521	SISKIYOU CO.SERVICE AREA #5/CARRICK	CARRICK PARK WELL	SISKIYOU
CA4710010_001_001	CA4710010	TULELAKE, CITY OF	WELL 01 - STANDBY RAW	SISKIYOU
CA4710009_002_002	CA4710009	WEED, CITY OF	GAZELLE WELL - STANDBY	SISKIYOU
CA4710009_003_003	CA4710009	WEED, CITY OF	MAZZEI WELL	SISKIYOU
CA4710011_003_003	CA4710011	YREKA, CITY OF	NORTH WELL - RAW - STANDBY	SISKIYOU
CA4800561_002_002	CA4800561	SNUG HARBOR RV LP	WELL 02	SOLANO
CA4800561_004_004	CA4800561	SNUG HARBOR RV LP	WELL DW-1R	SOLANO
CA4901071_002_002	CA4901071	BOULEVARD HEIGHTS MUTUAL WATER	WELL 02	SONOMA

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA4900508_006_006	CA4900508	CAZADERO WATER COMPANY, INC. (PUC)	BEI HORIZONTAL WELL	SONOMA
CA4900871_004_004	CA4900871	DE ANZA MOON VALLEY WATER COMPANY	WELL 02	SONOMA
CA4900637_002_002	CA4900637	MAGIC MOUNTAIN MUTUAL WATER COMPANY	AUSTIN CREEK WELL 02	SONOMA
CA4910026_010_010	CA4910026	ODD FELLOWS RECREATION CLUB	WELL 07	SONOMA
CA4900639_001_001	CA4900639	REDWOOD HEIGHTS MUTUAL WATER COMPANY	WELL 01	SONOMA
CA4900543_001_001	CA4900543	SONOMA COUNTY CSA 41-SALMON CREEK	MARYANA WELL 01	SONOMA
CA4910020_001_001	CA4910020	SONOMA COUNTY WATER AGENCY	RADIAL COLLECTOR WELL 03 - MIRABEL SITE	SONOMA
CA4910020_003_003	CA4910020	SONOMA COUNTY WATER AGENCY	RADIAL COLLECTOR WELL 05 - MIRABEL SITE	SONOMA
CA4910020_006_006	CA4910020	SONOMA COUNTY WATER AGENCY	TODD RD. WELL 01	SONOMA
CA4910020_015_015	CA4910020	SONOMA COUNTY WATER AGENCY	WELL 04 - MIRABEL PROD WELL - STANDBY	SONOMA
CA4910028_002_002	CA4910028	SWEETWATER SPRINGS CWD - MONTE RIO	MONTE RIO WELL 04	SONOMA
CA4900791_002_002	CA4900791	WESTERN MOBILE HOME PARK	WELL 02	SONOMA
CA5000082_001_001	CA5000082	4N MOBILEHOME PARK	WELL 01	STANISLAUS
CA5000060_002_002	CA5000060	CASA DE AMIGOS MANUFACTURED HOUSING COMM	SOUTH WELL	STANISLAUS
CA5010028_038_038	CA5010028	CERES, CITY OF	WELL 38 - RAW TO GAC	STANISLAUS
CA5010006_002_002	CA5010006	CITY OF WATERFORD	WELL NO. 244 - RAW - GAC - STANDBY	STANISLAUS
CA5010006_006_006	CA5010006	CITY OF WATERFORD	WELL NO. 303 - RAW TO GAC	STANISLAUS
CA5000058_002_002	CA5000058	FISHERMAN'S BEND MHP	WEST- MHP WELL	STANISLAUS
CA5010010_003_003	CA5010010	MODESTO, CITY OF	WELL 001 - RAW	STANISLAUS
CA5010010_041_041	CA5010010	MODESTO, CITY OF	WELL 039	STANISLAUS
CA5010010_042_042	CA5010010	MODESTO, CITY OF	WELL 040	STANISLAUS
CA5010010_048_048	CA5010010	MODESTO, CITY OF	WELL 046	STANISLAUS
CA5010010_070_070	CA5010010	MODESTO, CITY OF	WELL 057	STANISLAUS
CA5010010_127_127	CA5010010	MODESTO, CITY OF	WELL 265	STANISLAUS
CA5010010_129_129	CA5010010	MODESTO, CITY OF	WELL 259	STANISLAUS
CA5010010_146_146	CA5010010	MODESTO, CITY OF	WELL 304 - RAW	STANISLAUS
CA5010010_149_149	CA5010010	MODESTO, CITY OF	WELL 237	STANISLAUS
CA5010010_172_172	CA5010010	MODESTO, CITY OF	WELL 300	STANISLAUS
CA5010010_180_180	CA5010010	MODESTO, CITY OF	WELL 291 - RAW	STANISLAUS

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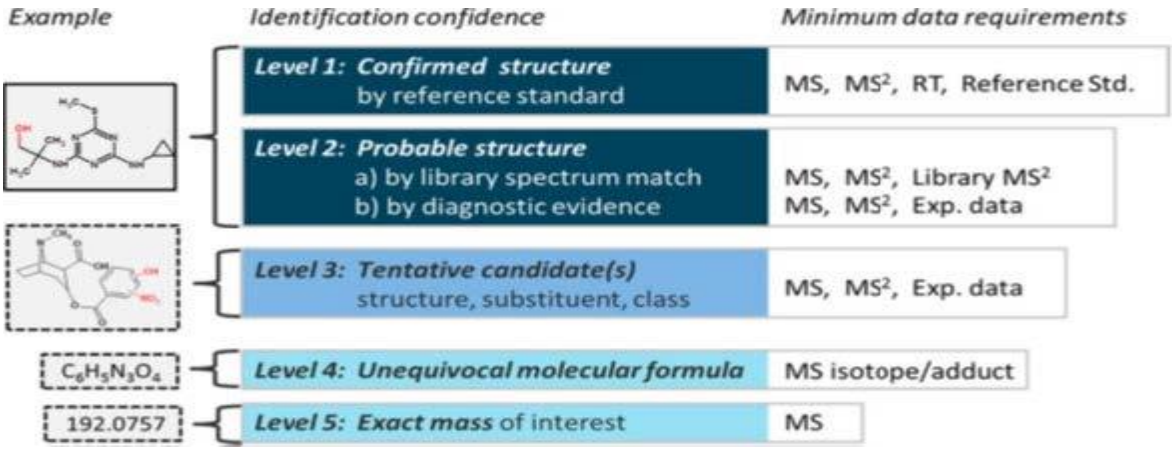
CA5000016_002_002	CA5000016	OID #41 - MOUNTAIN VIEW	WELL#3	STANISLAUS
CA5010019_022_022	CA5010019	TURLOCK, CITY OF	WELL NO. 22	STANISLAUS
CA5010019_031_031	CA5010019	TURLOCK, CITY OF	WELL NO. 31	STANISLAUS
CA5110001_003_003	CA5110001	CITY OF LIVE OAK	WELL 03	SUTTER
CA5110001_004_004	CA5110001	CITY OF LIVE OAK	WELL 04	SUTTER
CA5110001_011_011	CA5110001	CITY OF LIVE OAK	WELL 01A	SUTTER
CA5110001_017_017	CA5110001	CITY OF LIVE OAK	WELL 07	SUTTER
CA5101009_001_001	CA5101009	WILDWOOD EAST MUTUAL	WELL 01	SUTTER
CA5101009_002_002	CA5101009	WILDWOOD EAST MUTUAL	WELL 02	SUTTER
CA5201140_002_002	CA5201140	ANTOINETTE MUTUAL WATER CO	WELL #2 (DEEP WELL)	TEHAMA
CA5210001_001_001	CA5210001	CITY OF CORNING	6TH ST. WELL	TEHAMA
CA5210001_003_003	CA5210001	CITY OF CORNING	BUTTE ST. WELL	TEHAMA
CA5210001_009_009	CA5210001	CITY OF CORNING	FRIPP STREET WELL	TEHAMA
CA5210004_007_007	CA5210004	CITY OF RED BLUFF	WELL 07	TEHAMA
CA5210004_008_008	CA5210004	CITY OF RED BLUFF	WELL 08	TEHAMA
CA5210004_015_015	CA5210004	CITY OF RED BLUFF	WELL 14	TEHAMA
CA5200504_003_003	CA5200504	CITY OF TEHAMA	WELL 03 - NORTH END 4TH ST.	TEHAMA
CA5200574_002_002	CA5200574	DEL ORO WC - LARKSPUR MEADOWS	WELL 03-NEW WELL	TEHAMA
CA5200502_001_001	CA5200502	LAS FLORES WATER WORKS	WELL #1	TEHAMA
CA5200510_001_001	CA5200510	RIVER RANCH MOBILE HOME PARK	WELL #1	TEHAMA
CA5200010_002_002	CA5200010	WOODSON BRIDGE RV PARK	WELL #2 (BACK WELL)	TEHAMA
CA5301001_003_003	CA5301001	BUCKTAIL MUTUAL WATER COMPANY	WELL 03	TRINITY
CA5301001_005_005	CA5301001	BUCKTAIL MUTUAL WATER COMPANY	WELL 4	TRINITY
CA5301104_003_003	CA5301104	COVINGTON MILL MWC-DIVISION B	WELL 02 XCLD	TRINITY
CA5301104_004_004	CA5301104	COVINGTON MILL MWC-DIVISION B	COMBINED - WELLS 01,02, & 03	TRINITY
CA5301102_003_003	CA5301102	TRINITY KNOLLS MUTUAL WATER COMPANY	WELL 02 - RAW	TRINITY
CA5301102_006_006	CA5301102	TRINITY KNOLLS MUTUAL WATER COMPANY	WELL 05 - RAW	TRINITY
CA5301102_007_007	CA5301102	TRINITY KNOLLS MUTUAL WATER COMPANY	WELL 06 - RAW	TRINITY
CA5400544_002_002	CA5400544	ALLENSWORTH CSD	WELL 01 - EAST - RAW	TULARE
CA5410001_003_003	CA5410001	CUTLER PUD	WELL 05 - RAW	TULARE
CA5400935_001_001	CA5400935	CWS - MULLEN WATER COMPANY	WELL 300-01-BEFORE NO3, PERCHLORATE TRT	TULARE
CA5400602_001_001	CA5400602	EAGLE'S NEST RESORT	WELL 01	TULARE

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA5410021_001_001	CA5410021	EARLIMART PUD	NEW TULARE STREET WELL - RAW	TULARE
CA5400744_001_001	CA5400744	EAST THREE RIVERS MUTUAL WATER CORP	WELL 01 - RAW	TULARE
CA5410004_001_001	CA5410004	FARMERSVILLE, CITY OF	WELL 01A - STANDBY	TULARE
CA5400769_001_001	CA5400769	FOOTHILL APARTMENTS	WELL 01 - RAW	TULARE
CA5410006_015_015	CA5410006	LINDSAY, CITY OF	WELL 15 (CITY WELL) - RAW	TULARE
CA5400631_001_001	CA5400631	LINNELL FARM LABOR CENTER	WELL 01 - SOUTH	TULARE
CA5410008_008_008	CA5410008	OROSI PUBLIC UTILITY DISTRICT	WELL 08-RAW	TULARE
CA5400732_001_001	CA5400732	PIERPOINT SPRINGS WATER CO.	WELL 01	TULARE
CA5410009_004_004	CA5410009	PIXLEY PUBLIC UTIL DIST	WELL 04 - RAW	TULARE
CA5410010_010_010	CA5410010	PORTERVILLE, CITY OF	WELL C-8 - RAW	TULARE
CA5410010_024_024	CA5410010	PORTERVILLE, CITY OF	WELL C-21 - RAW	TULARE
CA5410010_049_049	CA5410010	PORTERVILLE, CITY OF	WELL R-07 - RAW	TULARE
CA5410010_056_056	CA5410010	PORTERVILLE, CITY OF	WELL C-25 - RAW	TULARE
CA5410010_090_090	CA5410010	PORTERVILLE, CITY OF	WELL AP-2 - RAW	TULARE
CA5410048_001_001	CA5410048	PORTERVILLE-JONES CORNER	WELL R-11 - RAW	TULARE
CA5410024_004_004	CA5410024	RICHGROVE COMMUNITY SERVICES DISTRICT	WELL 04 - RAW	TULARE
CA5402036_004_004	CA5402036	R-RANCH IN THE SEQUOIAS	WELL 04	TULARE
CA5400550_001_001	CA5400550	SEVILLE WATER COMPANY	WELL 01 - RAW	TULARE
CA5410012_002_002	CA5410012	STRATHMORE PUBLIC UTIL DIST	WELL 02 - BEFORE NO3 BLND	TULARE
CA5400824_002_002	CA5400824	SULTANA COMMUNITY SERVICES DISTRICT	WELL 02 - SOUTH STBY	TULARE
CA5410038_020_020	CA5410038	TERRA BELLA IRRIGATION DISTRICT - TBT	WELL 85 - RAW	TULARE
CA5410038_025_025	CA5410038	TERRA BELLA IRRIGATION DISTRICT - TBT	WELL 87 - RAW	TULARE
CA5410015_073_073	CA5410015	TULARE, CITY OF	WELL 45 - RAW	TULARE
CA5410020_006_006	CA5410020	WOODLAKE, CITY OF	WELL 10 - RAW	TULARE
CA5410020_009_009	CA5410020	WOODLAKE, CITY OF	WELL 13 - RAW	TULARE
CA5410025_004_004	CA5410025	WOODVILLE PUBLIC UTILITY DIST	WELL 03 - RAW	TULARE
CA5500120_002_002	CA5500120	49ER TRAILER RANCH	WELL 2	TUOLUMNE
CA5510008_005_005	CA5510008	LAKE DON PEDRO CSD	RANCHITO WELL NO. 2	TUOLUMNE
CA5500053_002_002	CA5500053	LEISURE PINES MUTUAL WATER CO	WELL 2	TUOLUMNE
CA5500057_002_002	CA5500057	LONG BARN PROPERTY OWNERS	WELL 2	TUOLUMNE
CA5500057_004_004	CA5500057	LONG BARN PROPERTY OWNERS	WELL 2A (2007)	TUOLUMNE
CA5500071_001_001	CA5500071	RAWHIDE INVESTMENT COMPANY	WELL 1 - RAW	TUOLUMNE
CA5500077_002_002	CA5500077	SLIDE INN SNOWBOWL WATER CO	WELL - SI 2	TUOLUMNE

PS CODE	PWSID	WATER SYSTEM NAME	WELL NAME	COUNTY
CA5500086_001_001	CA5500086	SONORA ESTATES MOBILE HOME PARK	WELL 1	TUOLUMNE
CA5510023_002_002	CA5510023	SONORA MEADOWS MUTUAL WTR CO	WELL NO. 1	TUOLUMNE
CA5510001_011_011	CA5510001	TUD - SONORA/JAMESTOWN WATER SYSTEM	MONO VILLAGE WELL 2 STBY	TUOLUMNE
CA5500119_001_001	CA5500119	YOSEMITE VISTA ESTATES	WELL 2	TUOLUMNE
CA5610021_005_005	CA5610021	CAL AMERICAN WATER COMPANY - PIRU	WELL 04	VENTURA
CA5610010_001_001	CA5610010	CAL AMERICAN WC - RIO PLAZA	WELL 02	VENTURA
CA5610001_001_001	CA5610001	DEMPSEY ROAD MUTUAL WATER CO	WELL 01 - STANDBY	VENTURA
CA5602108_002_002	CA5602108	GARDEN ACRES MUTUAL WATER CO	WELL 03 (1993)	VENTURA
CA5601401_003_003	CA5601401	KROTONA INSTITUTE	NORTH WELL 03 - STANDBY	VENTURA
CA5602111_003_003	CA5602111	NYELAND ACRES MUTUAL WATER CO	WELL 04	VENTURA
CA5601116_002_002	CA5601116	SAN CAYETANO MUTUAL WATER CO	WELL 05	VENTURA
CA5601141_004_004	CA5601141	SOUTH MOUNTAIN MUTUAL WATER CO	WELL 02	VENTURA
CA5610029_002_002	CA5610029	VINEYARD AVENUE ACRES MWC	WELL 02	VENTURA
CA5700555_001_001	CA5700555	BONFIRE VILLAGE HOTEL	WELL 01	YOLO
CA5700700_001_001	CA5700700	CACHEVILLE SERVICE DIST	SACRAMENTO ST. WELL	YOLO
CA5700712_001_001	CA5700712	CAL AM - DUNNIGAN	WELL 01	YOLO
CA5700712_050_050	CA5700712	CAL AM - DUNNIGAN	WELL 03	YOLO
CA5700571_011_011	CA5700571	MADISON SERVICE DIST	WELL 02 (STBY)	YOLO
CA5710009_001_001	CA5710009	UC - DAVIS	DOMESTIC WELL 02	YOLO
CA5710009_004_004	CA5710009	UC - DAVIS	DOMESTIC WELL 05	YOLO
CA5810001_008_008	CA5810001	CAL-WATER SERVICE CO.- MARYSVILLE	WELL 07-02	YUBA
CA5810001_009_009	CA5810001	CAL-WATER SERVICE CO.- MARYSVILLE	WELL 08-01	YUBA
CA5810001_016_016	CA5810001	CAL-WATER SERVICE CO.- MARYSVILLE	WELL 15-01	YUBA
CA5800924_002_002	CA5800924	CAMPTONVILLE COMMUNITY SERV DIST	WELL B	YUBA
CA5800832_001_001	CA5800832	CASTLEWOOD MOBILE HOME PARK	WELL	YUBA
CA5800863_002_002	CA5800863	FELLOWSHIP OF FRIENDS	SHOP WELL	YUBA
CA5800803_003_003	CA5800803	LOMA RICA WATER COMPANY	WELL	YUBA
CA5810003_010_010	CA5810003	OLIVEHURST PUBLIC U.D.	WELL 28	YUBA
CA5800821_002_002	CA5800821	WHEATLAND PARK ESTATES	WELL 02	YUBA

APPENDIX B: THE SCHYMANSKI SCALE

Description of NTA analysis confidence rating method adapted from Schymanski et al. 2014 to be used in reporting data.



Schymanski, E.L., J. Jeon, R Gulde, K. Fenner, M. ruff, H.P. Singer, J. Hollender. Identifying small molecules via high resolution mass spectrometry: communicating confidence. Env. Sci. Tech. 2014, 48,2097-2098. Dx.doAi.org/10.1021/es5002105.

APPENDIX C: DAILY FIELD CHECKLIST

PFAS BROAD SPECTRUM PROJECT - DAILY CHECKLIST

Activities (Pre-Sampling):

- ☐ Verify that the well owner was notified of sampling event.
- ☐ Review sampling guidance document (procedures for sampling).
- ☐ Review number of sites to be sampled.
- ☐ Review number of samples to be collected at each site, including QC samples (e.g. field duplicates, field reagent blanks, MS/MSD)
- ☐ Confirm that enough sample containers (preserved, unpreserved) are packed.
- ☐ Confirm that enough ice is brought based on the samples to be collected for the day's planned events.
- ☐ Check that required sampling materials and supplies (see list below) are present.
- ☐ Obtain spare set of batteries for meters (i.e., temperature/pH/conductivity meter, GPS).
- ☐ Calibrate temperature/pH/conductivity meter(s) prior to daily sampling event. Record calibration results.
- ☐ Clean equipment and materials prior to sampling.

Activities (Post-Sampling):

- ☐ Fill in the Chain of Custody sheet at each sampling location.
- ☐ Write a corrective action report for any discrepancies or deviations from the QAPP that occurred during the sampling event.
- ☐ Upload daily field forms, checklist, and site photographs onto the project website.
- ☐ Confirm the schedule for the following day.

Project Documentation

- ☐ Personal Identification and company ID badge or business card
- ☐ List of contact information for Project Sampling Coordinator, and State Water Resources Control Board QA Officer and QAPP Project Manager.
- ☐ Sampling guidance document and QAPP
- ☐ Field sampling schedule, maps, and addresses of well locations.
- ☐ Chain of custody forms
- ☐ Field forms

Sample Documentation, Shipping, and Handling

- ☐ Sample bottle kits
- ☐ Field blank kits
- ☐ Ice chest
- ☐ Wet Ice

- ☐ Packing material to ship samples (e.g., bubble wrap, packing tape)
- ☐ Extra sample labels
- ☐ Nitrile gloves in different sizes (powderless)
- ☐ Office supplies (indelible ballpoint or gel pens, PFAS-free tape)
- ☐ HDPE resealable bags
- ☐ Overnight carrier shipping forms

Field Meters

- ☐ Temperature/pH/EC/TDS meter and batteries
- ☐ Meter calibration standards and cleaning reagents
- ☐ GPS and charger

Decontamination

- ☐ Paper towels
- ☐ Scissors/cutter
- ☐ Alconox® or Liqui-Nox® soap
- ☐ Distilled or Deionized water

Other

- ☐ Safety glasses
- ☐ First Aid Kit
- ☐ Field clipboard
- ☐ Garbage bags
- ☐ Cell phone and charger
- ☐ Camera and charger – ensure time and date stamps are on digital image
- ☐ Folding table
- ☐ Tape measure

APPENDIX D: SAMPLE FIELD FORM

PFAS BROAD SPECTRUM PROJECT - SAMPLE FIELD FORM

SAMPLE ID#:		
SAMPLE COLLECTED BY:	**DATE:**	**TIME:**
SAMPLING CONTRACTOR BUSINESS NAME:		
WEATHER CONDITIONS:		

DUPLICATE SAMPLE COLLECTED? ☐ YES ☐ NO

If Yes, Sample ID#: _____

FIELD BLANK COLLECTED? ☐ YES ☐ NO

If Yes, Sample ID#: _____

Public Water System Information:

PUBLIC WATER SYSTEM NAME:		**PWS CODE:**
WELL/FACILITY NAME:		
STREET NUMBER:		**STREET NAME:**
CITY:	**COUNTY:**	**ZIP CODE:**
COMMENTS/NOTES:		

***Well Information**:*

TYPE OF SURFACE PAVEMENT AROUND WELL: ☐ **CONCRETE** ☐ **ASPHALT** ☐ **DIRT** ☐ **OTHER:**	
WELL SECURITY: ☐ **SECURED** ☐ **UNSECURED** **REMARKS:**	
SURFACE WATER DRAINAGE AWAY FROM WELL? ☐ **YES** ☐ **NO** ☐ **UNSURE**	
CASING DIAMETER AT SURFACE (INCHES):	
WELL LOCATION -GPS LONGITUDE (W):	**WELL LOCATION -GPS LATITUDE (N):**
GPS ELEVATION (ft. MSL):	**GPS MODEL NAME:**
PHOTOGRAPHS TO COLLECT: • **General: ground surface, well pump, piping, and surrounding background (structure, landscape, entire well building, if present)** • **Specific to Well – well pump, including ground surface** • **Sample port used to collect sample**	

***Sample Collection Information**:*

LOCATION OF SAMPLE PORT (in relation to the well and any treatment) (collect sample prior to treatment and hydrostatic tank)(include picture):	
SAMPLE ANALYSES COLLECTED: ☐ **EPA METHOD 533** ☐ **AOF-CIC** ☐ **LC-HRMS/IC-MSMS** ☐ **Other: _____**	**WELL PUMP OPERATING DURING SAMPLING?** ☐ **ON** ☐ **OFF** ☐ **UNSURE**
REMARKS:	

Water Quality Field Parameters:

MULTIMETER MODEL:					
pH Calibration					
Date: Time:	Temp adjusted value (°F):	pH 4 standard readout prior to reset:	pH 4 standard reset value:	Standard expiration date:	Initials
Specific Conductance Calibration					
Date: Time:	Conductivity before reset (µS.cm):	Conductivity reset value (µS/cm):	Buffer standard:	Buffer expiration date:	Initials
Turbidity Calibration					
Date: Time:	Turbidity before reset (nTU):	Turbidity reset value (NTU):	Standard (NTU):	Standard expiration date:	Initials

Well Measurement 1: Date: Time:	Temperature (°F):	pH:	Electrical Conductivity (µS/cm):
Well Measurement 2: Date: Time:	Temperature (°F):	pH:	Electrical Conductivity (µS/cm):
Well Measurement 3: Date: Time:	Temperature (°F):	pH:	Electrical Conductivity (µS/cm):

TURBIDITY (NTU):	
GAS BUBBLES: ☐ **PRESENT** ☐ **NOT PRESENT**	**ODOR PRESENT?** ☐ **NO** ☐ **YES** **IF YES, DESCRIBE:**
COLOR: ☐ **CLEAR** ☐ **CLOUDY** ☐ **OTHER, PLEASE DESCRIBE:**	

SEDIMENT PRESENT IN SAMPLE?

☐ **NO** ☐ **YES** **IF YES, DESCRIBE CHARACTERISTICS:**

∗Take a minimum of three water samples for the above parameters (beginning of purging well, midway, and just before sampling).

OTHER REMARKS:

APPENDIX E: CHAIN OF CUSTODY FORM

Sample Collection Agency:	Agreement No.:
Sample Collection Agency Address:	Project Code:
	Project Name:
Project Lead:	Field Lead:
Name:	Name:
Phone:	Phone:
Email:	Email:

	Sample ID	Date	Time	Location	Sample Matrix (See Codes Below)	Sample Type (G=Grab; O=Other)	Container Size (ml)	Container Type (H=HDPE)	Preservation Code (See Codes Below)	# of Containers	Analyses Requested: EPA Method 533	Analyses Requested: AOF-CIC	Analyses Requested: LC-HRMS DoD QSM extract	Analyses Requested: IC-MSMS—DoD extract (TFA, PFPrA, TFMS, PFEtS, PFPrS, Bistrif, PF6)	Field Quality Meter Readings (last measurement before sample collection): pH (unitless)	Conductivity (µS/cm)	Turbidity (NTU)	Notes
1)																		
2)																		
3)																		
4)																		
5)																		
6)																		
7)																		
8)																		
9)																		
10)																		

Samples Relinquished By:	Name (Print) and Agency	Signature	Date	Time	Samples Received By:	Name (Print) and Agency	Signature	Date	Time
1)									
2)									
3)									
4)									

Sample Matrix	Preservation Codes	Sample Receipt — Completed by Laboratory personnel:		Laboratory Notes:	Special Instructions:	
SFW = Surface Fresh Water; SSW = Surface Salt Water; DW = Drinking Water; GW = Groundwater; SW = Stormwater; WW = Wastewater; OL = Other Liquids; SO = Soil / Sediment; SL = Sludge / Slurry; OS = Other Solids; O = Other_____	1. Cool, ≤ 6 °C 2. HNO3 3. HCl 4. H2SO4 5. Na2S2O3 6. NaOH 7. NaOH/ZnAcetate 8. NH4Cl 9. Trizma 10. Filtered 11. Freeze, ≤ −10 °C 12. None required 13. Other_____	Total Number of Sample Containers Received:			Evidence sample handling required?	☐
		Sample(s) Properly Cooled: Y / N / NA Temperature: °C			Return Shipping Containers?	☐
		Sample(s) Intact: Y / N / NA			Turn Around Time: Routine	☐
		Custody Seal(s) Intact: Y / N / NA		Send Results to:	*3-5 Day (Rush)	☐
		Sample(s) Accepted: Y / N			*48-Hr (Rush)	☐

APPENDIX F: CORRECTIVE ACTION REPORT TEMPLATE

Date:

Reporting Party:

Involved Party:

Subject:

Problem Type:

Problem Description:

Proposed Corrective Action:

Impact on Data:

Sample Results:

Follow Up:

FOR INTERNAL USE:

Resolution Date:

Quality Assurance (QA) Officer name:

QA Signature: Date:

Contract Manager: Date:

APPENDIX G: SAMPLE BOTTLE KIT, SAMPLE PREPARATION FOR SHIPPING, PACKING THE COOLER, AND SHIPPING INSTRUCTIONS

PFAS BROAD SPECTRUM PROJECT

SAMPLE BOTTLE KIT

Each well sample will be analyzed by EPA Method 533 and AOF-CIC. The number of sample collection bottles are provided below. One sample bottle will be needed for both the NTA analysis by high resolution mass spectrometry (HRMS) and analysis of selected Ultra-short PFAS by IC-MS/MS. The assignment of a field duplicate, matrix spike and matrix spike duplicate at a well or for a sampling event will be made before the sampling event and in time to acquire the necessary containers for the event.

CONTAINER LIST BY SAMPLE TYPE AND ANALYTICAL TEST

Field Sample Type	EPA Method 533	AOF-CIC	LC-HRMS – DoD QSM extract	IC-MS/MS – DoD QSM extract
Well	2 x 250 ml polypropylene or HDPE; ammonium acetate preservative	1 x 250 ml polypropylene or HDPE; no preservative	1 x 250 ml polypropylene or HDPE; no preservative	1 x 250 ml polypropylene or HDPE; no preservative
Field Reagent Blank	1 x 250 ml polypropylene or HDPE; ammonium acetate preservative	1 x 250 ml polypropylene or HDPE; no preservative	1 x 250 ml polypropylene or HDPE; no preservative	1 x 250 ml polypropylene or HDPE; no preservative
Field Duplicate	2 x 250 ml polypropylene or HDPE; ammonium acetate preservative	2 x 250 ml polypropylene or HDPE; no preservative	2 x 250 ml polypropylene or HDPE; no preservative	1 x 250 ml polypropylene or HDPE; no preservative
Matrix Spike & Matrix Spike Duplicate	2 x 250 ml polypropylene or HDPE; ammonium acetate preservative	2 x 250 ml polypropylene or HDPE; no preservative	2 x 250 ml polypropylene or HDPE; no preservative	1 x 250 ml polypropylene or HDPE; no preservative

Babcock Lab will provide bottle kits based on the following six scenarios. These scenarios give the sampling crew the ability to meet the quality control requirement metrics among the analyses planned at each well and depending on if the well is pre-selected for a LC-HRMS/IC-MS/MS sample since they are collected at a lesser frequency than the other analyses:

- If a field duplicate is needed, use Kit B (no NTA) or Kit D (NTA)
- If an MS/MSD is needed, use Kit E (no NTA) and Kit F (NTA)
- If a field duplicate or MS/MSD is not needed, use Kit A (no NTA), Kit C (NTA)

Sample Kit	A	B	C	D	E	F
533 & AOF	Yes	Yes	Yes	Yes	Yes	Yes
QSM (LC-HRMS/IC-MSMS)	No	No	Yes	Yes	No	Yes
FB	Yes	Yes	Yes	Yes	Yes	Yes
FD	No	Yes	No	Yes	No	No
MS/MSD	No	No	No	No	Yes	Yes
Included in Kit:	**533** (250 mL Ammonium Acetate) 2 Field Samples 1 Field Blank **AOF** (250 mL unpreserved) 2 Field Samples 1 Field Blank **DI Water** 2 Bottles	**533** (250 mL Ammonium Acetate) 4 Field Samples 1 Field Blank **AOF** (250 mL unpreserved) 4 Field Samples 1 Field Blank **DI Water** 2 Bottles	**533** (250 mL Ammonium Acetate) 2 Field Samples 1 Field Blank **AOF** (250 mL unpreserved) 2 Field Samples 1 Field Blank **LC-HRMS/IC-MSMS** (250 mL unpreserved) 2 Field Samples 1 Field Blank **DI Water** 3 Bottles	**533** (250 mL Ammonium Acetate) 4 Field Samples 1 Field Blank **AOF** (250 mL unpreserved) 4 Field Samples 1 Field Blank **LC- HRMS/IC-MSMS** (250 mL unpreserved) 4 Field Samples 1 Field Blank **DI Water** 3 Bottles	**533** (250 mL Ammonium Acetate) 4 Field Samples 1 Field Blank **AOF** (250 mL unpreserved) 4 Field Samples 1 Field Blank **DI Water** 2 Bottles	**533** (250 mL Ammonium Acetate) 4 Field Samples 1 Field Blank **AOF** (250 mL unpreserved) 4 Field Samples 1 Field Blank **LC-HRMS/IC-MSMS** (250 mL unpreserved) 4 Field Samples 1 Field Blank **DI Water** 3 Bottles
Number of Bottles	4 FS Bottles 2 FB Bottles 2 DI Bottles	4 FS Bottles 4 FD Bottles 2 FB Bottles 2 DI Bottles	6 FS Bottles 3 FB Bottles 3 DI Bottles	6 FS Bottles 6 FD Bottles 3 FB Bottles 3 DI Bottles	4 FS Bottles 4 MS/MSD Bottles 2 FB Bottles 2 DI Bottles	6 FS Bottles 6 MS/MSD Bottles 3 FB Bottles 3 DI Bottles

SAMPLE PREPARATION FOR SHIPPING

Samples must be stored in ice chests at least 1/3 filled with wet ice until analyzed at the laboratory. If immediate delivery to the laboratory is not possible, samples should be stored consistently at or below 10°C (50°F) while enclosed in their individual sealed bag but must not be frozen. Use fresh ice for packaging and shipping.

- Samples bottles must be filled to top rim.
- Samples must arrive at the laboratory within 48 hours of sampling and at a temperature below 10°C (50°F) but not frozen.
- If samples are received at the laboratory for more than 48 hours but no more than 3 days after sampling, they must be kept consistently below 6°C (42.8°F) but not frozen.
- **Samples should not be sent for a Saturday or Monday arrival at the laboratory**. Unless special arrangements are made with the lab for Saturday delivery, the lab is not open on Saturdays. Additionally, the courier service will not maintain sample temperatures between 6°C (42.8°F) and 0°C (32°F) if the cooler is in their possession over the weekend. The samples **WILL NOT ARRIVE** within the required temperature for preservation on the following Monday.

PACKING THE COOLER

1. Ensure that the interior of the ice chest is clean.

Example bottle kit for EPA Method 533 (non-QC) (from left to right; 2-250 ml HDPE for field blank [orange sticker – sample bottle, blue sticker – field reagent water], 2-250 ml HDPE w/ Ammonium Acetate preservative for sample). Sample bottle kit will include a resealable HDPE bag to store, and ship filled sample bottles.

Foreground: HDPE resealable bag used to store sample bottles and separately bagged ice. Background: Completely packed cooler with no empty space.

2. Place a layer of bagged wet ice at bottom of cooler.
3. Place each sample in a separate sealable HDPE bag provided by the laboratory over the bagged wet ice.
4. Place the bottles upright in the ice chest. Ensure that the bottles cannot move sideways at all.
5. Fill all remaining space with bagged wet ice.
6. Verify that chain of custody (COC) is complete and retain a copy for project files.
7. Place original copy COC inside a ziploc® plastic bag and place inside the cooler. If available, adhere a FedEx pouch to the inside of the lid and place COC into pouch and seal.
8. Close cooler.
9. Secure the lid to the cooler base by wrapping shipping tape all the way around the cooler several times at both ends of the cooler.
10. Refer to pictures to right.

COC placed in pouch adhered to inside of cooler lid.

Cooler lid secured with shipping tape around each end.

SHIPPING INSTRUCTIONS

[Courier Service] Shipping Locations

Coolers are to be dropped off **only** at a [Courier Service] Authorized Ship Center since these locations have personnel (or authorized [Courier Service] personnel) onsite to accept the cooler.

The cooler is **NOT** to be left at any Drop Box or other vendor accepting [Courier Service] shipments (e.g. Walmart, Office Depot, OfficeMax, Dollar General) that is not an authorized ship center.

Find the nearest [Courier Service] Authorized Ship Center location. Check the store hours and last pickup time – they are not the same – last pickup time could be several hours before the store closes – depending on location.

Shipping Documents

Complete and attach all required shipping documents to the outside of the cooler. Information used to complete the shipping label for domestic shipments follows.

- **ADDRESS INFORMATION**

FROM ADDRESS:	**TO ADDRESS:**
Your Name:	**Recipients Name**: Allie Guerra
Company: Office of Water Programs at California State University, Sacramento	**Company**: Babcock Labs
Country Location: United States	**Country Location**: United States
Address: 6000 J Street	**Address**: 6100 Quail Valley Court
Zip Code: 95819-6025	**Zip Code**: 92507
City: Sacramento	**City:** Riverside
State: California	**State:** California
Phone Number: (916) 278-6142	**Phone Number**: 951-653-3351
Email Notifications:	**Email Notifications**:

- **SHIPMENT DETAILS**

☐ **[Courier Service] One Rate** ☑ **[Courier Service] Standard Rate**

Package Weight: *Weight entered by courier*
Dimensions (optional):
Declared Value (optional): $1,000

Select Delivery Service

☐ **[Courier Service] Priority Overnight** *(arrives by noon the next day)*
☐ **[Courier Service] First Overnight** *(arrives by 9:30 AM the next day)*
☑ **[Courier Service] Standard Overnight** *(arrives by 5 pm the next day)*
☐ **[Courier Service] Ground** *(arrives by end of day or later)*

Additional Services

☐ **Hold at Location** (do not check)
Signature Options: None Specified

- **PAYMENT**

Bill to: Sender

[Courier Service] Account Number:

APPENDIX H: TENTATIVE COMPOUND LIST FOR MONITORING DATA QUALITY BY LC-HRMS AND IC-MS/MS

ANALYTE	SPC	CAL/CCV	QC SPIKE	EIS	NIS
PFPrA		X	TBD		
PFBA	X	X	X		
PFPeA	X	X	X		
PFHxA	X	X	X		
PFHpA	X	X	X		
PFOA	X	X	X		
PFNA	X	X	X		
PFDA	X	X	X		
PFUnA	X	X	X		
PFDoA	X	X	X		
PFTrDA	X	X	X		
PFTeDA	X	X	X		
PFHxDA	X	X	X		
PFOcDA	X	X	X		
TFMS		X	TBD		
PFEtS		X	TBD		
PFPS	X	X	TBD		
PFBS	X	X	X		
PFPeS	X	X	X		
PFHxS	X	X	X		
PFHpS	X	X	X		
PFOS	X	X	X		
PFNS	X	X	X		
PFDS	X	X	X		
PFDoDS	X	X	X		
4:2-FTS	X	X	X		
6:2-FTS	X	X	X		
8:2-FTS	X	X	X		
10:2-FTS	X	X	X		
HFPO-DA		X	TBD		
ADONA	X	X	X		
9Cl-PF3ONS	X	X	X		
11Cl-PF3OUdS	X	X	X		
PFMPA		X	TBD		
PFMBA		X	X		
PFEESA	X	X	X		
NFDHA	X	X	X		

ANALYTE	SPC	CAL/CCV	QC SPIKE	EIS	NIS
TFMSi	X	X	X		
TFMSA	X	X	X		
Bistriflimide	X	X	X		
FBSA	X	X	TBD		
FPeSA	X	X	TBD		
FHxSA	X	X	TBD		
FHpSA	X	X	TBD		
FOSA	X	X	X		
FDSA	X	X	TBD		
N-MeFOSAA	X	X	X		
N-EtFOSAA	X	X	X		
N-MeFOSA	X	X	X		
N-EtFOSA	X	X	X		
N-MeFOSE	X	X	X		
N-EtFOSE	X	X	X		
3:3 FTCA (FPrPA)	X	X	X		
5:3 FTCA (FPePA)	X	X	X		
7:3 FTCA (FHpPA)	X	X	X		
FHEA 6:2-FTCA	TBD	X	TBD		
FOEA 8:2-FTCA	TBD	X	TBD		
FDEA 10:2-FTCA	TBD	X	TBD		
7H-PFHpA	X	X	TBD		
6:2-FTUA	TBD	X	TBD		
8:2-FTUA	TBD	X	TBD		
10:2-FTUA	TBD	X	TBD		
PFHxPA	TBD	X	TBD		
8:8-PFPi	X	X	TBD		
6:2-PAP	X	X	TBD		
8:2-PAP	X	X	TBD		
6:2-diPAP	X	X	TBD		
8:2-diPAP	X	X	TBD		
N-AP-FHxSA, PFHxSAm	X	X	TBD		
N-TAmP-FHxSA, 6:2-deFTA	X	X	TBD		
N-CMAmP-6:2-FOSA, 6:2-FTAB	X	X	TBD		
PFEtChS	X	X	TBD		
PFBAm	TBD	X	TBD		
Isotopically Labeled PFAS					
[13C2]-TFA				IC only	
[13C3]-PFPrA				IC only	

ANALYTE	SPC	CAL/CCV	QC SPIKE	EIS	NIS
[13C4]-PFBA				X	
[13C5]-PFPeA				X	
[13C5]-PFHxA				X	
[13C4]-PFHpA				X	
[13C8]-PFOA				X	
[13C9]-PFNA				X	
[13C6]-PFDA				X	
[13C7]-PFUnDA				X	
[13C2]-PFDoDA				X	
[13C2]-PFTeDA				X	
[13C2]-PFHxDA				X	
[13C3]-PFBS				X	
[13C3]-PFHxS				X	
[13C8]-PFOS				X	
N-MeFOSAA-D_3				X	
N-EtFOSAA-D_5				X	
[13C2]-4:2FTS				X	
[13C2]-6:2FTS				X	
[13C2]-8:2FTS				X	
[13C8]-FOSA				X	
N-MeFOSA-D_3				X	
N-EtFOSA-D_5				X	
N-MeFOSE-D_7				X	
N-EtFOSE-D_9				X	
[13C3]-PFBA					X
[13C2]-PFHxA					X
[18O2]-PFHxS					X
[13C4]-PFOS					X
[13C4]-PFOA					X
[13C5]-PFNA					X
[13C2]-PFDA					X

CAL - Calibration (Compounds)
CCV - Continuing Calibration Verification (Compounds)
EIS - Extracted Internal Standard (Compounds)
NIS - Non-extracted Internal Standard (Compounds)
QC Spike - Quality Control Spiking Compounds for both LCS and MS/MSD
SPC - System Performance Compounds
TBD: Performance to be determined

APPENDIX I: WELL DATA – ELECTRONIC DATA DICTIONARY

Field Name	Data Type	Required	Description
PS_Code	Varchar	Yes	Unique ID pre-assigned to the Water System. Example: 1234567_001_001
PWSID	Varchar	Yes	Unique public water system (PWS) ID
PWS_water_system_name	Varchar	Yes	PWS name
PWS_County	Varchar	Yes	County for PWS
PWS_population	Int	Yes	Population of customers for the PWS
PWS_DAC_status_(2023)	Varchar	Yes	PWS status (DAC or SDAC)
PWS_number_service_connection	Int	Yes	Number of service connections
Regulating_Agency	Varchar	Yes	Division of Drinking Water (DDW) district number and region name
Well_facility_name	Varchar	Yes	PWS well ID
Well_Latitude	Varchar	Yes	Well location - latitude
Well_Longitude	Varchar	Yes	Well location - longitude
Well_elevation_in_ft_msl	Int	No	Well elevation in feet mean sea level
Well_casing_diameter_in_inches	Int	No	Well casing diameter in inches
Well_top_of_screen_in_ft_bgs	Int	No	Well – depth to top of screen in feet below ground surface
Well_screen_length_in_ft	Int	No	Well – screen length in feet
NTA_preselected_Locations	Varchar	Yes	Preselected location for Non-Target Analysis (yes, no)
Previous_Order	Varchar	Yes	Well listed in 2020/2022 or DoD DDW Order (2020 Order, DOD Order, NoPrevOrder)
ActivityStatus	Varchar	Yes	Well Activity Status (Active, Inactive, Standby)
Removed	Varchar	No	Well removed from project (Yes, No)
Added	Varchar	No	Well added to project
Updated	Varchar	No	Record updated
Changelog	Varchar	No	Description of change made to well status, sample status, NTA status.

APPENDIX J: FIELD DATA – ELECTRONIC DATA DICTIONARY

Field Name	Data Type	Required	Description
PS_Code	varchar	Yes	Unique ID pre-assigned to the Water System. Example: CA1234567_001_001
field_collection_date	datetime	Yes	Date that the field data was collected. MM/DD/YYYY format.
field_data_id	int (PK)	Yes	Integer uniquely identifying record
visit_id	int (UK)	Yes	Integer uniquely identifying sampling visit
weather_conditions	varchar	Yes	Description of weather conditions at time of sampling
pws_info_notes	varchar	No	Public water system information comments or notes
pump_operating	varchar	Yes	Pump operation during sampling (yes, no, unsure)
sample_location	varchar	Yes	Location of sample tap (well head, post-pressure tank/pre-treatment, Other)
sample_collection_remarks	varchar	No	Remarks/comments about sample collection
meter_model	varchar	Yes	Model(s) of the meter(s) used to collect field data
time_1	datetime	Yes	Collection time #1
time_2	datetime	Yes	Collection time #2
time_3	datetime	Yes	Collection time #3
temp_f_1	float	Yes	Temperature reading #1 in °F
temp_f_2	float	Yes	Temperature reading #2 in °F
temp_f_3	float	Yes	Temperature reading #3 in °F
ph_1	float	Yes	pH reading #1
ph_2	float	Yes	pH reading #2
ph_3	float	Yes	pH reading #3
ec_uscm_1	float	Yes	Electrical conductivity reading #1 in µS/cm
ec_uscm_2	float	Yes	Electrical conductivity reading #2 in µS/cm
ec_uscm_3	float	Yes	Electrical conductivity reading #3 in µS/cm
turbidity_ntu	float	Yes	Turbidity reading #1 in NTU
clarity	varchar	Yes	Clarity observation [Clear, Cloudy, Other]
clarity_other_desc	varchar	No	Description of clarity if ‘Other’ was selected
gas_bubbles	varchar	Yes	Gas bubble observation [Present, Not Present]
color	varchar	Yes	Color observation [Clear, Cloudy, Other]

Field Name	Data Type	Required	Description
color_other_desc	varchar	No	Description of color if 'Other' was selected
odor	varchar	Yes	Odor observation [No, Yes]
odor_yes_desc	varchar	No	Description of odor if 'Yes' was selected
sediment	varchar	Yes	Sediment observation [No, Yes]
sediment_yes_desc	varchar	Yes	Description of sediment if 'Yes' was selected
other_remarks	varchar	No	General remarks/notes/comments provided by sampler

APPENDIX K: EPA METHOD 533 DATA - ELECTRONIC DATA DICTIONARY

California Laboratory Intake Portal Format - https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/clip.html

Field Name	Data Type	Required	Description
Lab_ELAP_CertID	Numeric	Yes	4-digit ELAP Certification ID. See Reference Value Tables file for valid ELAP Certification IDs
Lab_Sample_ID	Text	Yes	Lab Sample Identification
Composite_YN	Text	Yes	Enter Y if this is a composite sample. Enter N if this is not a composite sample. Defaults to N
State_Sample_ID	Text (20)	Yes	PS Code_Identifying Letter EX: CA3610001_013_013_S (PS Code CA3610001_013_013, field sample Identifying Letter = field sample (S), field duplicate (D), field blank (FB), matrix spike/matrix spike duplicate (MSMSD) For method blanks, laboratory control spike, laboratory control spike duplicates, the State_Sample_ID is “Lab QC”
PS_Code	Text	Yes	Ex: CA1234567_001_001. Use the PS_Code for the field sample, field blanks, and corresponding matrix spike and matrix spike duplicates. For method blanks, laboratory control spike, laboratory control spike duplicates, the PS_Code is “Lab QC”
Collection_Address	Text		Collection_Address
Collection_Date	datetime	Yes	Collection Date in MM/DD/YYYY.
Collection_Time	datetime	Yes	Collection Time in HH:MM format. For composite parent samples (Composite_Parent_YN=Y), populate the Collection_Time with the Composite_Sample_Time
Sample_Type	Text	Yes	FB=Field Blank. RT=Routine. SP=Special. BLK = Method Blank. LCS = Laboratory Control Spike. LCSD = Laboratory Control Spike Duplicate. MS = Matrix Spike. MSD = Matrix Spike Duplicate.
Lab_Receipt_Date	datetime	Yes	Lab Receipt Date in MM/DD/YYYY
Collector_Name	Text	No	Name of sample collector

Field Name	Data Type	Required	Description
Composite_Parent_YN	Text	No	Enter Y if this is the parent for the composite sample. Enter N if this is not the parent for the composite sample. Required for composite samples only
Composite_Parent_Sample_ID	Text	No	Sample ID of the composite parent sample. Required for composite samples only. Should be equal to the Lab_Sample_ID of the composite parent sample
Composite_Sample_Date	datetime	No	Date for the composite sample in MM/DD/YYYY. Required for composite samples only. The composite sample date should be the same for all records with the same composite parent sample ID. For parent composite samples, the Collection_Date, Lab_Receipt_Date, and Composite_Sample_Date should all be the same date
Free_Chlorine_Residual	Numeric	No	Free_Chlorine_Residual (mg/L)
Total_Chlorine_Residual	Numeric	No	Total_Chlorine_Residual (mg/L)
Sample_Comments	Text	No	Sample_Comments
Analyte_Name	Text	Yes	Long version of the analyte name (e.g. 4:2 Fluorotelomer Sulfonate)
Analyte_Code	Text	Yes	4-digit Analyte Code. See Reference Value Tables file for valid analyte codes (https://download.earthsoft.com/CASWRCB/CLIP_ReferenceValueTables.xlsx)
Analysis_Start_Date	datetime	Yes	Analysis Start Date in MM/DD/YYYY
Analysis_Start_Time	datetime	Yes	Analysis Start Time in HH:MM format
Analysis_Complete_Date	datetime	No	Analysis Complete Date in MM/DD/YYYY
Analysis_Complete_Time	datetime	No	Analysis Complete Time in HH:MM format
Analysis_Method_Code	Text	Yes	See Reference Value Tables file for valid method codes
Less_Than_Indicator	Text	No	Y = non-detect. N or null = detect
Reporting_Level	Numeric	Yes	All analytes require a Reporting Level, except those analytes in the Reference Value Tables Exceptions List
Reporting_Level_Units	Text	Yes	Reporting_Level_Units
Result	Numeric	Yes	Result
Result_Units	Text	Yes	Result_Units
Radiological_Count_Error	Numeric	No	Required if analyte is a radionuclide.
Analysis_Comments	Text	Yes	Analysis_Comments

APPENDIX L: EPA METHOD 533 +, AOF-CIC, IC-MS/MS DATA - ELECTRONIC DATA DICTIONARY

Based on the California Laboratory Intake Portal Format - https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/clip.html with additional fields at the end table.

Field Name	Data Type	Required	Description
Lab_ELAP_CertID	Numeric	Yes	4-digit ELAP Certification ID. See Reference Value Tables file for valid ELAP Certification IDs
Lab_Sample_ID	Text	Yes	Lab Sample Identification
Composite_YN	Text	Yes	Enter Y if this is a composite sample. Enter N if this is not a composite sample. Defaults to N
State_Sample_ID	Text	Yes	PS Code_Identifying Letter_Analysis EX: CA3610001_013_013_S_533 (PS Code CA3610001_013_013, field sample, EPA Method 533) Identifying Letter = field sample (S), field duplicate (D), field blank (FB), matrix spike/matrix spike duplicate (MSMSD) For method blanks, laboratory control spike, laboratory control spike duplicates, the State_Sample_ID is “Lab QC”
PS_Code	Text	Yes	Ex: CA1234567_001_001. Use the PS_Code for the field sample, field blanks, and corresponding matrix spike and matrix spike duplicates. For method blanks, laboratory control spike, laboratory control spike duplicates, the PS_Code is “Lab QC”
Collection_Address	Text		Collection_Address
Collection_Date	Datetime	Yes	Collection Date in MM/DD/YYYY
Collection_Time	Datetime	Yes	Collection Time in HH:MM format. For composite parent samples (Composite_Parent_YN=Y), populate the Collection_Time with the Composite_Sample_Time
Sample_Type	Text	Yes	FB=Field Blank. RT=Routine. SP=Special. BLK = Method Blank. LCS = Laboratory Control Spike.

Field Name	Data Type	Required	Description
			LCSD = Laboratory Control Spike Duplicate. MS = Matrix Spike. MSD = Matrix Spike Duplicate.
Lab_Receipt_Date	Datetime	Yes	Lab Receipt Date in MM/DD/YYYY
Collector_Name	Text	No	Name of sample collector
Composite_Parent_YN	Text	No	Enter Y if this is the parent for the composite sample. Enter N if this is not the parent for the composite sample. Required for composite samples only
Composite_Parent_Sample_ID	Text	No	Sample ID of the composite parent sample. Required for composite samples only. Should be equal to the Lab_Sample_ID of the composite parent sample
Composite_Sample_Date	Datetime	No	Date for the composite sample in MM/DD/YYYY. Required for composite samples only. The composite sample date should be the same for all records with the same composite parent sample ID. For parent composite samples, the Collection_Date, Lab_Receipt_Date, and Composite_Sample_Date should all be the same date
Free_Chlorine_Residual	Numeric	No	Free_Chlorine_Residual (mg/L)
Total_Chlorine_Residual	Numeric	No	Total_Chlorine_Residual (mg/L)
Sample_Comments	Text	No	Sample_Comments
Analyte_Name	Text	Yes	Long version of the analyte name (e.g. 4:2 Fluorotelomer Sulfonate)
Analyte_Code	Text	Yes	4-digit Analyte Code. See Reference Value Tables file for valid analyte codes (https://download.earthsoft.com/CASWRCB/CLIP_ReferenceValueTables.xlsx). If there is no analyte code – use the analyte short name (e.g. AOF-CIC)
Analysis_Start_Date	Datetime	Yes	Analysis Start Date in MM/DD/YYYY
Analysis_Start_Time	Datetime	Yes	Analysis Start Time in HH:MM format
Analysis_Complete_Date	Datetime	No	Analysis Complete Date in MM/DD/YYYY
Analysis_Complete_Time	Datetime	No	Analysis Complete Time in HH:MM format
Analysis_Method_Code	Text	Yes	See Reference Value Tables file for valid method codes
Less_Than_Indicator	Text	No	Y = non-detect. N or null = detect
Reporting_Level	Numeric	Yes	All analytes require a Reporting Level, except those analytes in the Reference Value Tables Exceptions List
Reporting_Level_Units	Text	Yes	Reporting_Level_Units

Field Name	Data Type	Required	Description
Result	Numeric	Yes	Result
Result_Units	Text	Yes	Result_Units
Radiological_Count_Error	Numeric	No	Required if analyte is a radionuclide
Analysis_Comments	Text	Yes	Analysis_Comments
Batch	Text	Yes	Lab batch control number
MDL	Numeric	Yes	Method Detection Limit
MRL	Numeric	Yes	Method Reporting Limit
Recovery	Percent	Yes	percent recovery measured in laboratory control spike samples and matrix spike samples
Relative Percent Difference (RPD)	Percent	Yes	Percent measured concentrations between the parent sample and an associated duplicate
Qualifiers	Text	Yes	Refer to Appendix N in this QAPP for data validation qualifiers

APPENDIX M: NTA - ELECTRONIC DATA DICTIONARY

Field Name	Data Type	Required	Description
Lab_Sample_ID	Text	Yes	Lab Sample Identification. Must be unique per sample.
PS_Code	Text	Yes	Ex: CA1234567_001_001. Use the PS_Code for the field sample, field blanks, and corresponding matrix spike and matrix spike duplicates. For method blanks, laboratory control spike, laboratory control spike duplicates, the PS_Code is "Lab QC"
State_Sample_ID	Text	Yes	PS Code_Identifying Letter_Analysis EX: CA3610001_013_013_S_533 (PS Code CA3610001_013_013, field sample, EPA Method 533) Identifying Letter = field sample (S), field duplicate (D), field blank (FB), matrix spike/matrix spike duplicate (MSMSD) For method blanks, laboratory control spike, laboratory control spike duplicates, the State_Sample_ID is "Lab QC"
Collection_Date	Datetime	Yes	Collection Date in MM/DD/YYYY.
Collection_Time	Datetime	Yes	Collection Time in HH:MM format.
Sample_Type	Text	Yes	FB=Field Blank. RT=Routine. SP=Special. BLK = Method Blank. LCS = Laboratory Control Spike. LCSD = Laboratory Control Spike Duplicate. MS = Matrix Spike. MSD = Matrix Spike Duplicate.
Batch	Text	Yes	Compound Discoverer Batch ID
Study_File_ID	Text	Yes	Compound Discoverer Study File ID
Method	Text	Yes	Analytical method name
Conf	Text	Analytes only	Confidence Level (Schymanski) OR _Tracer_
Analyte_Name	Text	Yes	Long version of the analyte name (e.g. 4:2 Fluorotelomer Sulfonate)
DSSToxID	Text	Nas allowed	DSSToxID
ExactMass	Decimal	Yes	Exact Mass of the neutral species. Very useful for looking up other potential candidates
MZError	Decimal	Yes	Mass error in ppm

Field Name	Data Type	Required	Description
Formula	Text	Yes for Lvl1-3	Molecular Formula
RT	Decimal	Yes	Retention Time (mins)
Area	Integer	Yes	Area/Abundance of the feature. Used later for qNTA
AreaCV	Decimal	Yes	Area Percent Coefficient of Variation (%CV).
nReps	Integer	Yes	Number of replicates detected for analyte (ie: n of 3)
TcrRec	Integer	Tracers only	Tracer Recovery in percent
Analyzed	Datetime	Yes	Analysis Date/Time for NTA
MDL	Integer	No	Method Detection Limit (3 times average of the Blank data)
Res2MDL	Integer	No	Result to MDL ratio (used to indicate "High" results versus "low" relative to blanks
Qualifiers	Text	No	Refer to Appendix N in this QAPP for data validation qualifiers. Also any additional notes on analyte.
Comments	Text	No	Lab Comments. May contain notes about analytes detected at multiple RTs.

APPENDIX N: BABCOCK LABORATORY'S DATA VALIDATION QUALIFIERS

FLAG	DEFINITION
?SUS	Data suspect.
A-01	[Custom Value]
EIS	The Extracted Internal Standard did not meet recovery acceptance criteria.
N_HTa	Sample analyzed outside of the EPA recommended holding time.
N_HTe	Sample extracted outside of the EPA recommended holding time.
N_J	Result is estimated based on qualitative criteria
N_J+	Result is estimated and biased high based on qualitative criteria
N_J-	Result is estimated and biased low based on qualitative criteria
N_pLab	Sample preserved at lab.
N_RLdil	The reporting limit has been raised due to sample dilution.
N_RLm	Due to sample matrix, the reporting limit has been raised.
NBLK	Analyte was detected at [Custom Value] in the Method Blank.
NBLK10x	Analyte was detected at [Custom Value] in the Method Blank. Since sample result is equal to or greater than ten times the blank result, this bias is considered to be negligible.
NCALh	The sample result(s) are estimate(s). The instrument calibration verification result(s) were above laboratory acceptance criteria.
NCALhND	Calibration Verification recovery was above the method control limit for this analyte. Analyte not detected, therefore data not impacted.
NCALlnd	Calibration Verification recovery was below the method control limit for this analyte. An additional check standard was analyzed at the reporting limit to ensure instrument sensitivity. Samples ND.
NIS	The associated Internal Standard recovery did not meet acceptance criteria.
NISm	Due to matrix interference, the internal standard recovery for this analyte did not meet laboratory acceptance criteria.
NLOh	The LCS was biased high. The recovery did not meet laboratory acceptance criteria. Data is suspect.
NLOhND	LCS recovery was above method control limit for this analyte. Analyte not detected, therefore data not impacted.
NLOl	The LCS was biased low. The recovery did not meet laboratory acceptance criteria. Data is suspect.
NMint	Due to matrix interference, the matrix spike and/or matrix spike duplicate performed on this sample did not meet laboratory acceptance criteria.

FLAG	DEFINITION
NMoRo	The matrix spike and/or matrix spike duplicate performed on this sample did not meet laboratory acceptance criteria and the RPD of replicate analyses performed on this sample did not meet laboratory acceptance criteria.
NMout	The matrix spike and/or matrix spike duplicate performed on this sample did not meet laboratory acceptance criteria.
NOcal	The concentration indicated for this analyte is above the calibration range of the instrument.
NRPDa	Both percent recoveries of MS/MSD analyses performed on this sample were acceptable, however, the RPD was above laboratory acceptance criteria.
NRPDc	The RPD value for the LCS/LCSD did not meet laboratory acceptance criteria.
NRPDo	The RPD/precision of replicate analyses performed on this sample did not meet laboratory acceptance criteria.
Q_nes	Insufficient sample for the sample duplicate and/or MS/MSD analysis.
QBLK	The method blank did not meet laboratory acceptance criteria.
QCALh	The instrument calibration verification result(s) were above laboratory acceptance criteria. The QC sample result(s) are estimate(s) only.
QIS	The Internal Standard recovery for this QC analyte did not meet acceptance criteria.
QISm	Due to matrix interference, the internal standard recovery for this QC sample did not meet laboratory acceptance criteria.
QLCSD	Batch acceptance based on LCS recovery. The LCSD did not meet laboratory acceptance criteria.
QLout	The LCS and/or LCSD recovery did not meet laboratory acceptance criteria.
QLraw	Based on raw data calculation, LCS and/or LCSD recovery was within laboratory acceptance criteria.
QLrpd	The LCS recovery and LCS/LCSD RPD met laboratory acceptance criteria. LCSD recovery was not within range.
QM-4X	Due to analyte concentration greater than or equal to 4 times the spike concentration, recoveries for the MS and/or MSD did not meet laboratory acceptance criteria.
QMint	Due to matrix interference, the MS and/or MSD did not meet laboratory acceptance criteria.
QMoRo	MSD recovery and the MS/MSD RPD value did not meet laboratory acceptance criteria.
QMout	MS and/or MSD recovery did not meet laboratory acceptance criteria.
QMSD	The MS recovery and MS/MSD RPD met laboratory acceptance criteria. MSD recovery was not within range. MSD performed to assess precision data only.
QOcal	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument.
Qraw	Based on raw data excluding numerical rounding, QC recovery was within laboratory acceptance criteria.

FLAG	DEFINITION
Qrnd	The precision and/or accuracy criteria has been met when rounded to the nearest whole percentage value.
QRPDa	Both percent recoveries were acceptable, however, the RPD result was above laboratory acceptance criteria.
QRPDc	The RPD value for the LCS/LCSD did not meet laboratory acceptance criteria.
QRPDo	The RPD value for the sample duplicate or MS/MSD did not meet laboratory acceptance criteria.
QSint	Due to matrix interference, the surrogate recovery for this QC sample cannot be accurately quantified or does not meet laboratory acceptance limits.
QSout	Surrogate recoveries did not meet laboratory acceptance criteria.
X	See Case Narrative on analytical PDF report.

APPENDIX O: NTA SPIKE COMPOUND LIST

ANALYTE	M/Z	MODE	ION	RT
TFA	112.9850	-	M-H	0.8
PFPrA	162.9817	-	M-H	2.2
PFBA	212.9792	-	M-H	4.5
PFPeA	262.9760	-	M-H	5.0
PFHxA	312.9728	-	M-H	5.7
PFHpA	362.9696	-	M-H	6.9
PFOA	412.9664	-	M-H	7.7
PFNA	462.9632	-	M-H	8.5
PFDA	512.9600	-	M-H	9.3
PFUnA	562.9568	-	M-H	10.1
PFDoA	612.9536	-	M-H	10.9
PFTrDA	662.9504	-	M-H	11.8
PFTeDA	712.9472	-	M-H	12.5
PFHxDA	812.9408	-	M-H	13.9
PFOcDA	912.9344	-	M-H	15.0
TFMS	148.9526	-	M-H	1.3
PFEtS	198.9490	-	M-H	3.7
PFPS	248.9462	-	M-H	4.8
PFBS	298.9430	-	M-H	5.2
PFPeS	348.9398	-	M-H	6.3
PFHxS	398.9366	-	M-H	7.0
PFHpS	448.9334	-	M-H	7.7
PFOS	498.9302	-	M-H	8.5
PFNS	548.9270	-	M-H	9.3
PFDS	598.9238	-	M-H	10.1
PFDoDS	698.9181	-	M-H	11.7
4:2-FTS	326.9743	-	M-H	5.6
6:2-FTS	426.9679	-	M-H	7.6
8:2-FTS	526.9615	-	M-H	9.2
10:2-FTS	626.9551	-	M-H	10.9
HFPO-DA	284.9774	-	M-CO2-H	6.4
ADONA	376.9688	-	M-H	7.0
9Cl-PF3ONS	530.8956	-	M-H	8.9
11Cl-PF3OUdS	630.8892	-	M-H	10.6
PFMPA	228.9741	-	M-H	4.5

ANALYTE	M/Z	MODE	ION	RT
PFMBA	278.9709	-	M-H	5.2
PFEESA	314.9379	-	M-H	5.4
NFDHA	200.986	-	M-CO2-C2F3-H	6.9
TFMSi	132.9568	-	M-H	1.3
TFMSA	147.9677	-	M-H	1.8
Bistriflimide	279.9181	-	M-H	5.0
FBSA	297.9590	-	M-H	6.2
FHxSA	397.9526	-	M-H	7.8
FOSA	497.9462	-	M-H	9.1
FDSA	597.9398	-	M-H	10.7
N-MeFOSAA	569.9673	-	M-H	9.7
N-EtFOSAA	583.9830	-	M-H	10.1
N-MeFOSA	511.9618	-	M-H	11.2
N-EtFOSA	525.9775	-	M-H	12.0
N-MeFOSE	616.0091	-	M+HOAc-H	11.8
N-EtFOSE	630.0248	-	M+HOAc-H	12.5
3:3 FTCA, FPrPA	241.0105	-	M-H	5.7
5:3 FTCA, FPePA	341.0041	-	M-H	7.1
7:3 FTCA, FHpPA	440.9977	-	M-H	8.6
6:2-FTCA, FHEA	376.9852	-	M-H	7.0
8:2-FTCA, FOEA	476.9788	-	M-H	8.6
10:2-FTCA, FDEA	576.9724	-	M-H	10.3
7H-PFHpA	344.9794	-	M-H	5.9
6:2-FTUA, FHUEA	356.979	-	M-H	7.0
8:2-FTUA, FOUEA	456.9726	-	M-H	8.6
10:2-FTUA, FDUEA	556.9662	-	M-H	10.3
PFHxPA	398.9461	-	M-H	6.0
8:8-PFPi	900.9098	-	M-H	13.8
6:2-PAP	442.9723	-	M-H	6.9
8:2-PAP	542.9659	-	M-H	8.8
6:2-diPAP	788.9750	-	M-H	12.4
8:2-diPAP	988.9622	-	M-H	14.5
N-AP-FHxSA, PFHxSAm	485.0564	+	M+H	8.0
N-TAmP-FHxSA, 6:2-deFTA	499.0720	+	M+H	7.4
N-CMAmP-6:2-FOSA, 6:2-FTAB	571.0937	+	M+	7.9
PFEtChS	460.9334	-	M-H	7.6