

Central Valley Regional Water Quality Control Board

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CONDUCT GROUNDWATER SAMPLING FOR PER AND POLY- FLUORINATED SUBSTANCES (PFAS) AT CITY OF MERCED MUNICIPAL AIRPORT, MERCED, MERCED COUNTY, CALIFORNIA

Staff of the California Central Valley Regional Water Quality Control Board (Central Valley Water Board) completed the review of the *Merced Regional Hazardous Waste Site, PFOA and PFOS Investigation Report of Findings* dated 29 November 2016 (Report). The Report summarizes the results of PFAS groundwater sampling conducted at the Merced Municipal Airport (Airport) in September 2016. This PFAS sampling event was conducted concurrently with the routine groundwater monitoring for chlorinated solvents performed under the Central Valley Water Board Monitoring and Reporting Program (MRP) No. R5-2011-0808. Based on the results presented in the Report (discussed below), the Central Valley Regional Board has determined it is necessary to revise the MRP No. R5-2011-0808 to include PFAS monitoring at the Airport. To facilitate the revision of the MRP, at this time, the Central Valley Regional Board requests that the Airport conduct at least one round of PFAS sampling at all monitoring wells currently present at the Airport and evaluate the present condition of PFAS pollution in groundwater. Please conduct the PFAS groundwater sampling and analysis and include the results as part of the next Semi-annual Groundwater Monitoring Report due **1 November 2022**.

The Airport's September 2016 PFAS Investigation Results and the Central Valley Water Board's rationale and expectations for the above requested PFAS sampling, analysis and reporting activities are discussed below.

September 2016 Investigation Results and Intended Use of the New Sampling and PFAS Analysis - In the September 2016 event, eight monitoring wells, including two shallow wells, five intermediate-depth wells, and one deep well were analyzed for 12 PFAS compounds with the analytical method available at that time. Multiple PFAS compounds were detected in each shallow and intermediate-depth well, with the concentrations in some wells exceeding the relevant thresholds for PFAS deemed protective of human health. As an example, perfluorooctane sulfuric acids (PFOS) and perfluorooctanoic acids (PFOA) were observed in intermediate-depth well (BZW-5) at concentrations of 79 and 54 nanograms per liter (ng/L),

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respectively, exceeding the current Notification Levels (NLs) for PFOS and PFOA in drinking water (i.e., 6.5 and 5.1 ng/L, respectively).

The September 2016 PFAS sampling was conducted over five years ago and included select monitoring wells and limited numbers of PFAS analytes. Due to analytical method limitations, the September 2016 event did not include fluorotelomer chemicals commonly present in Aqueous Film Forming Foams (AFFF) likely applied historically at the Airport. With the recent development in PFAS analytical method, more PFAS chemicals used in AFFF have become readily analyzable. Results of the new round of sampling and analysis will be used for the following purposes:

1. Evaluate present levels of analyzable PFAS chemicals in the groundwater of the Airport, including evaluating PFAS chemicals not analyzed in 2016 and assessing changes of PFAS concentrations, if available, from those in 2016.
2. Estimate the potential maximum amount of aggregate PFAS concentrations in groundwater to help determine if additional monitoring wells need to be installed to complete PFAS plume delineation at the Airport.

PFAS Sampling and Analysis Expectations – At a minimum, the sampling and analysis activities at the Airport should consist of the following:

1. Field sampling methods should be consistent with the State Water Board's *Per- and Polyfluoroalkyl Substances (PFAS) Sampling Guidelines for Non-Drinking Water*¹.
2. All monitoring wells currently present at the Airport, including shallow, intermediate-depth, and deep wells, should be monitored for depth to groundwater (DTW).
3. All monitoring wells currently present at the Airport should be analyzed for the 31 target PFAS analytes contained in Table 1, Adsorbable Organic Fluorine (AOF, Table 2), and the field and general chemistry parameters in Table 3:
 - a. PFAS analysis should be performed by an analytical laboratory accredited by the California Environmental Laboratory Accreditation Program that is capable to conduct the PFAS analysis compliant with the quality control requirements of Department of Defense Table B-15 of Quality Systems Manual (QSM)²;
 - b. AOF analysis should meet the quality control criteria summarized in Table 4 of the draft EPA method 1621³ and contain reporting limits not greater than 10 ng/L; and
 - c. Analytical methods for the field parameters and general groundwater chemistry parameters in Table 3 should be appropriate for the expected concentrations at the Airport.

¹ Available online at [Per- and Polyfluoroalkyl Substances \(PFAS\) Sampling Guidelines for Non-Drinking Water \(ca.gov\)](https://www.waterboards.ca.gov/pfas/Pages/Per-and-Polyfluoroalkyl-Substances-PFAS-Sampling-Guidelines-for-Non-Drinking-Water.aspx)

² Available online at <http://www.waterboards.ca.gov/pfas/>

³ Available online at [Draft Method 1621 Screening Method for the Determination of Adsorbable Organic Fluorine \(AOF\) in Aqueous Matrices by Combustion Ion Chromatography \(CIC\) \(epa.gov\)](https://www.epa.gov/groundwater-remediation-ddivision/draft-method-1621-screening-method-for-the-determination-of-adsorbable-organic-fluorine-aof-in-aqueous-matrices-by-combustion-ion-chromatography-cic)

PFAS Sampling Results Reporting Expectations – At a minimum, the PFAS sampling results reporting should include the following:

1. A description of the sampling activities performed.
2. A complete list of existing monitoring wells, including the GPS location, well depth, and screen interval information of each well, located within the Airport's footprint. The Central Valley Water Board staff understands that multiple monitoring wells likely have been destroyed for the re-development of the former Pepsi Bottling Plant area within the Airport. It would be beneficial to have the up to date well list and map of existing monitoring wells to evaluate the available monitoring well network at the Airport.
3. Tabular and graphic summary of the DTW, groundwater flow directions and analytical results. QA/QC sample results should also be reported in a tabular format.
4. A survey of sensitive receptors within a one-mile radius from the Airport. Sensitive receptors may include, and not be limited to, surface water bodies and groundwater extraction wells such as domestic, irrigation and municipal supply wells or extraction wells for pump-and-treat purposes. The relevant groundwater extraction well information should include, but not be limited to, well GPS locations, well logs, use purposes of the extracted groundwater, extraction flow rates, and if available, a summary of water quality monitoring activities performed at each well (e.g., schedules and monitoring parameters) and their associated monitoring results. Historical sensitive receptor survey conducted within five years before the date this letter is issued may be submitted to meet this request.

Finally, please include the PFAS sampling results in the next Semi-annual Groundwater Monitoring Report due **November 1, 2022**. Should you have any questions about the requested sampling and analysis, or sampling result due date, please contact the Project Manager, Xueyuan (Helen) Yu by telephone at (916) 464-4729 or e-mail to Helen.Yu@waterboards.ca.gov.

Sincerely,

Xueyuan Yu

Xueyuan (Helen) Yu
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cc: (via email)

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Table 1. Requested PFAS analytes and the highest acceptable Reporting Limits

Chemical Name/ Abbreviation(s)	GeoTracker PARLABEL	Chemical Abstracts Service (CAS) No.	Acceptable Reporting Limit for Groundwater (ng/L)	Acceptable Reporting Limit for Stormwater (ng/L)	Acceptable Reporting Limit for Soil (ng/g)
Perfluorobutanoic acid (PFBA)	PFBA, PFBTA	375-22-4	8.0	8.0	1.0
Perfluoropentanoic acid (PFPeA)	PFPeA, PFPA	2706-90-3	5.0	5.0	1.0
Perfluorohexanoic acid (PFHxA)	PFHxA, PFHA	307-24-4	5.0	5.0	1.0
Perfluoroheptanoic acid (PFHpA)	PFHPA	375-85-9	5.0	5.0	1.0
Perfluorooctanoic acid (PFOA)	PFOA	335-67-1	5.0	5.0	1.0
Perfluorononanoic acid (PFNA)	PFNA	375-95-1	5.0	5.0	1.0
Perfluorodecanoic acid (PFDA)	PFDA, PFNDCA	335-76-2	5.0	5.0	1.0
Perfluoroundecanoic acid (PFUnDA)	PFUnA, PFUNDCA	2058-94-8	5.0	5.0	1.0
Perfluorododecanoic acid (PFDoA)	PFDOA	307-55-1	5.0	5.0	1.0
Perfluorotridecanoic acid (PFTrDA)	PFTrDA, PFTRIDA	72629-94-8	5.0	5.0	1.0
Perfluorotetradecanoic acid (PFTA)	PFTA, PFTEDA	376-06-7	8.0	8.0	2.0
Perfluorobutane sulfonic acid (PFBS)	PFBS, PFBSA	375-73-5	5.0	5.0	1.0
Perfluoropentane sulfonic acid (PFPeS)	PFPeS	2706-91-4	5.0	5.0	1.0
Perfluorohexane sulfonic acid (PFHxS)	PFHXS, PFHXSA	355-46-4	5.0	5.0	1.0
Perfluoroheptane sulfonic acid (PFHpS)	PFHpS, PFHPSA	375-92-8	5.0	5.0	1.0
Perfluorooctane sulfonic acid (PFOS)	PFOS, PFOS_A	1763-23-1	5.0	5.0	1.0
Perfluorodecane sulfonic acid (PFDS)	PFDS, PFDSA	335-77-3	5.0	5.0	1.0
Perfluorooctanesulfonamide (PFOSAm)	PFOSA	754-91-6	8.0	8.0	1.0
N-Ethyl perfluorooctane sulfonamido ethanol (EtFOSE)	ETFOSE	1691-99-2	8.0	8.0	2.0
N-Methyl perfluorooctane sulfonamido ethanol (MeFOSE)	MEFOSE	24448-09-7	8.0	8.0	2.0
N-Ethyl perfluorooctane sulfonamide ² (EtFOSAm)	EtFOSAm, ETFOSA	4151-50-2	8.0	8.0	2.0

Table 1, Continued

Chemical Name/ Abbreviation(s)	GeoTracker PARLABEL	Chemical Abstracts Service (CAS) No.	Acceptable Reporting Limit for Groundwater (ng/L)	Acceptable Reporting Limit for Stormwater (ng/L)	Acceptable Reporting Limit for Soil (ng/g)
N-Methyl perfluorooctane sulfonamide (MeFOSA, MeFOSAm)	MeFOSAm, MEFOSA	31506-32-8	8.0	8.0	2.0
N-Methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	NMEFOSAA	2355-31-9	8.0	8.0	2.0
N-Ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	NETFOSAA	2991-50-6	8.0	8.0	2.0
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	4:2FTS	757124-72-4	8.0	8.0	2.0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	6:2FTS	27619-97-2	8.0	8.0	2.0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	8:2FTS	39108-34-4	8.0	8.0	2.0
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	HFPO-DA, HFPA-DA	13252-13-6	8.0	8.0	5.0
4,8-Dioxa-3H- perfluorononanoic acid (ADONA)	ADONA	919005-14-4	8.0	8.0	5.0
9-Chlorohexadecafluoro-3- oxanonane-1-sulfonic acid (9- Cl-PF3ONS)	9CIPF3ONS	756426-58-1	8.0	8.0	5.0
11-Chloroeicosafluoro-3- oxaundecane-1-sulfonic acid (11-Cl-PF3OUdS)	11CIPF3OUd S	763051-92-9	8.0	8.0	5.0

Table 2. Highest Reporting Limit for Adsorbable Organic Fluorine Analysis

Analyte	Acceptable Reporting Limit for Groundwater (ng/L)
Adsorbable Organic Fluorine	10

Table 3. Field and General Chemistry Parameters for Groundwater Samples

Field Parameters	Units	General Chemistry	Units
Depth to Groundwater	Feet, bgs	Total Dissolved Solids	mg/L
Temperature	Degrees C	Chloride	mg/L
Electrical Conductivity	µmhos/cm	Carbonate	mg/L
pH	units	Bicarbonate	mg/L
Turbidity	NTU	Nitrate-Nitrogen	mg/L
Dissolved Oxygen	mg/L	Sulfate	mg/L
Oxidation/Reduction Potential	mV	Calcium	mg/L
		Magnesium	mg/L
		Potassium	mg/L
		Sodium	mg/L
Notes: bgs – below ground surface C – Celsius mg/L – milligrams per liter NTU – nephelometric turbidity units µmhos/cm – micromhos per centimeter mV – millivolts			