



QUALITY ASSURANCE/QUALITY CONTROL

QA/QC guidelines established in the Handbook of Methods for Acid Deposition Studies (EPA 600/4-87/026, September 1987) and Standard Methods for the Examination of Water and Waste Water (20th edition) are used for the analytical activities in the Air Program Laboratory. The work environment is kept scrupulously clean and the instruments used for analysis are calibrated and serviced on appropriate maintenance schedules.

Standard reference materials are obtained from Inorganic Ventures and High Purity Standards which are National Institute of Standards Technology traceable. USGS Round Robin Standard Reference Samples (SRS) testing is performed for internal quality control every six months.

All samples received are immediately computer-archived and stored in a cold, dark environment and processed as quickly as dictated by EPA guidelines. Control samples are utilized daily to monitor internal quality control. Appropriate field and laboratory blanks are analyzed as are duplicates and check standards (every 10 samples).



The lab manager and data analyst check, verify, and archive all collected data. The sample data, as well as all pertinent quality control check information, are provided to the user and are posted at sites linked from <http://www.fs.fed.us/air/>.

Detection Limits 2012*		
Analyte	USFS/USGS (mg/L)	EPA** (mg/L)
Na	0.02	0.01
NH ₄	0.01	0.01
K	0.01	0.01
Mg	0.01	0.01
Ca	0.04	0.01
F	0.01	0.005
Cl	0.02	0.01
NO ₃	0.03	0.005
SO ₄	0.04	0.05

*Detection Limit = 3 x Std. Dev. of 10 nonconsecutive reagent or calibration blank analyses.
 **U.S. Environmental Protection Agency 1987. Handbook of Methods for Acid Deposition Studies: Laboratory Analysis for Surface Water Chemistry. USEPA Acid Deposition and Atmospheric Research Division, Office of Research and Develop.



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Air Program Laboratory



Water and Passive Ozone Analyses

Overview

Surface Water Quality Monitoring on the National Forests

The US Forest Service routinely collects and analyzes the chemistry of many lakes and streams on national forests and rangelands. These data are used to evaluate the status and trends of watersheds affected by atmospheric deposition. This monitoring began in the early 1980's at just a few locations. It continues and has expanded in two ways. First, long-term monitoring goes on at many of the most sensitive locations. Second, samples are collected at new locations every year (synoptic monitoring) to better characterize spatially the sensitivity of watersheds across the national forests. This work was undertaken and continues in satisfaction of responsibilities assigned in the Clean Air Act and in fundamental management and organic authorities.

Passive ozone monitoring is an inexpensive method for measuring ozone exposure in remote locations. Such monitoring has been conducted since the early 1990's under the same authorities as for water monitoring.

The US Forest Service Air Program Laboratory The water samples collected from the national forests, particularly those from wildernesses and high mountain locations, are often quite dilute. At long-term monitoring sites, we look for subtle but significant changes in water chemistry. At synoptic sites, we accurately characterize the current condition. This type of monitoring requires a laboratory like ours, well suited to routinely analyzing for low acid neutralizing capacities, often near instrument detection levels. Our laboratory provides the Forest Service and partners with consistently high quality water and passive ozone filter analyses of samples taken from the national forests, rangelands and other public lands.

To accomplish its mission, our lab uses strict protocols to avoid contamination. The laboratory is staffed by experienced technicians and is equipped with state-of-the-art automated computer-controlled analysis systems. Analyses performed and data generated are carefully scrutinized using QA/QC procedures established by the U.S. EPA and the American Society for Testing and Materials. Data reliability, strict adherence to QA/QC protocols, and prompt service are the primary goals of our laboratory.

Specific Water Analyses Provided Using State-of-the-Art Equipment	
Analyses	Equipment
pH, ANC, and Conductivity	Metrohm/Brinkman Titration System and Metrohm/Brinkman Conductivity Meter
Anions	Metrohm Ion Chromatograph
Cations	Metrohm Ion Chromatography
Ozone	Metrohm Ion Chromatography
Turbidity	Turbidity Meter
Suspended Solids Analysis	Total Suspended Solids
Minimum quantity of water required for analysis:	
Unfiltered Sample	150 mL (pH, ANC, conductivity)
Filtered Sample	60 mL (chloride, nitrate, sulfate, ammonium, phosphate, sodium, potassium, magnesium, calcium)
Filtered acidified sample	30 ml (total dissolved metals)



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Price of Analyses (effective January 2012)	
Procedure	Cost/Sample
Total Water Analysis: Filtering, Anions, Cations, pH, ANC, and Conductivity	\$130.00
pH, ANC, and Conductivity	\$50.00
Anions: Filtering, F, Cl, NO ₃ , PO ₄ , SO ₄	\$55.00
Cations: Filtering, Na, NH ₄ , K, Mg, Ca	\$55.00
DOC, TDN, TP	\$15.00
Turbidity	\$18.00
Sedimentation	\$25.00
Turbidity and Sedimentation	\$35.00
Sediment Transport (sieving/ashing)	\$65.00
Passive Ozone Badge Analysis	\$30.00
Water Replicates— up to 30% of regular samples & replicates	\$0.00
Water Replicates— beyond 30% of regular samples & replicates	\$130.00
Water Field Blanks— not recommended unless you are field filtering	\$130.00

Note 1: Although our lab does not perform heavy metals analyses in-house, we commonly ship samples to appropriate laboratories as an added service upon request after we complete our water analyses. Costs will be determined at time of request.

Note 2: Clients will be sent clean sample bottles, coolers, and icepacks for sample shipping as an included part of costs. Blanks and duplicate samples are analyzed at no charge (we suggest running 1 duplicate sample for every 10 samples). There is an additional \$20.00 charge for field filtering supplies if required. Data are quality assured and entered into our online database as a part of sample costs.

“Climate change has been linked to declining snowpacks, retreating glaciers, and changing patterns of precipitation and runoff. The evidence shows that we are entering a period of water scarcity not seen in our history. The national forests were created in part for ‘securing favorable conditions of water flows,’ the importance of which has grown as populations have grown. We can make a difference by managing national forests and grasslands to restore ecological processes and functions that support clean and healthy streams, lakes, and aquifers.”

—Forest Service Chief Gail Kimbell, 2007