

ATTACHMENT 8 QUALITY ASSURANCE

For the “AttachmentName” in the naming convention of BMS, use “QA” for this attachment.

Demonstrate that appropriate and well-defined Quality Assurance and Quality Control (QA/QC) measures will be used in each task. The information-gained discussion and QA/QC plan in this section should be consistent and incorporated into the project work plan. QA/QC measures may include, but are not limited to the following:

↳ *Procedural assurances, such as review processes for quality of reports, data, and lab analyses*

ACWD operates under a comprehensive quality assurance and quality control (QA/QC) program designed to engage QA/QC practices at all levels. This program is documented in ACWD’s August 26, 2010 Quality Assurance Manual which describes in detail the implementation of the QA/QC Program by outlining specific policies, organizational structure, responsibilities, and procedures. The primary purpose of the QA/QC Program is to assure that all data generated are scientifically sound and legally defensible. ACWD guarantees the identity and integrity of a sample (or data) from collection through reporting of the test results from ACWD’s laboratory.

ACWD’s Water Quality Laboratory is certified by the California Department of Public Health (CDPH) Environmental Laboratory Accreditation Program (ELAP), and serves as the primary analytical facility. The laboratory provides analytical training, data management, method development, and administers performance test samples.

ACWD personnel maintain high ethical and analytical standards which are an integral part of a credible QA/QC Program. It is recognized at all levels of the organization that data are used to make decisions affecting water quality and groundwater basin management. Therefore, all personnel carry out daily tasks in a manner consistent with the goals and procedures expressed in ACWD’s Quality Assurance Manual and in accordance with standard operating procedures (SOPs). All personnel involved in any function affecting data quality (sample collection, analysis, testing, data reduction, calibration of instruments, and other quality assurance activities) must have sufficient training to enable them to generate and report accurate, precise, and complete data. ACWD management is committed to providing continued training regarding ethics, new technologies, and method development to support high quality analytical services.

ACWD’s QA/QC Program is characterized by an efficient communication system that works both up and down the organization. The Water Quality Manager, Laboratory Services Manager, and the QA/QC Officer assure that all stakeholders are aware of quality policies, objectives, plans, and procedures. The QA/QC Officer works independently from the Laboratory Services Manager to provide an unbiased check on laboratory operations to assure conformance with the Quality Assurance Manual and Water Quality Laboratory policies and procedures.

ACWD's Water Quality Laboratory is staffed by qualified, experienced, and well-educated personnel. Each individual has successfully completed a competitive hiring process and meets all the requirements as listed in ACWD's job descriptions. Training further supports the specific needs of each staff in their role to carry out ACWD's mission. The following table provides a brief summary of ACWD's analytical staff that play a critical role in the success of the QA/QC Program:

Name and Title	Degrees	Years*	Role in QA/QC Program
Jeannette Kelley, Laboratory Services Manager	Ph.D., Microbiology B.S., Microbiology	23	Supervises laboratory staff; oversees sampling and analytical procedures; maintains CDPH ELAP certification; ensures overall quality of analytical services & reports.
Calvin Liu, Quality Assurance/ Quality Control Officer	MBA, Operations & Materials Management B.S., Chemistry	11	Perform internal audits of QC and analytical procedures; implement QA policies in accordance with the EPA standards; assures ELAP certification through successful annual performance testing and on-site inspections; oversees field equipment QA.
Yanyang Xu, Senior Chemist	M.S., Analytical Chemistry	21	Team leader, training and development, LIMS administration to enforce QA/QC policies and practices; QA/QC for inorganic chemical analyses.
Elin Leung, Senior Chemist	B.S., Chemistry	18	Team leader, training and development, QA/QC for inorganic chemical analyses, wet chemistry analyses, and metals analyses.
Joseph Lennen, Chemist 2	B.A., Biology, B.A., Chemistry	24	Team leader, QA/QC for organic chemistry analyses, inorganic chemistry analyses, wet chemistry analyses, and field equipment.
Jennifer Reyes, Laboratory Technician 2	B.S., Micro/Molecular Biology	10	QA/QC for inorganic chemistry analyses, wet chemistry analyses, and microbiological analyses.
Nadia Lorenson, Laboratory Technician 2	B.S., Biological Sciences	9	QA/QC for inorganic chemistry analyses, wet chemistry analyses, and microbiological analyses.
Johanna Sayo, Laboratory Technician 2	B.S., Environmental Sciences	5	QA/QC for inorganic chemistry analyses, wet chemistry analyses, and microbiological analyses.

* = Years of experience

Once the data has been reviewed and validated by the Laboratory Services Manager

and QA/QC Officer, the data will be reviewed by the Project Manager and Project Director to determine if the data “makes sense” with the existing knowledge of the groundwater basin. Any data which appear to be outliers will be presented to the Laboratory Services Manager and QA/QC Officer for verification. After verification is complete, the data will be used in the development of a final report. The review process for the quality of reports requires the technical review of at least two senior staff. For this project, both senior staff will be registered professionals.

↳ *An existing or proposed QA/QC plan for field sampling and lab analysis of water quality that ensures high accuracy and precision*

As mentioned above, QA/QC for this project will comply with ACWD’s August 26, 2010 Quality Assurance Manual, attached as “Att8_LGA12_ACWD_QA_2of4”, which includes the following sections:

Section 1: Introduction – Quality Assurance Program

Section 2: Lab Facilities

Section 3: Training

Section 4: Sample Collection

Section 5: Sample Custody

Section 6: Quality Control

Section 7: Data Quality Objectives

Section 8: Standard Operating Procedures

Attachment 1: Water Quality Laboratory Floor Plan

Attachment 2: ACWD’s ELAP Certification

Attachment 3: MWH’s ELAP Certification

Attachment 4: ACWD Analytical Staff Resumes (updated summary above)

Attachment 5: ACWD Chain of Custody

In addition to the Quality Assurance Manual, two examples of Standard Operating Procedures are attached for Chloride (Anions by Ion Chromatography EPA 300.1; file name is “Att8_LGA12_ACWD_QA_3of4”) and Total Dissolved Solids (by SM 2540-C, file name is “Att8_LGA12_ACWD_QA_4of4”). The type of subjects covered in Standard Operating Procedures may include:

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|---|--|
| 1. Scope and Application | 9. Calibration |
| 2. Interferences | 10. Procedure |
| 3. Safety | 11. Quality Assurance/Quality Control |
| 4. Apparatus and Materials | 12. Calculations |
| 5. Documentation | 13. Data Handling |
| 6. Reagents and Standards | 14. Maintenance |
| 7. Sample Collection, Preservative and Storage | 15. Waste Management |
| 8. Sample Handling | 16. References |

↵ *Personnel qualifications that may include professional registrations (such as a California Professional Geologist or Professional Engineer), certifications, and experience of persons performing and overseeing work to be performed*

The proposed team for this project will consist of qualified ACWD staff and a well drilling contractor under ACWD's direction. The following descriptions provide a summary of the qualifications, professional registrations, and experience of ACWD staff that will be involved with this project:

Steven D. Inn, Groundwater Resources Manager

- **Day to day contact for the grant application and project director.**
- **B.S., Chemical Engineering, University of California, Berkeley, 1980.**
- **Registered as a Professional Engineer, Chemical Engineering, No. CH4426, 1988.**
- **26 years of experience in groundwater management activities; 24 years at ACWD.**
- **20 years of experience managing the Groundwater Resources Division which includes a staff of 17 positions; 8 of these positions are professional staff.**
- **Responsible for the development and implementation of ACWD's Groundwater Management Policy and all groundwater resources programs.**

Douglas T. Young, Hydrogeologist II

- **Project manager and day to day contact during the project. Responsible for preparing the well construction specifications and overseeing the work of the well drilling contractor.**
- **M.S., Geology, California State University, San Jose, 1986.**
- **B.A., Geology, University of California, Berkeley, 1983.**
- **Registered as a Professional Geologist, California, No. 5859**
- **Registered Professional Geologist, Arkansas, No. 1176**
- **Registered Professional Geologist, Wyoming, No. 1015**
- **Over 28 years of experience in geology, hydrogeology, and water resources.**
- **Experience has included monitoring well construction and development, development and implementation of soil and groundwater sampling protocols, geophysical logging, aquifer testing programs, and report preparation.**
- **Primary expertise is with managing projects involving the installation, design, and completion of deep test wells, aquifer testing, and modeling.**

Michelle Myers, Well Ordinance Supervisor

- **Responsible for providing project support and overseeing the Engineering Technicians assigned to inspect the construction of the monitoring wells proposed in this project.**
- **B.S., Civil Engineering, San Jose State University, 2003.**
- **10 years of groundwater resources experience at ACWD.**
- **7 years of experience coordinating Well Ordinance programs and responsible for overseeing the inspection work of five Engineering Technicians.**

- Assisted with the passage of the ACWD Groundwater Protection Act in 2009 and developed and implemented ACWD Ordinance No. 2010-01 and “Standards for the Construction, Use, Operation, Maintenance, Repair, Inactivation, or Destruction of Wells, Exploratory Holes, Other Excavations, and Appurtenances” for the cities of Fremont, Newark, and Union City.
- Recognized as an expert in well construction and destruction techniques.
- One of the speakers for Groundwater Resources Association’s February 15, 2012 webcast, “Abandoned Wells and Improperly Constructed Wells are a Continuing Threat to California’s Groundwater Resources.”

Groundwater Resources Intern

- Responsible for preparing drafts of various portions of the documentation, reports and tables that are required to be submitted as part of this project.
- Budgeted positions that are filled by limited term employees that usually have at least a B.S. or B.A. degree in an engineering or geology field.
- This employee will be working directly with the Hydrogeologist and provide technical support and assistance.

Engineering Technician II

- Responsible for inspecting and documenting the field activities related to the construction of the monitoring wells proposed in this project.
- One of the five Engineering Technicians will be assigned to provide full time inspection of the well drilling contractor.
- The range of education varies between limited college level studies to a B.S. in Environmental Science.
- The range of experience varies between 6 years and 29 years of field work related to the inspection of well construction activities.

All reports will be prepared by Douglas Young, a Registered Geologist, and reviewed by Steven Inn, a Professional Engineer - Chemical Engineering, and by Robert Shaver, a Registered Civil Engineer and ACWD’s Assistant General Manager - Engineering.

↳ *Standardized methodologies to be used, such as construction standards, health and safety standards, laboratory analysis, or accepted soils classifications methods*

- Health and Safety standards which are described in ACWD’s Occupational Injury and Illness Prevention Program will be enforced by ACWD’s Safety and Health Officer, Jerry Ledbetter.
- During drilling, samples will be collected and materials will be classified by ACWD’s Registered Geologist following the Manual Soil Description Standard (ASTM D2488-00) and the Unified Soils Classification System.
- ACWD will use best management practices criteria as outlined in ACWD’s Best

Management Practices Guidelines for construction operations and comply with all storm water runoff requirements of the Alameda County Flood Control District and the Regional Water Quality Control Board.

- **All wells will be constructed in accordance with ACWD Ordinance No. 2010-01 and ACWD’s December 2010 “Standards for the Construction, Use, Operation, Maintenance, Repair, Inactivation, or Destruction of Wells, Exploratory Holes, Other Excavations, and Appurtenances”. Unless otherwise indicated in ACWD’s standards, the minimum standards are provided in DWR’s Bulletin No. 74-2, “Water Well Standards: Alameda County” (June, 1964); Bulletin No. 74-81, “Water Well Standards: State of California” (December, 1981), together with the supplemental standards of DWR Bulletin No. 74-90, “California Well Standards; Water Wells, Monitoring Wells, and Cathodic Protection Wells” (June, 1991).**
- **Soil samples collected for permeability testing will be submitted to a soils laboratory certified by the American Association of State Highway and Transportation Officials (AASHTO).**

↪ *Standardized analyses, such as statistical tests or American Society for Testing and Materials and U.S. Environmental Protection Agency analytical methodologies*

- **ACWD Falling Head - Flexible Wall permeability testing will be conducted on fine grained aquitard material by ASTM Method D-5084.**
- **General groundwater quality samples will be collected and analyzed for physical characteristics: chlorides (EPA Method 300.1), total dissolved solids (Standard Methods 2540-C), and hardness (Standard Methods 2340B).**
- **Groundwater samples collected for aquifer chemical characteristics testing will be collected and analyzed for: total alkalinity (Standard Method 2320B); chloride and sulfate (EPA Method 300.1); and calcium, magnesium, sodium, and potassium (Standard Methods 3111B).**

↪ *Quality requirements of material or computational methods, such as use of specific grades of building materials or use of specific, tested, and established models (or software)*

All monitoring wells will be completed as 2-inch diameter monitoring wells constructed with schedule 80 PVC casing.

↪ *Comparison and calibration of models with actual data to enhance accuracy of modeling results*

Modeling is not included in the scope of this project.