Quality Assurance Guidelines for Analytical Laboratories

September 1997
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iv
Each year the Department of Water Resources invests millions of dollars in the collection and analysis of environmental data. To ensure that the quality of the data meets designated standards, DWR developed its Laboratory Services Policy for analytical laboratory work. This document presents that policy, along with the procedures for selecting laboratories to perform environmental analyses for DWR and continuing evaluation of the quality of those laboratory services. These procedures will be updated periodically as performance requirements change.

This document will be useful to DWR Program Managers in planning for new projects. It will also help other agencies that may want to use DWR laboratory services or use the document as a model for procuring and evaluating analytical services for their own programs.
Department of Water Resources
Laboratory Services Policy

Historically, DWR’s analytical procedures were relatively uncomplicated because of the type of parameters that were monitored (e.g., electrical conductivity, minerals, dissolved solids, etc.). The task of contracting for analytical services was therefore left to individual Program Managers. With this decentralized system, there were no consistent procedures in place to control the cost or the quality of data generated by these laboratories.

More recently, DWR’s environmental measurement activities have shifted in emphasis toward collection of data related to sensitive water quality issues involving toxic substances that affect human and environmental health. Concerns about the credibility of the data generated within DWR environmental measurement programs led to the realization that comprehensive quality assurance and quality control evaluations must accompany all such analytical laboratory data. A system of continuing assessment of the quality of the data needed to be instituted and maintained. The Laboratory Services Policy was approved by DWR to address these concerns.

Effective July 1, 1994, the Laboratory Services Policy centralized authority to contract for and control the quality of all analytical laboratory work performed on behalf of DWR.

- With the policy in place, all DWR requests for analytical services must be submitted to Bryte Laboratory. To assist Bryte Laboratory management with their workload planning, sampling plans or other additional information may be provided.

- DWR’s Quality Assurance Program, in conjunction with the management and technical personnel of Bryte Laboratory, was directed to develop
master contracts with commercial laboratories to provide services not available through Bryte Laboratory.

- DWR’s QA Program, in conjunction with the management and technical personnel of Bryte Laboratory, was directed to maintain continuing assessment and control of the quality of work performed by contract laboratories.

- Bryte Laboratory maintains responsibility for distributing the analytical workload to make efficient use of DWR and contract laboratory equipment and capabilities. Analytical charges are determined by Bryte Laboratory management and, to the extent feasible, will be uniform throughout DWR.

- DWR is in the process of updating and simplifying its paper flow by developing a modern laboratory information management system. This system will be capable of reporting all the quality assurance/quality control data generated by Bryte Laboratory and contract laboratories.
Guidelines for Requesting Analytical Services

Program Managers should consult with Bryte Laboratory in the early stages of planning a new project or expanding an existing one. Program Managers will submit their requests for analytical services to the Bryte Laboratory Chief. Requests should include a sampling plan, types of analyses to be performed, and a description of the data quality objectives for the project.

Data quality is a measure or description of the types and amounts of error associated with the data set. Therefore, data quality objectives are statements of the level of uncertainty the Project Manager is willing to accept in results derived from environmental data. Assistance in defining data quality objectives is available from the Bryte Laboratory Quality Assurance Officer and DWR’s QA Program.

A project’s data quality objectives will be utilized by Bryte Laboratory and the DWR Quality Assurance Program in evaluating the performance of contract laboratories. The following DWR technical documents may also be consulted:


Copies of these documents can be obtained from DWR’s Bulletins and Reports, Post Office Box 942836, Sacramento, California 94236-0001; phone (916) 653-1097.
Selection of Contract Analytical Laboratory

Contract Laboratory Certification
Commercial analytical laboratories that perform analyses for DWR must be certified by the Environmental Laboratory Accreditation Program administered by the State of California Department of Health Services. Exceptions may be considered where an analytical method is not certified by ELAP. The contract laboratory (contractor) shall not subcontract any analyses without prior approval by DWR. All quality control, certification, and other requirements of the contractor shall be applicable to subcontractors.

There are instances where no commercial analytical laboratory is ELAP certified for a specific analysis, especially with new methods for new analytes. Some government and university laboratories meet or exceed minimum standards established for certified laboratories, even though they may not be ELAP certified. Such a noncertified laboratory can be used for analytical purposes, provided the laboratory is evaluated properly, meets performance criteria described in this document, and has a record of good QA/QC practices. To provide a complete line of analytical services, Bryte Laboratory regularly participates in interagency agreements with laboratories of municipalities, universities, and other agencies for specialized analytical work.

Invitation for Bid/Request for Proposals
Laboratory analytical services will be contracted through the invitation for bids/request for proposals process. The bid process will consist of a three-stage procedure.

Stage 1: Compliance Documentation and Laboratory QA Manuals
Candidate laboratories will be required to submit proof of compliance with Minority, Women, Disabled Veteran Business Enterprise requirements and a copy of their laboratory QA Manual which should include, but not be limited to, the following:

- A reference to the standard operating procedures for all monitoring and analytical methods
- Written procedures of quality control practices for instruments, equipment, reagents, supplies, and analyses to assure that data generated is of acceptable precision and accuracy
- Qualifications of staff (number and types of positions, educational background, formal training, and experience)
- Adequacy of laboratory facilities (size; number of hoods and sinks; adequacy of lighting, bench space, and storage areas)
- Adequacy of laboratory instrumentation (major equipment suitable for program needs)
- Preventive maintenance of instruments and equipment (e.g., frequency of maintenance, adequate documentation, etc.)
- Sample logging and tracking of standard operating procedures
- Sample preparation (drying, grinding, homogenization, digestion, and extraction)
- Analytical methods (identification of specific methods, detection limits suitable for program needs, availability of raw data; SOPs)
- Laboratory internal quality control (use of blanks, duplicates, matrix spikes, and reference materials; frequency of incorporation of quality control samples; acceptance criteria [i.e., precision, accuracy, etc.] for quality control results; corrective actions; use of control charts; SOPs)
- External quality assurance data (e.g., interlaboratory check samples; participation in
round robin studies such as those conducted by the Environmental Protection Agency, U.S. Geological Survey, and others)

- Laboratory data reports (format, SOPs)
- Sample storage (security, SOPs)
- Turnaround time of analyses suitable for program needs
- Laboratory forms (types, copies included in manual)
- Laboratory safety (type of equipment, condition of equipment, frequency of inspection, availability of a safety plan, SOPs)

**Stage 2: Analyses of Performance Evaluation Samples**

Candidate laboratories that pass Stage 1 will be required to participate in the analyses of performance evaluation samples and attain an acceptable score determined by the DWR QA Officer. DWR will purchase the samples, and the candidate laboratories will perform the analyses at their own expense. PE samples will also be submitted to a referee laboratory in case there is a dispute about analytical results. Candidate laboratories will be required to submit their PE sample analyses in both hard copies and an electronic format compatible with DWR’s database.

**Stage 3: Cost Proposal Evaluation**

Candidate laboratories that pass Stage 2 will qualify to advance to the cost proposal evaluation. The lowest responsible bidder will be considered for award of the contract. An on-site visit will be conducted before a contract is awarded as part of the final evaluation process. The on-site visit will be to verify that the description of the laboratory facilities in the IFB/RFP is accurate and that the laboratory follows its own QA Manual procedures. The analytical laboratory evaluation form (see Appendix) will be used for this purpose.

**Ongoing Performance Evaluation**

Contract analytical laboratories and their subcontractors will be required to routinely participate in analyses of performance evaluation samples as part of the continuing performance audit process. The frequency and extent of these audits will be determined by DWR’s QA Program in consultation with the Bryte Laboratory QA Officer. DWR has contracted with an independent contractor to provide certified performance evaluation samples to DWR. Other sources of PE samples include agencies such as the DHS, EPA, USGS, National Institute of Standards and Technology, and the National Research Council of Canada.

The PE samples will be submitted to contract laboratories or their subcontractors blind, double blind, or in any other format determined by DWR’s Quality Assurance Program. The analytical results reported will be scored either on the basis of USGS “z” scores (with additional penalties for missed analytes and false positives) or on the basis of another standard scoring procedure. In all instances, the laboratory must obtain the minimum score defined by the scoring method. If a laboratory scores below the passing score twice in a row, DWR may terminate the contract or require analytical work to be subcontracted to a laboratory that can meet satisfactory performance.

An example of a scoring system that has been used by DWR is the following:

- Total possible points = 100
- Number of analytes = N per PE sample
- Points per analyte = (100/N) = P
- Penalty for missed analyte (Or analyte on contract but not attempted) = 2P
- Penalty for analyte found but not present = P
- Penalty for analyte found but outside certified control limits = P
- Final score = 100 - Penalty points
This system uses 80 percent as the passing score. A laboratory not meeting the 80 percent requirement would be sent a second performance evaluation sample to analyze at its own expense.

**System Audits**

System audits (Appendix A) will be conducted at the discretion of DWR’s QA Program and Bryte Laboratory QA Officer, who will determine the composition and format of the audits. On-site visits will help ensure that contract laboratories and their subcontractors continue to meet DWR’s quality requirements during the term of the contract. See Appendix A for an example of an analytical laboratory audit form. Deficiencies will be documented and discussed with the contract laboratory staff. In addition, laboratory weaknesses identified through DWR’s quality assurance performance evaluations will be discussed. Subsequent on-site visits will ensure that the contract laboratory has implemented the recommended or required corrective actions identified in previous on-site visits. If the contract laboratory is unable to implement recommendations to correct quality assurance problems, DWR reserves the right to terminate the contract or to require that analytical work be subcontracted to a laboratory that can meet the quality assurance requirements.

**Quality Assurance Practices Required of Analytical Laboratory**

The following is a general outline of expected quality assurance practices from a contract laboratory:

- The analytical laboratory is expected to comply with its own internal QA Laboratory Manual.
- All calibration and quality control requirements for a given analytical method will be strictly followed.
- The laboratory will, at DWR discretion, participate in performance evaluation studies for parameters covered by the contract. The laboratory will analyze performance evaluation samples, split samples, and blind samples supplied to the contract laboratory over the term of the contract. The laboratory will follow the instructions provided with these samples.
- The laboratory will operate its own internal quality control program for an overall measure of performance. QC problems will be resolved at the laboratory’s expense, including reanalysis of the samples as necessary.

**Analytical Laboratory Reporting Requirements**

Contract laboratories will be required to provide internal quality control data along with their routine analytical results to ensure that their data are of acceptable quality. These quality control results include duplicate samples results, reference and control standards, blanks, and any other control samples results available. Analytical results must be provided in an electronic format compatible with the Bryte Laboratory information database system. At present this database is in Microsoft Access V2.0 for Windows 3.1. Contract laboratories will be expected to update their databases when newer versions are implemented at Bryte Laboratory.

Analytical results must include the information below as a minimum:

- Precision, as measured by analyses of duplicate samples (for both the environmental samples and the spiked analytes), reported as relative percent difference or relative standard deviation
- Accuracy, as measured by analyses of control samples
- Presentation of the measurement data expressing the limits of uncertainty for the laboratory analytical method in the range of concentrations determined
• Documentation tracing the sample from the field to the final results (chain of custody records)

• Description of the analytical methods used, analyst who performed the analysis, detection and reporting limits

• Data reported only to the number of significant figures consistent with their limits of uncertainty

• Any modification, as well as any new methodology, described in detail, including test results and details of its validation

• Documentation of sample handling, including date sampled, date prepared (if applicable) and date analyzed, to ensure adherence to method holding times

• Case narrative justifying out-of-control data when results are validated with apparent QC problems or exceedances

The contract laboratory’s invoice shall be reduced for each of the following that occur:

• Receipt of results of analyses exceeds the agreed-upon turnaround time

• Holding times are exceeded on any samples

• Laboratory does not notify DWR within 24 hours of broken, defective, or missing samples

• Laboratory reports unacceptable batch QC results

In addition, if any of the above occur, the laboratory must pay for resampling and reanalyze new or reserved samples at no charge to DWR.
Appendix
Analytical Laboratory
Quality Assurance Evaluation

Laboratory Name: ________________________________ Date: __________________

Address:
____________________________________________
____________________________________________
____________________________________________

Director: ______________________________________

Telephone Number: ______________________________

Laboratory QA Officer: ____________________________

Telephone Number: ______________________________

Laboratory Certified By: __________________________

Review Team Members/Affiliation:
____________________________________________
____________________________________________
____________________________________________

DWR QA Officer: ________________________________ Date: ________________

Signature
1. Laboratory Organization

Number of staff professionals _________
technicians _________
clerical _________
computer _________
other _________

(Organization chart should be provided and attached)

2. Laboratory Facilities and Instrumentation

Approximate laboratory size _________ (ft $^2$)

<table>
<thead>
<tr>
<th></th>
<th>Adequate</th>
<th>Inadequate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sinks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bench space</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage for glassware/reagents/samples/containers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hoods (100 LFM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample containers labeled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reagent containers labeled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sufficient electrical outlets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available gas/vacuum lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distilled/deionized water:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conductivity monitored regularly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH/other parameters monitored</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log maintained</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments: ________________________________

Basic Laboratory Instrumentation/Equipment:

a. pH Meter:
   - 0.05 unit sensitivity _________ _________
   - Calibrated daily with 2 buffers _________ _________
   - Buffers used only once _________ _________
<table>
<thead>
<tr>
<th><strong>Expiration date posted</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calibrations documented</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Electrode properly maintained/ stored</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

b. **Analytical Reagents:**
   - Reagent grade or better
   - Dated when opened
   - Stored properly
   - Expiration date posted

**Comments:**

c. **Conductivity Meter:**
   - Calibrated before each use
   - Calibrated with ____________________
   - Calibrations documented

**Comments:**

d. **Analytical Balance:**
   - Sensitivity of 0.1 mg
   - Positioned on stable base
   - Annual service contract
   - Class “S” or “S1” weights for periodic calibration checks
   - Calibration checks documented

**Comments:**

e. **Drying Ovens:**
   - Temperatures monitored
   - Documentation of temperature when in use

**Comments:**
f. Refrigerators/Freezers:  
- Monitored daily
- Refrigerators at 4 +/- 2 °C
- Records of monitoring with date
  -- temperature
  -- initials of responsible person
  -- acceptable range listed

Comments:

---

g. Water baths:
- Maintained at 95 ° to 100°C
- Documentation when bath in use

Comments:

---

h. Thermometers:
- Certified thermometer (and certificate)
- Lab thermometers routinely calibrated
- Calibration checks documented

Comments:

---

i. Glassware:
- Class “A” type used
- Method SOPs used for cleaning

Comments:

---

j. Desiccator:
- Desiccant monitored
- Desiccant replaced/regenerated regularly

Comments:

---
k. Turbidimeter:
   Calibrated with primary/secondary standards __________ __________
   Secondary standards checked quarterly __________ __________
   Calibrations/standards checks documented __________ __________

Comments:____________________________________________________

l. Sample containers:
   Stored in designated storage area __________ __________
   Area free from contamination __________ __________
   Routinely checked for contamination __________ __________

Comments:____________________________________________________

m. Other Equipment:
   _________________________________________________________
   _________________________________________________________
   _________________________________________________________

Major laboratory equipment suitable for program needs
   Yes    No
   ___    ___

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>Number</th>
<th>Age</th>
<th>Maintenance Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Comments:____________________________________________________
n. Test Method References on hand and available to all personnel: Yes  No

Standard Methods for the Examination of Water and Wastewater (current version)  ____  ____
EPA - Methods for Chemical Analysis of Water and Wastes  ____  ____
EPA - Handbook for Analytical Quality Control in Water and Wastewater Laboratories  ____  ____
EPA - Methods for the Determination of Organic Compounds in Drinking Water (500’s series)  ____  ____
EPA - SW 846 3rd Ed. and Updates I, II, IIA, and IIB  ____  ____
PAM Manuals, Volume I & II  ____  ____

Comments: ________________________________________________________________

3. Preventive Maintenance

Yes  No

Equipment manual available near each instrument  ____  ____
Fume hoods quarterly inspections (up-to-date)  ____  ____
Log books documenting equipment maintenance available  ____  ____
Includes:
date, description of routine maintenance  ____  ____
all corrective actions documented  ____  ____
entry signed by technician  ____  ____
Troubleshooting standard operating procedures available  ____  ____

Service contracts available for:

Most ___________________ Some ___________________ Few _________________

Comments: ________________________________________________________________

4. Sample Receiving/Storage

Yes  No

a. Sample Security:

Storage facilities secured  ____  ____
Locked storage area for litigation samples  ____  ____

Comments: ________________________________________________________________
b. Sample Receiving:  
<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designated area for receiving samples</td>
<td></td>
</tr>
<tr>
<td>Size of area adequate</td>
<td></td>
</tr>
<tr>
<td>Area includes facilities for preserving samples</td>
<td></td>
</tr>
<tr>
<td>Location minimizes potential contamination</td>
<td></td>
</tr>
<tr>
<td>Location provides easy access to sample storage area(s)</td>
<td></td>
</tr>
<tr>
<td>Area organized for efficient processing/preserving</td>
<td></td>
</tr>
<tr>
<td>Sample integrity and/or identity maintained</td>
<td></td>
</tr>
<tr>
<td>Designated individual for sample receiving</td>
<td></td>
</tr>
<tr>
<td>Written SOP available for sample receiving</td>
<td></td>
</tr>
<tr>
<td>Written SOP available for chain-of-custody</td>
<td></td>
</tr>
</tbody>
</table>

Comments: __________________________________________________________

C. Sample Identification/Record Keeping:  
Sample receiving log maintained
Receiving log includes:
--Time and date sampled
--Time and date received at laboratory
--Sample collector
--Nature of sample (matrix identified)
--Analyses to be performed
--Preservatives in/added to sample
--Condition of samples recorded
--Sample transport methods documented
--Information on container documented
--Sample recipient
Lab ID assigned and recorded
Computer log-in system in place
--Backup system available
Hard copies of all files available
Chain-of-Custody Forms Include:
Project name/manager
Laboratory name
Field/Lab ID
Matrix type
Number of containers
Analyses requested
Adequate signature space

Comments: __________________________________________________________
d. Posted Instructions:  
<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>In sample receiving area for</td>
<td></td>
</tr>
<tr>
<td>--Sample preservation</td>
<td></td>
</tr>
<tr>
<td>--Proper containers</td>
<td></td>
</tr>
<tr>
<td>--Holding time requirements</td>
<td></td>
</tr>
</tbody>
</table>

Comments: __________________________________________

---

e. Preservatives, Containers, Storage and Holding Times:  
<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samples collected in proper containers</td>
<td></td>
</tr>
<tr>
<td>Samples preserved with appropriate preservatives</td>
<td></td>
</tr>
<tr>
<td>--Preservatives indicated on sample container</td>
<td></td>
</tr>
<tr>
<td>Samples stored properly</td>
<td></td>
</tr>
<tr>
<td>Samples analyzed within the required holding time limit</td>
<td></td>
</tr>
</tbody>
</table>

Comments: __________________________________________

---
f. Sample Tracking System:  
Follow a sample (or samples) progress through the laboratory from receipt to reporting of final data.

<table>
<thead>
<tr>
<th>Sample(s) traced (ID)</th>
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</thead>
<tbody>
<tr>
<td>_____________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tracking system in place</th>
</tr>
</thead>
<tbody>
<tr>
<td>______________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System monitors holding times</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample tags attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>____________________</td>
</tr>
</tbody>
</table>

Comments: __________________________________________

---
g. Storage Facilities:  
<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate facilities to store all samples properly</td>
<td></td>
</tr>
<tr>
<td>Samples stored to minimize cross contamination</td>
<td></td>
</tr>
<tr>
<td>Drinking water VOA samples in separate refrigerator</td>
<td></td>
</tr>
<tr>
<td>Hazardous waste samples stored separately</td>
<td></td>
</tr>
<tr>
<td>Refrigerators maintained at 4 +/- 2 °C</td>
<td></td>
</tr>
<tr>
<td>Storage temperatures monitored and documented</td>
<td></td>
</tr>
</tbody>
</table>

Comments: __________________________________________

---
5. **Sample Preparation (digestion/extraction)**

Written SOPs available

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
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<tbody>
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</table>

Comments: __________________________________________________________

6. **Calibration Procedures**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reagents</td>
<td></td>
</tr>
<tr>
<td>Date of receipt or preparation shown</td>
<td></td>
</tr>
<tr>
<td>Analyst preparing reagents identified</td>
<td></td>
</tr>
<tr>
<td>Proper storage</td>
<td></td>
</tr>
<tr>
<td>Vendor source identified</td>
<td></td>
</tr>
<tr>
<td>Written SOPs for calibration documented</td>
<td></td>
</tr>
<tr>
<td>Blanks and standards prepared using same reagents</td>
<td></td>
</tr>
<tr>
<td>as for production samples</td>
<td></td>
</tr>
<tr>
<td>Analytical range</td>
<td></td>
</tr>
<tr>
<td>Frequency of blank/calibration standard analysis</td>
<td></td>
</tr>
<tr>
<td>Acceptance criteria documented for analyst</td>
<td></td>
</tr>
<tr>
<td>Corrective action documented</td>
<td></td>
</tr>
<tr>
<td>Initial and final calibration of standards within 15%</td>
<td></td>
</tr>
<tr>
<td>Blanks less than the detection limit</td>
<td></td>
</tr>
<tr>
<td>Control charts used</td>
<td></td>
</tr>
<tr>
<td>Calibration problems documented in analyst notebook</td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td></td>
</tr>
<tr>
<td>Range of standards appropriate</td>
<td></td>
</tr>
</tbody>
</table>

Comments: __________________________________________________________

7. **Analytical Method (for Each Field of Testing)**

Field of Testing: _____________________________________________

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument appropriate for analytes/matrix</td>
<td></td>
</tr>
<tr>
<td>Instrument in good operating condition</td>
<td></td>
</tr>
<tr>
<td>Written SOPs of methodology available at each analyst's station</td>
<td></td>
</tr>
<tr>
<td>Have methods been modified?</td>
<td></td>
</tr>
<tr>
<td>Validation information on file</td>
<td></td>
</tr>
</tbody>
</table>

Method Detection limits (matrix) _____________________________ Last updated ________

Method Detection limits (matrix) _____________________________ Last updated ________

Method Detection limits (matrix) _____________________________ Last updated ________
Average sample backlog____________________
Analysis conducted within_______days of receipt
Analysts' notebooks available:____    ____
entries made in ink ____    ____
corrections crossed through ____    ____
analysts identified ____    ____
dated documented ____    ____
Raw data on file ____    ____
Weights, volumes recorded

Date, time, procedure entered ____    ____
Instrument parameters recorded ____    ____
Analyst’s initial or signature ____    ____
Calibration run referenced ____    ____
Notes on SOP modifications recorded ____    ____

Comments:______________________________

8. Quality Control (Internal)

Yes  No

Written SOPs available ____    ____
Control charts available for:
   --blanks ____    ____
   --duplicates ____    ____
   --spikes ____    ____
   --standard reference material ____    ____
   --calibration standards ____    ____
   --other___________________________ ____    ____

Blanks/Duplicates/Spikes
   --Frequency of each____________________

Acceptance criteria available to analyst ____    ____
Corrective action known by laboratory personnel obtained ____    ____

Estimated percent passed on first run_______________________

Percent of sample loads:
   --standards_______
   --blanks_______ duplicates _______
   --spikes_______blind reference samples_____

Completeness: ____    ____
Acceptance criteria available ____    ____
Corrective action available ____    ____
QA reports prepared and problems documented in writing  
QA reports reviewed by Lab Director prior to submittal of report  
Comments:  

9. Safety  

a. Safety Equipment:  
   --Fire extinguishers/fire blankets  
   --Safety shower  
   --Spill kits  
   --Eye wash  
   --First aid kit(s)  
   --Safety glasses  
Comments:  

b. Safety Habits:  
   Lab coats worn  
   Safety glasses worn  
   Walkways clear  
   Work areas clean  
   Safety data sheets filed  
Comments:  

c. Distillation, Solvent Extraction, and Acid Digestion Procedures:  
   Performed under hoods  
   Hoods have proper flow (100 LFM)  
   Hoods monitored on regular basis  
   Monitoring documented  
Comments:  

d. Chemical Storage Shelving and Gas Cylinders:  
   Shelves have earthquake railings  
   Gas cylinders secured  
   Explosive gas cylinders grounded  
Comments:  

e. Solvents and Acids Storage:
   Solvents stored in flammable storage cabinets ______   ______
   Acids stored in acid resistant cabinets ______   ______
   Acid neutralizers available nearby ______   ______
   Organic extracts stored in explosion-proof refrigerators ______   ______

Comments:______________________________________________________________

f. Hazardous Wastes Handling:
   Hazardous wastes stored properly ______   ______
   --Reactive wastes isolated ______   ______
   --Acid waste neutralized ______   ______
   Hazardous wastes disposed of properly ______   ______
   Waste disposal contract in place ______   ______

Comments:______________________________________________________________

10. External Quality Assurance

   Interlaboratory duplicates ______   ______
   Percent of external QA samples per batch ______   ______
   Acceptance criteria (obtained) ______   ______
   Corrective action (obtained) ______   ______

   Interlaboratory Participation:
   Sponsoring Agency  Sample Types  Performance Results
   __________________________  __________________________  __________________________
   __________________________  __________________________  __________________________
   __________________________  __________________________  __________________________

   Reports Available ______   ______

Comments:______________________________________________________________

11. Records/Data Retention

   a. Data Retention Requirements:
      Complete records of regulatory analyses maintained ______   ______
      Records retained per client requirements ______   ______
      Instrument printouts, chart recordings, and chromatograms retained ______   ______
b. Raw Data:
Maintained on worksheets and/or permanently bound lab books
Entries made in indelible ink
Corrections made by crossing out entries
Corrections initialed by analyst

Comments:

---

c. Data Review:
Data checked by second analyst
Documentation of second analyst data check

Comments:

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d. Corrective Action:
Documentation of corrective actions in out-of-control situations
Documentation includes
--date
--analyst
--samples affected
--problem
--resolution

Comments:

---

e. Data Reduction:
Dilution factors taken into account
Interferences noted
Bias corrections made on data
--If so, uncorrected values are included
Appropriate use of significant figures

Comments:

---
f. Notification and Reporting Procedures:

Do data reports include the following:

- Identification of the laboratory ______________________
- Identification of the client/program ______________________
- Complete sample identification ______________________
- Date of sample collection ______________________
- Date sample received by laboratory ______________________
- Date of sample analysis ______________________
- Name of analytical method ______________________
- Analytical values including units of measure ______________________
- Limits of detection ______________________
- Date of report ______________________
- Original signature by a signatory person ______________________

Samples stored for how long following submittal of reports ______________________

Comments: ___________________________________________________________


12. Quality Assurance Plan

Quality Assurance Plan in place ______________________
Date of most recent update ______________________
Plan accessible to all analysts ______________________
Laboratory personnel familiar with plan ______________________
Plan describes actual laboratory practices ______________________

Comments: ___________________________________________________________