QUALITY ASSURANCE PROJECT PLAN
FOR
BIOLOGICAL AND SURFACE WATER SAMPLING

HYDROLOGICAL AND BIOLOGICAL SUPPORT TO LOWER SANTA MARGARITA RIVER WATERSHED MONITORING PROGRAM

TASK ORDER: 07PE308086
GSA CONTRACT: GS-10F-0404P

PREPARED FOR

UNITED STATES BUREAU OF RECLAMATION
SOUTHERN CALIFORNIA AREA OFFICE, TEMECULA

OCTOBER 11, 2007

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GROUP A: PROJECT MANAGEMENT

1.0 TITLE AND APPROVAL SHEETS

QUALITY ASSURANCE PROJECT PLAN (QAPP)
FOR
BIOLOGICAL AND SURFACE WATER SAMPLING

Project: Hydrological and Biological Support to Lower Santa Margarita River Watershed Monitoring Program

Prepared by: Stetson Engineers Inc.
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Approved by

Gregory Krzys
U.S. Bureau of Reclamation — Date: 10/17/07

Steven Evanko
Marine Corps Base Camp Pendleton — Date: 10/17/07

Scott Thomas
Stetson Engineers Inc., Project Manager — Date: 10/17/07

Ken Reich
Stetson Engineers Inc,. Quality Assurance Coordinator — Date: 10/17/07

Matt Rahn
San Diego State University — Date: 10/17/07

HASP APPROVAL

Scheduled Start-up Date: 11/1/2007	Scheduled Start-up Time: 0700
Project Name: Hydrologic and Biological Support for Lower Santa Margarita River Watershed Program	Site Name: Water Quality Monitoring Stations
Project #: 2258	Site Locations: Cities of Temecula, Fallbrook, and Camp Pendleton, California

We have reviewed the attached HASP for the above referenced site. We recognize that when this form is completed, the attached HASP is approved for the field activities on the above referenced sites. The signatures below also act as certification of the personal protective equipment hazard assessment(s) performed for the work activities addressed by this HASP. Changes to this HASP shall be documented in writing and approved.

Name of HASP Author: Natalie Schommer-Pries, EIT.	
Signature: Natalie Schommer-Pries	Date: 10-12-07
Name of HASP Reviewer: Scott Thomas, Ph.D.	
Signature: Scott Thomas	Date: 10-17-07
Project Manager Name: Scott Thomas, Ph.D.	
Signature: Scott Thomas	Date: 10-17-07
Health and Safety Officer Name: Yuen Yap	
Signature: Yuen Yap	Date: 10-15-07

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3.0 DISTRIBUTION LIST

The final QAPP will be kept on file at Stetson Engineers Inc. The following individuals will receive copies of the approved QAPP and any subsequent revisions:

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4.0 PROJECT/TASK ORGANIZATION

4.1 Involved Parties and Roles

Stetson Engineers Inc. (Stetson) is under contract with the U.S. Bureau of Reclamation to provide Hydrological and Biological Support to Lower Santa Margarita River Watershed Monitoring Program. As part of the Monitoring Program, biological and surface water samples will be collected. San Diego State University will assist Stetson in the biological sampling.

Scott Thomas is Stetson's Project Manager. He will be responsible for all aspects of the project, including the organization of field staff, scheduling of sampling days, and management of the laboratory.

Associated Laboratories will be the analytical laboratory for all analyses not conducted in the field. Associated Laboratories will analyze submitted samples in accordance with all method and quality assurance requirements found in this QAPP.

Table 4-1 provides a summary of the involved parties and roles.

TABLE 4-1. PERSONNEL RESPONSIBILITIES

Name	Organization Affiliation	Title	Contact Information (Telephone No., Fax No., E-Mail Address)
Gregory Krzys	U.S. Bureau of Reclamation	Contracting Officer's Representative	Ph: 951-695-5310 Fax: 951-695-5319 gkrzys@lc.usbr.gov
Steven Evanko	Marine Corps Base Camp Pendleton, Office of Water Resources	Project Proponent	Ph: 760-763-1969 Fax: 760-725-1058 steven.evanko@usmc.mil
Scott Thomas	Stetson Engineers Inc.	Project Manager	Ph: 228-342-0239 Fax: 415-457-1638 scottt@stetsonengineers.com
Ken Reich	Stetson Engineers Inc.	Quality Assurance Coordinator	Ph: 626-967-6202 Fax: 626-331-7065 kenr@stetsonengineers.com
Matt Rahn	San Diego State University	Biological Analysis Leader	Ph: 619-594-0580 Fax: 619-594-0714 mrahn@sciences.sdsu.edu

4.2 Quality Assurance Coordinator Role

Ken Reich is Stetson's Quality Assurance Coordinator (QAC) for this project. The QAC's role is to establish the quality assurance and quality control procedures found in this QAPP as part of the field sampling and field analysis. Ken Reich will also work with Associated Laboratories to communicate all quality assurance and quality control issues contained in this QAPP to the laboratory.

Ken Reich will also review and assess all procedures during the life of the contract against QAPP requirements. Ken Reich will report all findings to Scott Thomas, including all requests for corrective actions. Ken Reich may stop all actions, including those conducted by Associated Laboratories, if there is significant deviations from required practices or if there is evidence of a systematic failure.

4.3 Persons Responsible for QAPP Update and Maintenance

Stetson's Project Manager and the QAC are responsible for creating and maintaining this QAPP. Stetson's Project Manager will be responsible for making the changes and ensuring the updates are provided to each project participant.

4.4 Organization Chart and Responsibilities

The project organization chart is shown on Figure 4-1, along with responsibilities.

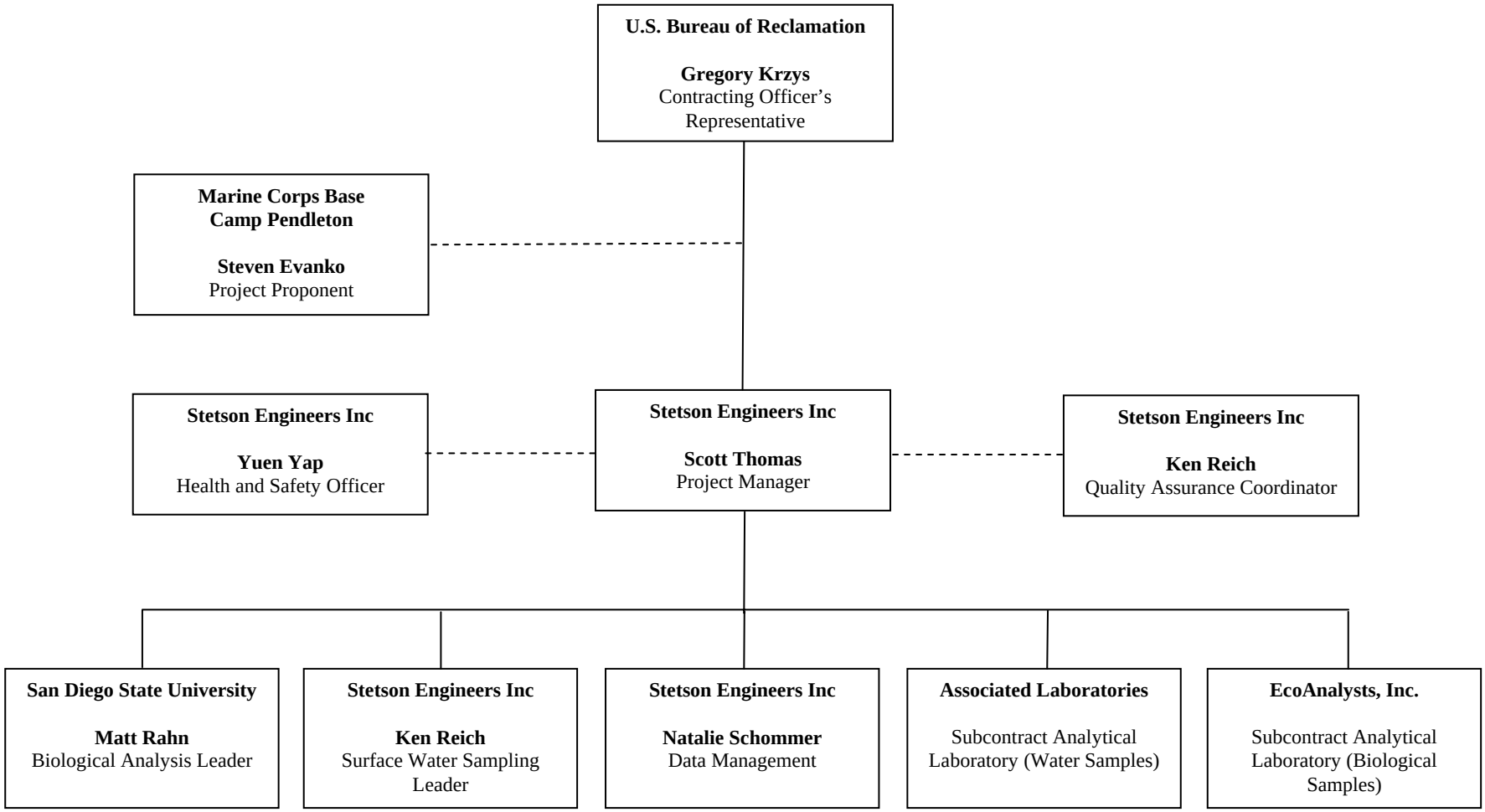


Figure 4-1. Project Organization Chart

5.0 PROBLEM DEFINITION/BACKGROUND

5.1 Problem Statement

The Santa Margarita River and estuary support a large population of seven federally-listed endangered species. While the watershed is characterized by many as an intact, functioning ecosystem, the Santa Margarita River is listed as a California Unified Watershed Assessment Category I watershed, which identifies it as a candidate for increased restoration activities due to impaired water quality or other natural resource goals.

The watershed also contains five water bodies listed as "impaired" under the California 303(d) list and is impacted by erosion, sedimentation, nutrient enrichment, flooding, an overdrawn aquifer in the Temecula Valley, and other products of agriculture and urbanization. Historical water development at the Santa Margarita River has led to the establishment of a foundation for the development of the Cooperative Water Resource Management Agreement (CWRMA).

5.2 Decision or Outcomes

As part of the Hydrologic and Biological Support to Lower Santa Margarita River Watershed Monitoring Program, biological and surface water samples will be collected to provide biological and water quality data that will support the following tasks:

1. Examine the water quality of the Santa Margarita River.
2. Determine whether the increased flows introduced under the CWRMA between the United States and Rancho California Water District influences threatened and endangered species, riparian and wetland habitats, or water quality downstream.

5.3 Water Quality or Regulatory Criteria

There is no requirement for a QAPP to be submitted for regulatory approval because this monitoring program is not being conducted to comply with a regulatory requirement. However, a simple QAPP is prepared following the State of California's Surface Water Ambient Monitoring Program (SWAMP) guidelines for the purpose of satisfying the quality guidelines of the monitoring program. Therefore, this QAPP is prepared with only sufficient detail to ensure a scientific quality process in the data collection.

6.0 PROJECT/TASK DESCRIPTION

6.1 Work Statement and Produced Products

Biological and surface water sampling will be conducted as part of the Hydrologic and Biological Support to Lower Santa Margarita River Watershed Monitoring Program. Sampling and monitoring of various parameters at various locations will be performed as described in Section 6.2.

This project will provide monthly progress updates, two draft semi-annual reports, a draft annual report, a draft final report, and a final report. With the exception of the first report (first draft semi-annual report), each report will incorporate the findings of previous reports such that the final draft report and the final report will include results for the entire 24 month period of sampling. The two semi-annual reports will include water quality data that have been gathered during the first six and 18 months of the project, respectively. The second semi-annual report will update the annual report and include an update to data gathered in the preceding six months. The first annual report will include all data gathered during the first 12 months of the project and will summarize the conceptual model and address recommendations, if any, for improving the data collection activities. The last annual report will include two years of data and the completed annotated bibliography in both paper and digital format.

Data from the project will be housed in accessible, web-based data sets with metadata descriptions. All draft and final reports, including appendices, tables, charts, reports, and other documents supporting such reports, will be furnished in hard-copy and electronic format (in computer compact disks [CDs]) in common Microsoft Office formats.

6.2 Constituents to be Monitored and Measurement Techniques

Monitoring will be conducted through biological sampling and surface water sampling. Surface water samples will be collected from seven sampling locations, as shown on Table 6-1 and Figure 6-1. Biological sampling will consist of field surveys of macrophyton and periphyton populations, which will be conducted from sites near established water quality monitoring stations. Six of the seven water quality sampling stations correspond to existing United States Geological Survey (USGS) flow gaging stations, enabling the addition of newly-collected data to historical water quality data sets from these gaging stations. Constituents to be monitored and measurement techniques are shown on Table 6-2.

TABLE 6-1. SURFACE WATER COLLECTION LOCATIONS, SANTA MARGARITA WATERSHED

Sample Location/Station Name	USGS Station Number	LATITUDE	LONGITUDE
Santa Margarita River at Ysidora (aka Topomai Bridge)	11045400	33°18'37"	117°20'52"
Fallbrook Creek at Fallbrook	11045300	33°20'49"	117°19'01"
DeLuz Creek at DeLuz	11044800	33°25'11"	117°19'15"
Roblar Creek near DeLuz Creek	None	33°23'16"	117°19'12"
Sandia Creek near Fallbrook	11044350	33°25'28"	117°14'54"
Santa Margarita River at Fallbrook Sump	11044300	33°24'29"	117°14'25"
Santa Margarita River near Temecula (aka SMR @Gorge)	11044000	33°28'26"	117°08'29"

TABLE 6-2. CONSTITUENTS MONITORED, ANALYTICAL METHODS, PRESERVATIVES, AND HOLDING TIMES

Parameter	Analytical Method	Container	Volume (ml)	Preservatives (in addition to 4 °C)	Holding Time
Aluminum	EPA 200.7 ICP	Polyethylene	500	Nitric Acid	6 Months
Ammonia as N	EPA 350.1	Polyethylene	250	Sulfuric Acid	28 Days
Antimony	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
Arsenic	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
Beryllium	EPA 200.7 ICP	Polyethylene	500	Nitric Acid	6 Months
Bicarbonate	SM 2320B	Polyethylene	250	None	14 Days
BOD5	SM 5210B	Polyethylene	1000	None	48 Hours
Boron	EPA 200.7 ICP	Polyethylene	500	Nitric Acid	6 Months
Cadmium	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
Calcium	EPA 200.7 ICP	Polyethylene	500	Nitric Acid	6 Months
Chloride	EPA 300.0	Polyethylene	125	None	28 Days
Chlorophyll a	10200H	Amber Glass	1000	None	Filter within 24 hrs
Chromium, total	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
COD	EPA 410.4	Polyethylene	250	Sulfuric Acid	28 Days
Conductivity	SM 2510B	Polyethylene	250	None	28 Days
Copper	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
Cyanide	EPA 335.4	Polyethylene	1000	Sodium Hydroxide	14 days
Dissolved Oxygen	SM 4500-OG	BOD Bottle		None	24 Hours
Fecal Coliform	SM 9221E	Sterile Polyethylene	125	None	24 Hours

Parameter	Analytical Method	Container	Volume (ml)	Preservatives (in addition to 4 °C)	Holding Time
Fluoride	SM 4500F-C	Polyethylene	125	None	28 Days
Iron	EPA 200.7 ICP	Polyethylene	500	Nitric Acid	6 Months
Lead	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
Manganese	EPA 200.7 ICP	Polyethylene	500	Nitric Acid	6 Months
MBAS-surfactants	SM 5540C	Polyethylene	500	None	48 Hours
Mercury	EPA 245.1	Polyethylene	500	Nitric Acid	28 Days
Nickel	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
Nitrate as N	EPA 300.0	Polyethylene	125	None	48 Hours
Nitrite as N	EPA 300.0	Polyethylene	125	None	48 Hours
Nitrogen, total	Calculation				
Oil and Grease	EPA 1664	Amber Glass	1000	Hydrochloric Acid	28 Days
Ortho Phosphate as P	SM 4500P-E	Polyethylene	125	None	48 Hours
pH	SM 4500 H-B	Polyethylene	125	None	7 Days
Phosphate, total as P	EPA 365.1	Polyethylene	125	Sulfuric Acid	28 Days
Selenium	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
Silver	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
Sodium	EPA 200.7 ICP	Polyethylene	500	Nitric Acid	6 Months
Solids, total dissolved	SM 2540C	Polyethylene	500	None	7 Days
Solids, total suspended	SM 2540 D	Polyethylene	500	None	7 Days
Sulfate	EPA 300.0	Polyethylene	125	None	28 Days
Thallium	EPA 200.8 ICP/MS	Polyethylene	500	Nitric Acid	6 Months
Total Kjeldahl Nitrogen	EPA 351.2	Polyethylene	250	Sulfuric Acid	28 Days
Total Organic Carbon	SM 5310C	Amber Glass	250	Phosphoric Acid	28 Days
Turbidity	EPA 180.1	Polyethylene	250	None	48 Hours
Zinc	EPA 200.7 ICP	Polyethylene	500	Nitric Acid	6 Months

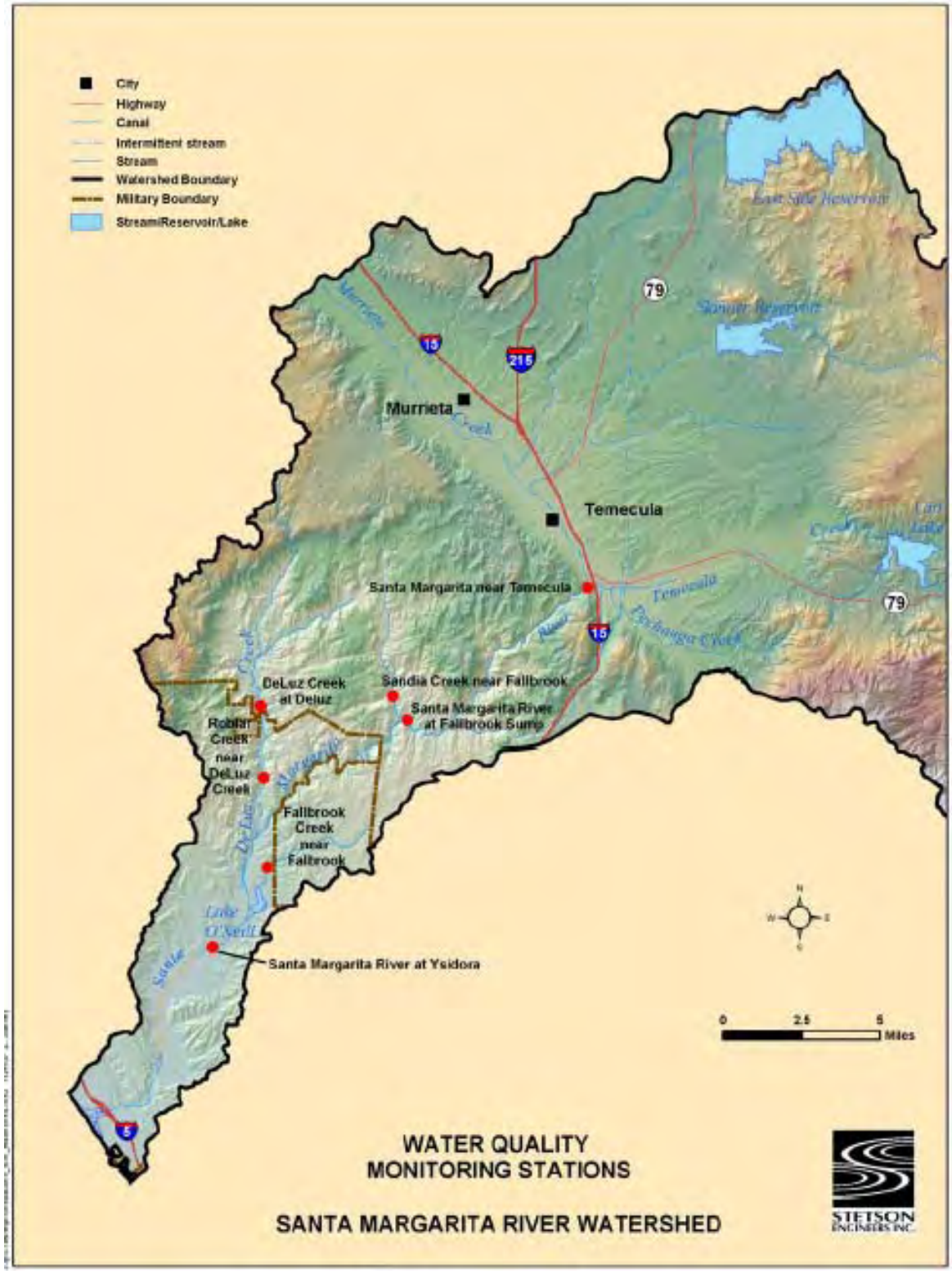


Figure 6-1. Water Quality Monitoring Sites

6.3 Project Schedule

The project schedule is shown on Table 6-3.

TABLE 6-3. PROJECT SCHEDULE

Activity	Date		Deliverable	Deliverable Due Date
	Anticipated Date of Initiation	Anticipated Date of Completion		
Biological Sampling				
Periphyton and Macrophyton Sampling	Apr 2008	Sep 2009	NA	NA
Water Chemistry Sampling				
Quarterly Water Quality Sampling	Nov 2007	Jul 2009	NA	NA
Continuous Water Quality Sampling	Nov 2007	Sep 2009	NA	NA
Index Period Sampling (Nutrient Protocol)	Feb 2008	Sep 2009	NA	NA
Deliverables				
Monthly Progress Update	Oct 2007	Dec 2009	Progress Report	Monthly*
First Semi-Annual Report	24 Mar 2008	24 Apr 2008	Report	28 Apr 2008
First Annual Report	1 Oct 2008	10 Nov 2008	Report	12 Nov 2008
Second Semi-Annual Report	24 Mar 2009	24 Apr 2009	Report	27 Apr 2009
Draft Project Report	1 Oct 2009	10 Nov 2009	Draft Report	12 Nov 2009
Final Project Report	26 Nov 2009	24 Dec 2009	Final Report	28 Dec 2009

NA = Not Applicable
* Submit with monthly invoices

6.4 Geographical Setting

The Santa Margarita River Watershed lies within the Counties of San Diego and Riverside in Southern California. The Watershed encompasses approximately 744 square miles and ranges from the Santa Ana Mountains overlooking Lake Elsinore to the San Bernardino Mountains northeast of Anza, then south to Palomar Mountain and west to the Pacific Ocean near Oceanside, California. The 27-mile long Santa Margarita River begins at the confluence of Murrieta and Temecula Creeks and flows to the ocean. A USGS topography map is attached showing the geographical features in the area (see Figure 6-2).

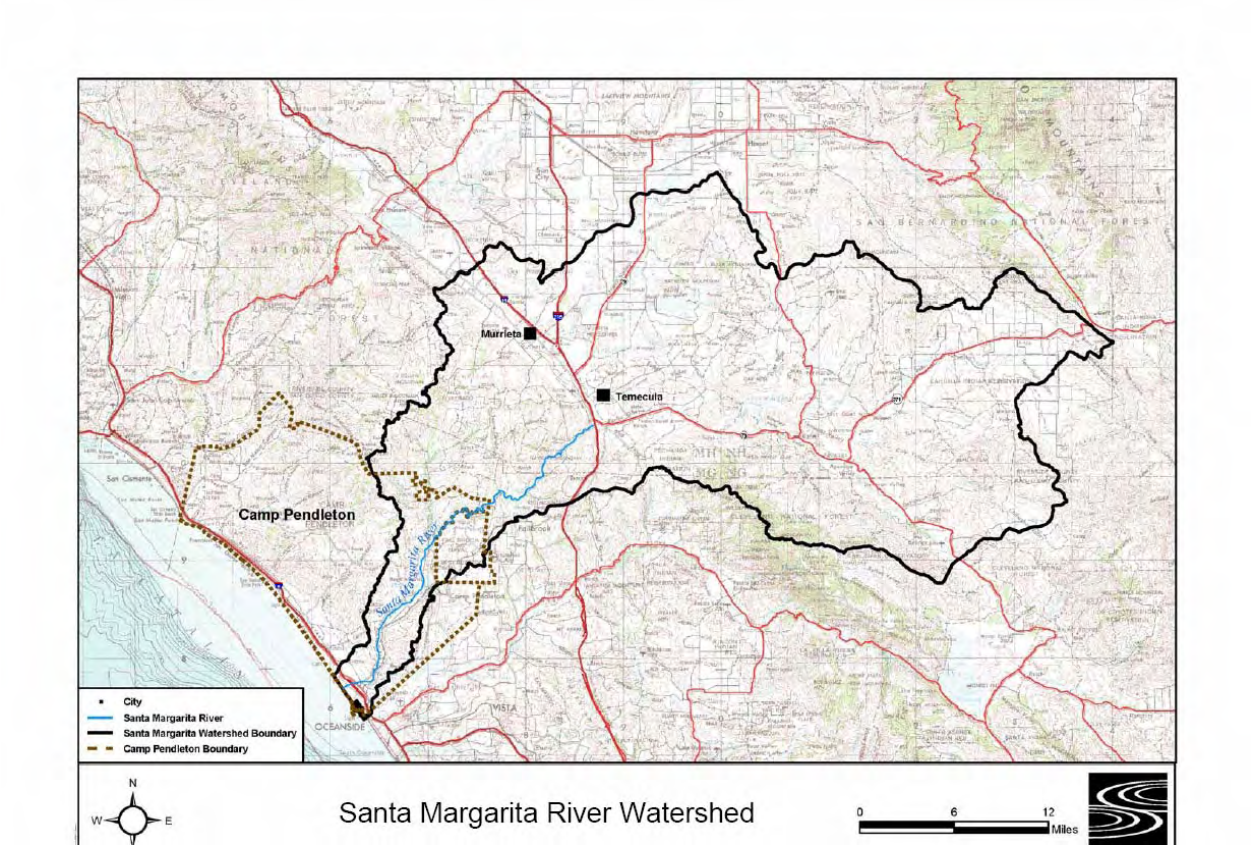


Figure 6-2. The Santa Margarita River Watershed in Southern California

6.5 Constraints

No constraints are identified at this time.

7.0 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Data quality objectives (DQOs) for this project will consist of the following:

- Field Measurement – Accuracy, Precision, and Completeness.
- Laboratory Analyses – Accuracy, Precision, Recovery, and Completeness.

Tables 7-1 and 7-2 provide the DQOs for field measurements and quality control acceptance criteria for laboratory analyses, respectively.

7.1 Accuracy (Recovery)

The accuracy of data is determined by particular actions of the analytical laboratory and field staff. The accuracy of an analysis is a measure of how much of the constituent actually present is determined. It is measured, where applicable, by adding a known amount of the constituent to a portion of the sample and determining how much of this spike is then measured. It is reported as Percent Recovery. The acceptable percent deviations and the acceptable percent recoveries are dependent on many factors including: analytical method used, laboratory used, media of sample, and constituent being measured.

Accuracy will be determined by measuring one or more performance testing samples or standard solutions from sources other than those used in calibration.

7.2 Precision

The precision of the data is determined by particular actions of the analytical laboratory and field staff. The precision of data is a measure of the reproducibility of the measurement when an analysis is repeated. It is reported in Relative Percent Difference (RPD) or Relative Standard Deviation (RSD). Precision measurement will be determined on both field and laboratory replicates.

7.3 Completeness

The completeness of data is basically a relationship of how much of the data are available for use to compare to the total potential data before any conclusion is reached. Ideally, 100 percent of the data should be available. However, the possibility of the data becoming unavailable due to laboratory error, insufficient sample volume, or samples broken in shipping

must be expected. Also, unexpected situations may arise where field conditions do not allow for 100 percent data completeness.

TABLE 7-1. DATA QUALITY OBJECTIVES FOR FIELD MEASUREMENTS

Parameter	Accuracy	Precision	Recovery	Completeness
Conductivity	± 5%	± 0.5 or 10%	NA	90%
Temperature	± 0.5 °C	± 0.5 or 5%	NA	90%
pH	± 0.5 units	± 0.5 or 5%	NA	90%
Dissolved Oxygen	± 0.5 mg/L	± 0.5 or 10%	NA	90%
Turbidity	± 10% or 0.1, whichever is greater	± 10% or 0.1, whichever is greater	NA	90%

NA = Not Applicable

TABLE 7-2. QUALITY CONTROL ACCEPTANCE CRITERIA FOR LABORATORY ANALYSES

Analysis	Analytical Method	Method Detection Limit	Laboratory Reporting Limit	Units	LCS/LFB (% R)	MS/MSD (% R)	RPD (%)	
							LCS	MS
Aluminum	EPA 200.7 ICP	0.013	0.03	mg/L	80-120	75-125	NA	20
Ammonia as N	EPA 350.1	0.01	0.1	mg/L	80-120	80-120	NA	20
Antimony	EPA 200.8 ICP/MS	0.0004	0.002	mg/L	80-120	70-130	NA	20
Arsenic	EPA 200.8 ICP/MS	0.0006	0.002	mg/L	80-120	70-130	NA	20
Beryllium	EPA 200.7 ICP	0.001	0.001	mg/L	80-120	75-125	NA	20
Alkalinity as CaCO3	SM 2320B	5	5	mg/L	NA	NA	NA	20*
BOD5	SM 5210B	1.5	3	mg/L	80-120	80-120	NA	20
Boron	EPA 200.7 ICP	0.007	0.05	mg/L	80-120	75-125	NA	20
Cadmium	EPA 200.8 ICP/MS	0.0001	0.001	mg/L	80-120	70-130	NA	20
Calcium	EPA 200.7 ICP	0.004	0.1	mg/L	80-120	75-125	NA	20
Chloride	EPA 300.0	0.1	1	mg/L	85-115	80-120	NA	20
Chlorophyll a	SM 10200H	NA	1	mg/M3	NA	NA	NA	NA
Chromium, total	EPA 200.8 ICP/MS	0.0006	0.005	mg/L	80-120	70-130	NA	20
COD	EPA 410.4	3.8	4	mg/L	80-120	75-125	NA	20
Conductivity	SM 2510B	0.86	1	mg/L	NA	NA	NA	20

Analysis	Analytical Method	Method Detection Limit	Laboratory Reporting Limit	Units	LCS/LFB (% R)	MS/MSD (% R)	RPD (%)	
							LCS	MS
Copper	EPA 200.8 ICP/MS	0.0002	0.005	mg/L	80-120	70-130	NA	20
Cyanide	EPA 335.4	0.001	0.01	mg/L	90-110	80-120	NA	20
Dissolved Oxygen	SM 4500-OG	NA	NA	mg/L	NA	NA	NA	NA
Fecal Coliform	SM 9221E	NA	2	MPN/ 100ml	NA	NA	NA	NA
Fluoride	SM 4500F-C	0.004	0.05	mg/L	80-120	75-125	NA	20
Iron	EPA 200.7 ICP	0.002	0.02	mg/L	80-120	75-125	NA	20
Lead	EPA 200.8 ICP/MS	0.0001	0.005	mg/L	80-120	70-130	NA	20
Manganese	EPA 200.7 ICP	0.001	0.01	mg/L	80-120	75-125	NA	20
MBAS-surfactants	SM 5540C	0.02	0.04	mg/L	80-120	75-125	NA	20
Mercury	EPA 245.1	0.00003	0.0004	mg/L	80-120	75-125	NA	20
Nickel	EPA 200.8 ICP/MS	0.0003	0.005	mg/L	80-120	70-130	NA	20
Nitrate as N	EPA 300.0	0.016	0.1	mg/L	90-110	80-120	NA	20
Nitrite as N	EPA 300.0	0.018	0.1	mg/L	90-110	80-120	NA	20
Nitrogen, total	Calculation	NA	0.5	mg/L	NA	NA	NA	NA
Oil and Grease	EPA 1664	1.7	5	mg/L	78-114	78-114	NA	20
Ortho Phosphate as P	SM 4500P-E	0.005	0.02	mg/L	80-120	75-125	NA	20
pH	SM 4500 H-B	NA	NA	NA	NA	NA	NA	NA
Phosphate, total as P	SM 4500P-E	0.01	0.02	mg/L	80-120	75-125	NA	20
Selenium	EPA 200.8 ICP/MS	0.0003	0.002	mg/L	80-120	70-130	NA	20
Silver	EPA 200.8 ICP/MS	0.0001	0.005	mg/L	80-120	70-130	NA	20
Sodium	EPA 200.7 ICP	0.12	0.5	mg/L	80-120	75-125	NA	20
Solids, total dissolved	SM 2540C	5.7	10	mg/L	NA	NA	NA	5*
Solids, total suspended	SM 2540 D	2.7	5	mg/L	NA	NA	NA	5*
Sulfate	EPA 300.0	0.17	1	mg/L	90-110	80-120	NA	20
Thallium	EPA 200.8 ICP/MS	0.0001	0.001	mg/L	80-120	70-130	NA	20
Total Kjeldahl Nitrogen	EPA 351.2	0.06	0.4	mg/L	80-120	75-125	NA	20
Total Organic Carbon	SM 5310B	0.3	0.5	mg/L	80-120	80-120	NA	20
Turbidity	EPA 180.1	NA	0.2	mg/L	NA	NA	NA	NA

Analysis	Analytical Method	Method Detection Limit	Laboratory Reporting Limit	Units	LCS/LFB (% R)	MS/MSD (% R)	RPD (%)	
							LCS	MS
Zinc	EPA 200.7 ICP	0.002	0.01	mg/L	80-120	75-125	NA	20

* Sample/Duplicate Result

8.0 SPECIAL TRAINING NEEDS/CERTIFICATION

8.1 Specialized Training or Certifications

Proper training of field personnel represents a critical aspect of quality control. Field technicians will be trained to conduct a variety of activities using standardized protocols to ensure comparability in data collection among crews and across geographic areas.

All field personnel will be required to read and understand the field procedures. The field team leader will conduct field planning meetings with field personnel prior to commencement of field work. The field training meetings will include discussion of relevant field procedures. Upon commencement of field work, experienced field personnel will train/mentor junior field personnel in the correct application of relevant field procedures.

8.2 Training and Certification Documentation

Field staff training will be documented and filed at Stetson's office. The Quality Assurance Coordinator will provide documentation of training of field staff upon request.

8.3 Training Personnel

The QA coordinator and field team leader will provide training to field staff.

9.0 DOCUMENTS AND RECORDS

All field data gathered will be recorded in field notebooks and, if applicable, also on standardized field data entry forms. Table 9-1 provides a summary of the documents that will be maintained for this project. A document control system will be maintained by Stetson administrative staff and will include a document inventory procedure and a filing system. Project personnel will be responsible for project documents in their possession while working on a particular task. Electronic copies of project documents will be routinely backed up and archived.

Laboratory data reports will contain case narratives that briefly describe the number of samples, the analyses, and noteworthy analytical difficulties or quality assurance/quality control (QA/QC) issues associated with the submitted samples. The data reports will include signed chain-of-custody forms, sample cooler receipt forms, analytical data, QC package, raw data, and an electronic copy of the data. Hard copies and electronic copies of the data reports will be archived and retained for a minimum of five years and will be made available upon request.

A permanent bound and consecutively paginated field logbook will be maintained daily by the field team. Any corrections to field logbook entries will consist of a single strikeout, initialed, and dated.

The most recent version of this QAPP will be maintained in the project files and distributed to all appropriate project personnel, including the field team. The QA coordinator will be responsible for distributing copies of the latest QAPP to project personnel.

TABLE 9-1. PROJECT DOCUMENTS

Document	Location
Field Logbooks/Notes	Project File
Chain-of-Custody Forms	Project File
Laboratory Data Package	Project File
Photographs/Photographic Logs	Project File
Corrective Action Forms/Reports	Project File and Analytical Laboratory
Laboratory Equipment Calibration Logs	Analytical Laboratory

Document	Location
Sample Preparation Logs	Analytical Laboratory
Sample Run Logs	Analytical Laboratory
Sample Disposal Records	Analytical Laboratory
Paper Copy of All Records	Project File

GROUP B: DATA GENERATION AND ACQUISITION

10.0 SAMPLING PROCESS DESIGN

Sample collection points were selected as described in the Work Plan and Section 6. Sample locations are shown on Figure 6-1.

11.0 SAMPLING METHOD

Field personnel will adhere to sample collection protocols described in this QAPP in order to insure the collection of representative and uncontaminated water samples for laboratory analyses. Pre-cleaned sample containers will be provided by the analytical laboratory; the sample containers will be pre-filled with sample preservatives by the analytical laboratory, where required.

11.1 Field Measurements

Field measurements will be made using an instrument capable of meeting the accuracy requirements indicated in Section 7. Field measurements will be recorded on a field forms. All field instruments used for water quality measurements will be calibrated according to the manufacturer's instructions at the beginning of each sampling day, and checked at the end of the day. In the event of erratic or faulty instrument readings, the instrument will be re-calibrated. All calibration records will be recorded in the field logbook.

11.2 Surface Water Sampling

All surface water samples for laboratory analysis will be collected as grab samples at approximately 6 to 12 inches below the water surface, with precautions taken to avoid disturbing the bottom sediment. All sample containers designated for a particular analysis will be filled sequentially before containers for another analysis are filled. If a field duplicate sample is to be collected at a given location, all containers designated for a particular analysis for both the primary sample and the duplicate sample will be filled sequentially before containers for another analysis are filled.

Water quality samples will be collected directly from the stream in acid washed polyethylene bottles, plastic cubitainers or scoops, and then aliquoted into appropriately preserved and labeled containers for field measurements or shipment to the analytical laboratory. The bottle or scoop will be rinsed with stream water prior to start of sample collection. Each sampling site will have its own dedicated sampling devices. Once the samples are collected, they will be kept chilled (if appropriate) and processed for shipment to the analytical laboratory. Care will be taken not to touch the lip of the sample bottle during sample collection and preservation, so as not to contaminate the sample.

11.3 Biological Sampling

Reach-scale sampling will be conducted near existing stream flow gages and macroinvertebrate sampling stations. Each reach is designated 40 times as long as the stream is wide (minimum 150 meters [m], maximum of 1240 m, which means that most study reaches will be 150 m long). Within that distance, 11 cross sectional transects are established. From a random start point, periphyton samples are collected at one point on each transect (at ¼ right, ½ middle or ¾ left relative to the stream bank and transect). In coarse substrate, periphyton will be collected from a cobble and a 12 square centimeter (cm^2) area is scraped with a toothbrush which is then washed into a collection vial with deionized water. In fine substrate, sediments will be sucked into a 60 milliliter (mL) syringe. All the samples from a reach will be combined into a composite sample and preserved with 37 percent formalin.

Visual estimates and quantitative transect-based assessments will be used to determine the percent coverage and the estimated relative abundance of macrophytes. Macrophytes will be sampled by drawing the net through the vegetation from the bottom to the surface of the water (maximum of 0.5 m each sample). In shallow water, samples will be collected by dragging the net along the bottom in the rooted area, avoiding collection of sediments where possible. When possible, percent cover estimates will be generated for classes of macrophytes, with special attention given to potential invasive species within the stream.

12.0 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

Table 6-2 provides a summary of recommended sample containers, sample volumes, sample preservation requirements, and sample holding times.

12.1 Sample Handling

All samples collected will be packed in plastic bubble wrapping material, placed in coolers packed with ice, and cooled to 4 degrees Celsius or less. All caps and lids will be checked for tightness prior to shipping.

A completed chain-of-custody form will be placed in a water-tight resealable plastic bag and into the cooler to accompany the samples to the laboratory. Samples will be delivered to the laboratory as soon as possible to avoid exceeding any sample holding time.

12.2 Sample Documentation

Each sample, including the field QC sample, will be uniquely identified with a sample identification (ID) to allow tracking and retrieval of information on a particular sample. Each collected sample will be securely affixed with a waterproof sample label, completed using an indelible marker. Each sample label will include the sample ID, date and time of sample collection, sampler's initial, analytical tests to be performed, and sample preservatives, if any.

A field logbook will be used to document all data collection activities performed at the site, including:

- time of sample collection
- sample IDs, including IDs for field QC samples
- results of any field measurements made
- qualitative descriptions of relevant water conditions or weather conditions at the time of sample collection
- description of any unusual occurrences associated with the sampling event, particularly those that may affect sample or data quality.

12.3 Sample Custody

Chain of custody procedures will be followed to document custody of the samples. A chain-of-custody form will be completed by the sampler to accompany the samples from collection through receipt at the laboratory.

The laboratory will maintain custody logs to track each sample submitted and to analyze or preserve each sample within the specified holding times.

13.0 ANALYTICAL METHODS

The analytical methods used for this project are provided on Table 6-2.

14.0 QUALITY CONTROL

14.1 Laboratory Quality Control Samples

Laboratory QC samples will consist of laboratory control samples (LCS) and matrix spike/matrix spike duplicates (MS/MSD). The LCS consist of a clean matrix spiked with known concentrations of target analytes. The LCS is used to evaluate the performance of the total analytical system, including all preparation and analysis steps. The MS is a duplicate aliquot of a sample that is spiked with the analytes of interest and taken through the same analytical procedures.

14.2 Field Quality Control Samples

Field QC samples will consist of field duplicate samples. Field duplicate samples will be collected in the same manner and as close in time as possible as the associated sample. Field duplicate samples will be collected at a frequency of one per every 10 samples (10 percent).

15.0 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Field measurement equipment will be checked for operation in accordance with the manufacturer's specifications. The field team leader will be responsible for ensuring testing and maintenance requirements are met.

The laboratory will maintain its equipment in accordance with its Quality Assurance Manual (see Appendix A).

16.0 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Field equipment will be calibrated in accordance with the manufacturer's specification. Calibration checks performed will be recorded in the field logbook. The field team leader will be responsible for ensuring calibration requirements are met.

The analytical laboratory will perform the necessary calibration of its instruments or equipment in accordance with its Quality Assurance Manual (see Appendix A).

17.0 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

All supplies and consumables will be inspected to ensure they are in satisfactory condition and free of defects before being accepted for use. The field team leader is responsible for ensuring all supplies and consumables are properly inspected prior to use.

18.0 NON-DIRECT MEASUREMENTS

There are no known non-direct measurements that will fundamentally affect the success of the monitoring program of this project.

19.0 DATA MANAGEMENT

Data from this project will be housed in accessible, web-based data sets with meta descriptions. Field measurement data and laboratory data will be entered into a database. The database will be developed using either Microsoft Access or Excel software. Electronic data deliverables submitted by the laboratory will be loaded into the database. Periodic checks will be performed to ensure the accuracy of the data entered into the database. The database will have the capability to generate data reports and export data in Microsoft Excel format. Additional information on data management associated with the analysis of biological samples is provided in the laboratory's QAPP for periphyton taxonomy (see Appendix B).

GROUP C: ASSESSMENT AND OVERSIGHT

20.0 ASSESSMENT AND RESPONSE ACTIONS

Assessments will be conducted throughout the project to identify potential problems early in the project to allow for timely corrective actions. Performance assessment of the sampling procedures will be performed by the QA coordinator. Corrective actions will be implemented in the field immediately to correct a quality problem. Corrective actions taken will be documented in the field logbook and reported to the Project Manager. The Project Manager will be notified immediately in the event corrective actions cannot be implemented immediately.

Performance assessment of the laboratory procedures will be conducted by appropriate laboratory personnel in accordance with the laboratory's Quality Assurance Manual (see Appendix A).

21.0 REPORTS TO MANAGEMENT

The Project Manager will report the status of the data collection. QA reports will be provided to management when significant quality problems are encountered. Quality problems encountered in the field will be noted by field staff in the field logbook.

Two semi-annual reports, one annual report, and one project report (draft and final) will be provided to document data gathering, discuss water quality findings, and present analysis. Quality problems encountered in the field and actions taken to address quality problems will be included in these reports. Project reports will be issued according to the schedule on Table 6-3.

GROUP D: DATA VALIDATION AND USABILITY

22.0 DATA REVIEW, VERIFICATION, AND VALIDATION REQUIREMENTS

Data generated by project activities will be reviewed against the data quality objectives cited in Section 7.0 and the QA/QC practices cited in Sections 14.0, 15.0, 16.0, and 17.0. Data will be separated into three categories: data meeting all data quality objectives, data failing precision or recovery criteria, and data failing to meet accuracy criteria. Data meeting all data quality objectives, but with failures of QA/QC practices will be set aside until the impact of the failure on data quality is determined. Once determined, the data will be moved into either the first category or the last category.

Data falling in the first category is considered usable by the project. Data falling in the last category is considered not usable. Data falling in the second category will have all aspects assessed. If sufficient evidence is found supporting data quality for use in this project, the data will be moved to the first category, but will be flagged accordingly.

Laboratory data review will be performed by the laboratory in accordance with the laboratory's Quality Assurance Manual (see Appendix A).

23.0 VERIFICATION AND VALIDATION METHODS

Data verification is performed to provide a completeness review to ensure that the required information is available. Data verification involves verifying that the required methods and procedures have been followed at all stages of the data collection, sample receipt, sample preparation, sample analysis, and documentation review for completeness. Records examined during the verification process include field logbooks and field forms, chain-of-custody forms, sampling procedures, laboratory data reports, and project database. The field team leader is responsible for verifying field procedures and documentation associated with the field sample collection. Verification of the project database will be performed by the database coordinator. Laboratory verification procedures will be in accordance with the laboratory's Quality Assurance Manual (see Appendix A).

Data validation involves evaluating the quality of the data generated and determining whether project requirements were met. Data collected are compared with measurement performance criteria presented in Section 7.0. Data that do not meet the criteria specified in Section 7.0 will be qualified accordingly.

24.0 RECONCILIATION WITH USER REQUIREMENTS

Biological sampling data and surface water sampling data collected will be used to support the following tasks under the Hydrologic and Biological Support to Lower Santa Margarita River Watershed Monitoring Program:

1. Examination of the water quality of the Santa Margarita River.
2. Determination of whether the increased flows introduced under the CWRMA between the United States and Rancho California Water District influences threatened and endangered species, riparian and wetland habitats, or water quality downstream.

Work under the Watershed Monitoring Program will be conducted to support the Santa Margarita River Water Quality Monitoring Group's (Monitoring Group) on-going program. This Monitoring Group is a consortium of committed parties that bring important resources, tools, and capabilities to monitoring in the watershed. Members of the Monitoring Group include Marine Corps Base Camp Pendleton (Camp Pendleton), San Diego State University, Counties of San Diego and Riverside, local communities, water agencies including Fallbrook Public Utility District, Rancho California Water District, and Eastern Municipal Water District, and several resource conservation districts. These parties have been involved in water quality monitoring at various locations at various times throughout the watershed.

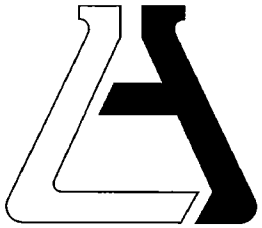
The overall intent is to develop and implement an integrated monitoring program that builds upon historical sampling data sets. The specific intent of this Watershed Monitoring Program is to immediately address some of the monitoring requirements identified by the Monitoring Group and of interest to Camp Pendleton in order to build momentum within the program while the Monitoring Group continues to refine the overall program and identify additional funding sources. The Watershed Monitoring Program will support Camp Pendleton's water resources and environmental management programs.

The deliverables from this Watershed Monitoring Program will provide useful input to the ongoing Watershed Analysis Risk Management Framework (WARMF) modeling project. Data from this sampling will be assembled in a format that supports the existing WARMF Model for the river. The WARMF initiative is funded by the Santa Margarita River Executive Management Team (SMREMT), which is led by the Bureau of Reclamation's Southern

California Area Office and includes many of the same parties that participate in the Monitoring Group. The Watershed Monitoring Program will also support the Technical Advisory Committee (TAC) and the Santa Margarita River Watermaster in their implementation of the CWRMA between the United States and the Rancho California Water District.

Any limitations of the data collected will be described in the project reports to allow data users determine their usefulness in their applications.

APPENDIX A: QUALITY ASSURANCE MANUAL ASSOCIATED LABORATORIES



QUALITY ASSURANCE MANUAL

Revision 10/2006

Effective October 2006

Quality Assurance Guidelines Applicable
to all Chemical Testing

ASSOCIATED LABORATORIES
806 N. BATAVIA
ORANGE, CA 92868
714-771-6900

SIGNATURES AND APPROVALS:

PRESIDENT:

Tito Parola — Date 11/02/06

VICE PRESIDENT:

Robert Webber — Date 11/2/06

VICE PRESIDENT, TECHNICAL DIRECTOR:

Edward S. Behare, PhD — Date 11/02/06

DIRECTOR OF QUALITY ASSURANCE:

James McCall, PhD — Date 11/02/06

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APPENDICES

MANAGEMENT QUALITY POLICY STATEMENT

It is the policy of Associated Laboratories to provide all clients with test results that are accurate and legally defensible. Associated Laboratories management is committed to good professional practices and quality in environmental testing and calibration as documented in the Quality Assurance Manual and all applicable NELAC standards.

This policy has the full support of Management and must be accomplished with the cooperation of all employees. All personnel concerned with environmental testing and calibration activities within the laboratory are required to familiarize themselves with the quality documentation and implement the policies and procedures in their work.

ORGANIZATION AND MANAGEMENT STRUCTURE

Associated Laboratories is a privately owned, independent laboratory incorporated in California (DePar, Inc.). The laboratory is actively managed by three directors. The laboratory is organized into Departments as follows:

1. Sample Receiving
2. Sample Custodian and Sample Storage
3. General Chemistry
4. Metals (ICP/AA)
5. Pesticides Analysis
6. Hydrocarbons Analysis
7. Volatile Organic Compounds GCMS
8. Semi-Volatile Organic Compounds GCMS
9. Microbiology
10. Fish Bioassay
11. TOC / Radioactivity
12. Sampling and Sample Pickup
13. QA Department

Each Department is managed by a Department Supervisor who reports to the Laboratory Directors.

The Quality Assurance Department operates independently from the other Departments. The Quality Assurance Director reports directly to the Laboratory Directors.

An Organization Chart is attached in Appendix G.

The Directors manage all operations of the laboratory and are the official signatories for all Laboratory Analysis Reports and other official documents of the Laboratory. The QA Director is the official signatory for Quality Assurance documents and may also sign Laboratory Analysis Reports. The signature page of this document includes all approved laboratory signatories.

All personnel are employees of the laboratory. Where contracted and additional technical and key support personnel are used, the laboratory ensures that such personnel are supervised and competent and that they work in accordance with the laboratory' s quality system.

RELATIONSHIP BETWEEN MANAGEMENT, TECHNICAL OPERATIONS, SUPPORT SYSTEMS AND THE QUALITY SYSTEM

The Laboratory Directors manage all operations of the laboratory and all technical operations support systems. The Quality System operates independently of other laboratory operations and reports directly to the Laboratory Directors.

JOB DESCRIPTIONS OF KEY STAFF

The job descriptions of key staff are attached in Appendix A.

FACILITIES, MAJOR EQUIPMENT AND SERVICES

ASSOCIATED LABORATORIES is located in two buildings:

Main Office and Laboratory: 806 North Batavia Street, Orange, CA 92868

Annex: 1108 West Barkley, Orange, CA.

Telephone: 714-771-6900
Fax No: 714-538-1209

Associated Laboratories has been in operation for over 80 years and is currently employing 75+ personnel.

Our main facility occupies 10,000 square feet, 8,000 square feet is laboratory space and 2,000 square feet office space. The Annex occupies 7,500 square feet and is maintained free of organic solvent vapors for analysis of volatile organic compounds. The annex also contains the microbiology and metals laboratories.

Refrigeration and freezers are provided for sample storage according to the method requirements. Samples are always stored in refrigerators and freezers separate from analytical standards to avoid cross contamination.

The laboratory monitors, controls and records environmental conditions as required by the relevant specifications, methods and procedures or where they influence the quality of the results. If specific environmental conditions are specified in a test method or by a regulation then the environmental conditions are documented on the sample preparation documents or separate monitoring document. Special procedures are prepared when necessary to meet environmental conditions.

The latest equipment inventory is attached (Appendix D)

ACCREDITATIONS

Associated Laboratories is accreditated by the following agencies:

- State of California, Department of Health Services, Environmental Laboratory Accreditation Program, Berkeley, Certificate No. 1338 .
- State of Hawaii, Department of Health, Safe Drinking Water Branch.
- State of Nevada, Department of Human Resources, Health Division, Bureau of Licensure and Certification.
- U.S. Army Corps of Engineers, Dept. of the Army, Omaha, NE.
- U.S. Food and Drug Administration, Department of Health and Human Services.

A listing of all test methods accredited by California is attached in Appendix K.

PERSONNEL QUALIFICATIONS

The laboratory management shall ensure the competence of all who operate specific equipment, perform environmental tests and/or calibrations, evaluate results, and sign test reports and calibration certificates. The laboratory management shall be responsible for checking the qualification of person before hiring based on the minimal level of qualification, experience and skills necessary for all positions in the laboratory (see Appendix A, Laboratory Job Descriptions). In addition to education and/or experience, basic laboratory skills such as using a balance, colony counting, aseptic or quantitative techniques shall be considered. Any falsification or inaccuracy of the employment application or educational diploma will be cause for the termination of employment. A copy of educational diplomas or certificates will be required to be included in the personnel file of new employees.

Records of personnel qualifications, training and experience are maintained in the employee training files maintained by the QA Department. The Laboratory training program is detailed below.

PERSONNEL TRAINING PROGRAM

All personnel shall be responsible for complying with all quality assurance/quality control requirements that pertain to their organizational/technical function. Each technical staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of their particular function and a general knowledge of laboratory operations, test methods, quality assurance/quality control procedures and records management.

All current as well as new technical personnel are required to become familiar with the the following documents:

Laboratory Safety Manual - A formalized laboratory safety training course has been established, including a video discussion of safety and a written test. An attendance log and the test results are filed in the Employee Safety Documentation File. Each employee is also given a copy of the Laboratory Safety Manual.

Quality Assurance Manual - A copy of the Quality Assurance Manual is available in all departments. All employees are required to understand and follow the appropriate Quality Assurance guidelines and procedures.

Standard Operating Procedures - Standard Operating Procedures (SOP's) are available to all analysts for most analytical methods. For analytical methods, the SOP provides details regarding specific procedures and QA acceptance limits. SOP's are also available for most laboratory operations. Analysts are required to understand and follow the standard method requirements as detailed in the SOP for each analytical method. Each SOP is reviewed at least annually by the analysts and department manager to insure that the SOP accurately describes the analytical procedure. All SOP's are approved by the department manager and the QA Director.

The Department Supervisor is responsible for ensuring that all department personnel read and understand the Safety Manual, QA Manual, standard methods and appropriate SOP's. Completion of these requirements and all other specific training are documented in the employee training records. Training records are filed in the employee training file maintained for each technical employee. Successful completion of training courses and other formalized training are also filed in the employee training files.

In addition, the following training is conducted:

Technicians are also given on-the-job training for each new method or procedure by the supervisor or an experienced analyst designated by the supervisor. During the training period the supervisor or experienced analyst continues to be responsible for all analytical results produced by the trainee. This training is also documented on the employee's training record.

Competence to perform each analysis is determined by the supervisor's direct evaluation and successful analysis of Lab Control Samples and/or Performance Evaluation Samples.

Periodically, analysts are encouraged to attend outside classes or other relevant training to increase their job knowledge. Attendance at these courses/seminars are also recorded on the training record.

Training Files

Training files for each employee are maintained by the QA Department. The training files contain training logs, sign-off sheets for the QA Manual, Standard Operating Procedures and Initial and Continuing Demonstration of Capability Certificates and supporting documentation. The training files are updated on an annual basis. Annually each employee signs a form that demonstrates that they have read, understood, and is using the latest version of the laboratory's in -house quality documentation, which relates to his/ her job responsibilities.

Demonstration of Capability

For NELAP certified tests an Initial Demonstration of Capability (IDOC) must be performed prior to using any test method, and at any time there is a change in instrument type, personnel or test method (NELAC, Quality Systems Revision 16, Appendix C, July 12, 2002). The Demonstration of Capability is updated annually, and a signed certification is placed in the employee training file for each method. When a work cell is employed, the performance of the group is linked to the training record of the individual members of the work cell.

The analyst training on each method shall be considered up to date if the employee training file contains a certification that the analyst has read, understood and agreed to perform the most recent version of the test method (the approved method or standard operating procedure as defined by the laboratory document control system) and documentation of continued proficiency by at least one of the following once per year:

a. acceptable performance of a blind sample (single blind to the analyst);

b. another demonstration of capability;

c. successful analysis of a blind performance sample on a similar test method using the same technology (e.g., GC/MS volatiles by purge and trap for Methods 524.2, 624 or 5035/8260) would only require documentation for one of the test methods;

d. at least four consecutive laboratory control samples with acceptable levels of precision and accuracy; or

e. if a-d cannot be performed, analysis of authentic samples with results statistically indistinguishable from those obtained by another trained analyst.

f) A certification statement is completed to document the completion of each demonstration of capability. A copy of the certification statement is retained in the personnel records of each affected employee.

Ethics Policy and Data Integrity Training

To prevent Data Fraud/Inappropriate Practices, all technical personnel are trained in ethical and legal responsibilities. Examples of Data Fraud are identified below:

a) Inappropriate use of manual integrations to meet calibration or method QC criteria would be considered fraud. For example, peak shaving or peak enhancement are considered fraudulent activities if performed to meet QC requirements.

b) Time travel of analyses to meet method holding time requirements.

c) Falsification of results to meet method QA requirements.

d) Reporting of results without analyses to support the results.

e) Selective exclusion of data to meet QC criteria (i.e. initial calibration points dropped without technical or statistical justification)

f) Misrepresentation of laboratory performance by presenting calibration data or QC data within data reports which are not linked to the data set reported.

g) Notation of matrix interference as basis for exceeding acceptance limits (typically without implementing corrective actions) in interference-free matrices (e.g. MB or LCS)

The potential punishments and penalties for improper, unethical or illegal actions include immediate dismissal, and possible legal court action.

All technical personnel are required to sign an Ethics and Data Integrity Agreement Form. These forms are filed in the QA Office.

The Ethics and Data Integrity Training and Agreement Form is updated annually for each employee.

Internal audits are performed periodically which include monitoring of data integrity. Any allegations of improper reporting or manipulation of data are investigated promptly.

DOCUMENT CONTROL AND RECORD KEEPING

All documents relating to laboratory analyses and reporting are kept a minimum of seven years. After that time the records will be destroyed, unless special arrangements are made.

The laboratory maintains a tracking system for Standard Operating Procedures, MDL determinations, training documentation and corrective actions. These records are kept by the QA Department.

A Lab Request is created by the Laboratory LIMS system for each group of samples received from a client to enable organization and tracking of the analyses and final reporting. All analytical results are reported in the LIMS database system, including date of analysis and analyst initials. All documentation other than bound laboratory notebooks relating to the analyses of a client's samples including a copy of the final report, Chain of Custody, all sample preparation worksheets and analytical raw data is attached to each Lab Request. Lab Requests including all relevant data are filed for a minimum of seven years. Other relevant analysis data may be written in bound laboratory notebooks which are maintained in each laboratory department. All calibration data and other relevant data such as calibration checks, which may apply to multiple Lab Requests are filed and retained in the individual departments.

Corrections

All generated data is recorded in permanent ink. Entries in records shall not be obliterated by methods such as erasures, overwritten files or markings. All corrections to record-keeping errors shall be made by one line marked through the error. The individual making the correction shall sign (or initial) and date the correction.

The document control system establishes procedures to ensure that all records required under the laboratory certification are retained. Procedures for control and maintenance of documentation through a document control system ensures that all standard operating procedures (SOPs), manuals, or documents clearly indicate the time period during which the procedure or document was in force.
Document control procedures are defined in the Standard Operating Procedure for Document Control.

REVIEW OF CLIENT PROJECTS

New projects and contracts are reviewed by laboratory management to ensure that the laboratory has the technical capability and resources to meet the requirements. Any potential conflict of interest or other problem noted in the review is discussed with the client prior to acceptance of the contract or samples. Refer to the SOP for Project Management.

The laboratory will afford clients or their representative 's cooperation to clarify the client' s requests and monitor the laboratory 's performance in relation to the work performed.

Client confidentiality is a high priority and the laboratory will ensure confidentiality to each client's work while providing service to other clients.

PROTECTION OF CLIENT CONFIDENTIALITY

Associated Laboratories recognizes the importance of client confidentiality. Each Lab Report contains the following statement: "The reports of Associated Laboratories are the confidential property of our clients and may not be reproduced or used for publication in part or in full without our written permission. This is for the mutual protection of the public, our clients, and ourselves." Analysis results are released to third parties only with the permission of the client.

Confidentiality agreements may be signed by Laboratory management to maintain confidentiality of analysis results between the Laboratory and the client.

SAMPLE RECEIVING AND CUSTODY

All sample receiving and log-in is handled by the Sample Receiving Department.

1. All samples are assigned a laboratory identification number during the log-in process. This number is a unique identifier assigned by the laboratory LIMS system.

2. All samples received from a client on the same day on the same Chain of Custody (COC) are normally grouped together in a unique Laboratory Request Number. The Laboratory Request Number is also assigned by the laboratory LIMS system.

3. A Laboratory Request Summary is prepared which includes: date, client name, client sample ID, corresponding laboratory sample number, all analyses to be performed, laboratory area designations and other special instructions.

Procedures for sample receiving and chain of custody for samples are detailed in the Sample Receiving SOP, attached to this document as Appendix B.

SAMPLE HANDLING PRACTICES AND CHAIN OF CUSTODY

1. After samples are logged in, they are transferred to the Sample Custodian.

2. All transfer of samples out of and into storage are documented on the Sample Control Record Book.

3. *Samples are stored according to the conditions specified by preservation protocols. Samples which require thermal preservation are stored under refrigeration which is +/-2 of the specified preservation temperature unless method specific criteria exist. For samples with a specified storage temperature of 4°C, storage at a temperature above the freezing point of water to 6°C is considered acceptable.*

4. Samples are stored away from all standards, reagents, food and other potentially contaminating sources. Samples are stored in such a manner to prevent cross contamination.

5. Sample fractions, extracts, leachates and other sample preparation products are stored according to #3 above or according to specifications in the test method.

6. The temperature of each refrigerator used for sample storage is monitored each working day, and recorded on the Temperature Control Record. This record is attached to each refrigerator. When the record is completely filled in, it is filed for future reference. If the temperature is out of control limits, the laboratory manager must be notified immediately.

7. Unless notified in writing, all samples will be discarded by appropriate disposal protocol 30 days from the date reported. Samples are discarded in the designated hazardous waste disposal containers. These containers are picked up periodically by a hazardous waste disposal company.

SAMPLE CONTAINERS, PRESERVATION AND HOLDING TIMES

In general, the shorter the time that elapses between collection of a sample and the analysis, the more reliable will be the analytical results. Preservation is necessary when the interval between sample collection and analysis is long enough to produce changes in either the concentration or the physical state of the constituent to be measured. Preservation of samples is specified in many EPA methods and when possible is confirmed by the laboratory during the sample log in process. The holding time of an analysis is the maximum time that samples may be held before analysis for the analysis to be considered valid. Each department is familiar with the holding times for sample analysis which they perform. The supervisor is responsible for ensuring that these holding times are met for all analyses. If holding times are not able to be met, then every effort is made to notify the client and if necessary send the samples to another laboratory.

Appendix C contains sample container guidelines and holding times as specified by the USEPA for environmental samples.

LABORATORY LIMS SYSTEM

Laboratory Information Management System (LIMS)

The laboratory information management system (LIMS) is a client-server network of computers used to login samples, track samples during and after analysis, and report the final results to the client. In addition the LIMS software which is database driven is able to generate historical reports and trends and generate other types of reports such as electronic deliverables which are increasingly used by clients to transfer data into their own computer systems without having to do manual data entry. The LIMS system is also used to track laboratory data such as detection limits (MDL) and reporting limits for analytes.

The hardware components of the LIMS include two servers and approximately twenty-five PC compatible computers running Windows 98 - 2000. The LIMS Software consists of Varian Starlims 7.0 with an Oracle 7 database system.

Security consists of a password login system and nightly tape backups. All reports are reviewed and signed by designated managers before release to the client. Tracking reports are generated daily from the LIMS system to insure timely analysis and reporting of all client samples.

Electronic Delivery Capabilities - laboratory data can be delivered to the client in electronic data deliverable (EDD) formats such as: spreadsheet (Lotus, Excel); standard database file formats (dB, Paradox, etc); delimited or fixed field formatted ASCII; or word processing formatted. The data files can be transmitted to the client either by diskette or directly using e-mail or FTP protocols.

STANDARD TEST METHODS

Essentially all laboratory analyses are conducted using published standard methods. Standard method sources which are available for use are listed below.

Analytical Standard Procedures for Environmental Analyses:

Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79- 020,3/1983

Standard Methods for the Examination of Water and Wastewater (American Public Health Association)

40 CFR, Appendix A to part 136-Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (600-series methods)

Methods for the Determination of Organic Compounds in Drinking Water, Supplement III, EPA-600/R-95/131, August 1995. (500-series methods)

Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993

Methods for the Determination of Metals in Environmental Samples, Supplement I EPA/600/R-94/111, May 1994

Test Methods for Evaluating Solid Waste, SW-846, 3rd Edition.

NELAC Quality Systems Revision 16, July 12, 2002.

Analytical Standard Procedures for Food, Feeds, Oil/Fats and Pharmaceuticals:

Association of Official Analytical Chemists (AOAC).

The American Oil Chemists' Society (AOCS).

Methods of the U.S. Department of Agriculture (USDA).

FDA Pesticide Analytical Manual (PAM).

US Pharmacopeia/National Formulary (USP/NF).

Food Chemicals Codex (FCC).

American Society for Testing and Materials (ASTM)

Note:

A listing of all environmental test methods for which Associated Laboratories is accredited by California is attached in Appendix H.

Methods Not Covered by Standard Methods

When it is necessary to use methods not covered by standard methods, these methods are subject to agreement with the client. This agreement includes a clear specification of the client' s requirements and the purpose of the environmental test and/ or calibration. The method is validated appropriately before use.

STANDARD OPERATING PROCEDURES

Standard Operating Procedures (SOP) are available for most methods to indicate specific procedures, instrumentation, data needs and laboratory data quality requirements. Standard Operating Procedures are available to the analyst and are updated at least annually to insure

that method and quality assurance requirements are being met. The original version of the SOPs are filed in the QA Department and controlled copies made available to the department. An inventory list of all current SOP's is maintained by the QA Department and are listed in Appendix H.

Each test method shall include or reference where applicable:

1) identification of the test method;
2) applicable matrix or matrices;
3) detection limit;
4) scope and application, including components to be analyzed;
5) summary of the test method;
6) definitions;
7) interferences;
8) safety;
9) equipment and supplies;
10) reagents and standards;
11) sample collection, preservation, shipment and storage;
12) quality control;
13) calibration and standardization;
14) procedure;
15) calculations;
16) method performance;
17) pollution prevention;
18) data assessment and acceptance criteria for quality control measures;
19) corrective actions for out-of-control data;
20) contingencies for handling out-of-control or unacceptable data;
21) waste management;
22) references; and,
23) any tables, diagrams, flowcharts and validation data.

TRACEABILITY OF MEASUREMENTS

Traceability of measurements is achieved by using standards for calibration and calibration checks which are traceable to primary NIST standards. Certificates of Analysis or purity are kept on file for each standard purchased, showing the traceability of the standard to a primary NIST standard. All balances are calibrated and certified annually using NIST certified weights. Thermometers are also calibrated at least annually using a thermometer certified against an NIST temperature standard.

When standard solutions, spiking solutions and calibration check solutions are prepared, the following information is recorded in a Standards Traceability Notebook maintained by each Laboratory Department:

a. The identifying name of the Working Standard consists of the Working Standard Identification and the date of preparation. This name must be unique and apply to only one standard solution, such that the standard can be unequivocally traced back to the

date of preparation, analyst and identification of all original standards and reagents used to prepare the standard.

b. Date and analyst initials

c. The name, manufacturer and lot number of each analytical standard, reagent and acid used in the solution.

d. The volume of each standard, reagent and acids used, and the final volume of the solution.

e. The calculated concentration of all analytes in the final solution.

The final standard solutions are transferred to a storage container and labeled with the identifying Working Standard ID, date of preparation, expiration date, concentration and initials of the analyst who prepared the solution.

All commercially prepared standards have a maximum expiration date of one year from the date of receipt or other expiration date as established and documented by the supplier.

Reagents are purchased from established commercial suppliers as specified by the laboratory standard methods or SOP. Reagents are stored at the appropriate temperature (refrigeration, freezing, room temp) as specified by the supplier.

Lot numbers of reagents are recorded on sample preparation log sheets or in analysis log books to enable traceability.

CALIBRATION AND VERIFICATION PROCEDURES

Initial Calibrations

Criteria for Initial Calibrations are specified in the applicable method and Standard Operating Procedure for each method.

The following items are essential elements of initial instrument calibration:

a) The details of the initial instrument calibration procedures including calculations, integrations, acceptance criteria and associated statistics are included or referenced in the test method SOP.

b) Sufficient raw data records are retained to permit reconstruction of the initial instrument calibration, e.g., calibration date, test method, instrument, analysis date, each analyte name, analyst's initials or signature; concentration and response, calibration curve or response factor; or unique equation or coefficient used to reduce instrument responses to concentration.

c) Sample results must be quantitated from the initial instrument calibration and may not be quantitated from any continuing instrument calibration verification unless otherwise required by regulation, method, or program.

d) All initial instrument calibrations must be verified with an **Initial Calibration Verification** standard (ICV) obtained from a second manufacturer or lot number. Standards for the initial calibration are traceable to a national standard such as NIST (National Institute of Standards and Technology), when available.

e) Criteria for the acceptance of an initial instrument calibration must be established, e.g., correlation coefficient or relative percent difference. The criteria used must be appropriate to the calibration technique employed.

f) Results of samples outside of the concentration range established by the initial calibration must be reported with defined qualifiers or flags or explained in the case narrative. The lowest calibration standard must be above the detection limit (MDL).

g) If the initial instrument calibration results are outside established acceptance criteria, corrective actions must be performed and all associated samples reanalyzed. If reanalysis of the samples is not possible, data associated with an unacceptable initial instrument calibration are reported with appropriate data qualifiers.

h) Calibration standards must include concentrations at or below the regulatory limit/decision level, if these limits/levels are known by the laboratory, unless these concentrations are below the laboratory's demonstrated detection limits.

i) The number of points for establishing the initial instrument calibration are determined by the method and regulatory guidelines and are stated in the SOP for each method.

Continuing Calibration Verification (CCV)

When an initial instrument calibration is not performed on the day of analysis, the validity of the initial calibration is verified prior to sample analyses by a continuing instrument calibration verification with each analytical batch. The following items are essential elements of continuing instrument calibration verification:

a) The details of the continuing instrument calibration procedure, calculations and associated statistics must be included or referenced in the test method SOP.

b) A continuing instrument calibration verification must be repeated at the beginning and end of each analytical batch. The concentrations of the calibration verification shall be varied within the established calibration range. If an internal standard is used, only one continuing instrument calibration verification must be analyzed per analytical batch.

c) Sufficient raw data records must be retained to permit reconstruction of the continuing instrument calibration verification, e.g., test method, instrument, analysis date, each analyte name, concentration and response, calibration curve or response factor, or unique equations or coefficients used to convert instrument responses into concentrations. Continuing calibration verification records must explicitly connect the continuing verification data to the initial instrument calibration.

d) Criteria for the acceptance of a continuing instrument calibration verification must be established, e.g., relative percent difference.

e) If the continuing instrument calibration verification results obtained are outside established acceptance criteria, corrective actions must be performed. If routine corrective action procedures fail to produce a second consecutive (immediate) calibration verification within acceptance criteria, then either the laboratory has to demonstrate performance after corrective action with two consecutive successful calibration verifications, or a new initial instrument calibration must be performed. If the laboratory has not demonstrated acceptable performance, sample analyses shall not occur until a new initial calibration curve is established and verified. However, sample data associated with an unacceptable calibration verification may be reported as qualified data under the following special conditions:

1) when the acceptance criteria for the continuing calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported. Otherwise the samples affected by the unacceptable calibration verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted.

2) when the acceptance criteria for the continuing calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level. Otherwise the samples affected by the unacceptable verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted.

METHOD DETECTION LIMITS

Method Detection Limits (MDL) are normally determined by taking seven or more aliquots of a sample containing the compounds of interest at a concentration 1 to 5 times the estimated detection limit and processing each sample through the entire analytical method. The MDL is calculated from the standard deviation of the replicate measurements (MDL = 3.143 x Standard Deviation for seven replicate measurements). MDL studies for each method are normally performed at least annually or when a major modification is made to the method or instrumentation used for analysis. Reference: 40 CFR, Ch. 1, Part 136, Appendix B (7-1-86 Ed.).

Method Detection Limits are updated in the laboratory information management system (LIMS) and tracked by the QC Department. The SOP for determination of MDL is attached (Appendix E).

PROCEDURES FOR REPORTING ANALYTICAL RESULTS

Final Reports issued to clients contain at a minimum the following information:

1. The report identification (Lab Request number) and page number is printed at the bottom of each page.

2. The Cover Page(s) include the Laboratory name and address, phone number, name and signature of person authorizing the report. The Cover page(s) also include the Client name,

address, Client ID number, project identification, contact or project manager, date of sample receipt at the laboratory and a cross-reference of lab identification numbers and client sample identifications. The Cover Page includes the statement: "*The reports of the Associated Laboratories are confidential property of our clients and may not be reproduced or used for publication in part or in full without our written permission. This is for the mutual protection of the public, our clients, and ourselves.*"

3. The Lab Report pages detail the date and time of sample collection, the test results, analysis units, methods of analysis, detection limits, dates of analyses and analyst initials. The time of analysis is reported when the holding time for preparation or analysis is 72 hours or less.

4. The original copy of the chain-of-custody is attached to the final report

5. A copy of the *Sample Receiving Checklist is attached to the final report.*

6. For NELAC reports and data packages, a case narrative is attached. The case narrative describes where the analyses were performed if not performed at the main address of the laboratory. Normally all analyses for volatile organic chemicals, organic volatiles in air, metals and microbiology are performed in the laboratory annex, located at 1108 West Barkley (one half block from the main laboratory building.

7. The case narrative also lists the number and identification of all discrete pages in the report and the total number of pages in the complete report.

8. A statement is included in the Narrative that the test results meet all requirements of NELAC or provide reasons and/or justification if they do not.

9. In addition to the requirements listed above, test reports shall, where necessary for the interpretation of the test results, include the following:

> *a) deviations from (such as failed quality control), additions to, or exclusions from the test method, and information on specific test conditions, such as environmental conditions and any non-standard conditions that may have affected the quality of results, including the use and definitions of data qualifiers;*
>
> *b) where relevant, a statement of compliance/non-compliance with requirements and/or specifications, including identification of test results derived from any sample that did not meet NELAC sample acceptance requirements such as improper container, holding time, or temperature;*
>
> *c) where applicable, a statement on the estimated uncertainty of measurement; information on uncertainty is needed in test reports when it is relevant to the validity or application of the test results, when a client's instruction so requires, or when the uncertainty affects compliance to a specification limit;*
>
> *d) where appropriate and needed, opinions and interpretations;*
>
> *e) additional information which may be required by specific methods, clients or groups of clients;*

f) clear identification of numerical results with values outside of quantitation limits.

10. In addition to the requirements listed above, test reports containing the results of sampling shall include the following, where necessary for the interpretation of test results:

a) the date of sampling;

b) unambiguous identification of the substance, material or product sampled (including the name of the manufacturer, the model or type of designation and serial numbers as appropriate);

c) the location of sampling, including any diagrams, sketches or photographs;

d) a reference to the sampling plan and procedures used;

e) details of any environmental conditions during sampling that may affect the interpretation of the test results;

f) any standard or other specification for the sampling method or procedure, and deviations, additions to or exclusions from the specification concerned.

DATA REVIEW

All data generated from each analysis are recorded either in a bound laboratory notebook or on worksheets which are attached to the Lab Request package.

Copies of the lab notebook page(s), worksheets, instrument readouts, chromatograms, QC forms and other data pertinent to the analysis are attached to the Laboratory Request Sheet.

In addition to the analytical results and calculations, the manufacturer and lot number of all reagents used must be included. Also the assigned code numbers of all prepared reagent and standard solutions are included for traceability purposes.

The review process includes at least three separate review stages:

The analyst reviews all data and calculations and also checks data for completeness and that any special requirements have been met.

The Lab Supervisor reviews the results and initials the report to signify his/her approval.

After the final report is completed, the Laboratory Manager or signatory of the report reviews the final report and signs the report to signify his/her final approval.

The QA Department reviews a proportionate amount of all QC data generated (at least ten percent) and also reviews all corrective action reports that are submitted by the Departments.

A copy of the test report and all supporting raw data for each Lab Request are maintained on file by the laboratory.

The minimum period of retention for the records is seven (7) years.

PROCEDURE FOR HANDLING CUSTOMER'S COMPLAINTS

Associated Laboratories encourages feedback from customers. Complaints such as improper billing or incorrect sample identifications are normally handled by client project managers, who make every effort to resolve the problem as quickly as possible. Where the complaint involves problems which can not be readily corrected, then the customer's complaints are recorded on a Customer Complaint Form which contains the following information:

Date of complaint
Name of company
Name of person submitting the complaint
How the complaint was submitted
Name of person receiving complaint by phone
Nature of complaint
Department(s) involved

The customer's complaint form is submitted to the department(s) involved for investigation and resolution of the complaint.

The results of the investigation and resolution of the complaint are recorded on the complaint form, signed and dated by the individual handling the complaint and submitted to the Lab Manager to be reviewed and approved.

The customer is notified of the results of the investigation and resolution of the complaint by the Lab Manager or by a person authorized by the Lab Manager, either verbally, by phone, or in the form of a letter.

The Complaint Form and all other documents pertinent to the complaint are filed in the Complaint File maintained by the QA Department.

QUALITY ASSURANCE PROCEDURES

The laboratory has established quality control procedures for monitoring the validity of environmental tests and calibrations undertaken. The resulting data is recorded in such a way that trends are detectable and, where practicable, statistical techniques can be applied to the reviewing of the results. This monitoring includes the following:

a) regular use of certified reference materials and/or internal quality control using secondary reference materials (Laboratory Control Samples);

b) participation in interlaboratory comparison or proficiency-testing programs (WS, WP and Hazardous Waste PE samples);

c) replicate tests or calibrations using the same or different methods;

d) retesting of retained samples;

e) correlation of results for different characteristics of a sample (for example, total phosphate should be greater than or equal to orthophosphate).

Routine Quality Control Samples

Quality Control samples are normally analyzed with each batch of samples for each analysis. For environmental samples the Quality Control samples include a Method Blank (MB), Laboratory Control Sample (LCS) and a Matrix Spike and Matrix Spike Duplicate. These QC samples are included in each batch of twenty samples or less for each matrix (frequency equivalent to 5% of all samples analyzed). If spike analyses are not feasible, a duplicate sample analysis is generally performed (eg TDS, dissolved oxygen, turbidity).

1. The Method Blank (negative control sample) is used to assess the preparation batch for possible contamination during the preparation and processing steps. The method blank is processed along with and under the same conditions as the associated samples to include all steps of the analytical procedure. Procedures are included in the method to determine if a method blank is contaminated. Any affected samples associated with a contaminated method blank are reprocessed for analysis or the results reported with appropriate data qualifying codes.

2. The Laboratory Control Sample (LCS) (Positive Control Sample) is used to evaluate the performance of the total analytical system, including all preparation and analysis steps. Results of the LCS are compared to established criteria and, if found to be outside of these criteria, indicate that the analytical system is "out of control". Any affected samples associated with an out of control LCS are reprocessed for re-analysis or the results reported with appropriate data qualifying codes. The Laboratory Control Sample (LCS) is run at the same frequency as QC samples for each type of matrix. The LCS is obtained when possible from a source external to the laboratory. The LCS may be prepared by the laboratory using certified standards from a different source or a different lot number from the source used for calibration standards. For NELAP accredited tests, all analytes are included in the LCS spike mixture over a two year period.

3. A Matrix Spike and Matrix Spike Duplicate sample (replicate samples) are normally analyzed with each batch of twenty samples or less. Matrix spikes are duplicate aliquots of a sample which are spiked with the analytes of interest and taken through the same analytical procedures. The recovery of the analyte concentration is calculated to indicate the accuracy of the analysis in the sample matrix. The relative percent difference between the Matrix Spike and Matrix Spike Duplicate sample provides a measure of precision of the analyses in the sample matrix. For NELAP accredited tests, all analytes are included in the matrix spike mixture over a two year period.

4. Surrogate spike analyses are performed for all organic analyses when required by the method. Surrogates are used most often in organic chromatography test methods and are chosen to reflect the chemistries of the targeted components of the method. Added prior to sample preparation/extraction, they provide a measure of recovery for every sample matrix. The surrogate spike solution is added to all samples, standards and blanks. The results are compared to the acceptance criteria as published in the mandated test method or laboratory generated acceptance criteria. Results reported from analyses with surrogate recoveries outside the acceptance criteria *must* include appropriate data qualifiers.

5. All other QC requirements (tuning, multiple points calibration, daily calibration check, etc.) are performed as specified in the method.

6. All QC data are to be recorded on the appropriate forms and kept on file by each department. Copies of these forms must be attached to the Lab Requests for all samples associated with that particular QC sample. Accuracy and precision data may be used to generate control charts.

7. Acceptance limits for QC samples are detailed in the Standard Operating Procedure for each method, and may be established by the original reference source or statistical analysis of the historical data for each type of QC sample, method and matrix using control charts.

8. When QC acceptance criteria are exceeded, corrective actions are to be taken as specified in the method or as instructed by the Department Supervisor.

9. Non-conformances such as QA limit failures which cannot be corrected by re-analyses, client requirements which cannot be met or standard method modifications are documentated by initiating a Non-Conformance Document Form (NCD). Appendix F describes the use of the Non-Conformance Document Form.

Other Essential Quality Control Procedures

1. Method capabilities are measured by determination of detection limits and quantitation limits. This is done on an annual basis or more often as needed (page 18).

2. Selection of appropriate formulae to reduce raw data to final results such as regression analysis, comparison to internal/external standard calculations, and statistical analyses is detailed in the method Standard Operating Procedures for each method.

3. Selection and use of reagents and standards of appropriate quality is included in the method Standard Operating Procedures.

4. Measures to assure the selectivity of the test for its intended purpose is assessed on a continuing basis by analysis of QA samples as detailed above.

5. Measures are taken as necessary to assure constant and consistent test conditions (both instrumental and environmental) where required by the test method such as temperature, humidity, light, or specific instrument conditions.

6. All quality control measures are assessed and evaluated on an on-going basis, and quality control acceptance criteria are used to determine the usability of the data.

7. The laboratory will develop acceptance/rejection criteria where no method or regulatory criteria exist.

8. The quality control protocols specified by the laboratory's Standard Operating Procedure for each method is to be followed. The laboratory shall ensure that the essential standards outlined in NELAC, Quality Systems, Appendix D or the mandated methods or regulations (whichever are more stringent) are incorporated into their Standard Operating Procedures. When it is not apparent which is more stringent the QC in the mandated method or regulations is to be followed.

QUALITY ASSURANCE DEPARTMENT FUNCTIONS

Internal Audits and Data Review

Various types of internal audits are performed on Laboratory activities on a routine basis. These audits should reflect as closely as possible, the Laboratory performance under normal operating conditions.

Performance Audits: Evaluation of data reports generated by the laboratory. All technical, clerical and administrative aspects of the data report are reviewed. Errors observed during these ongoing audits are categorized as they relate to the technical accuracy and legal defensibility of data.

Internal audits of each department are conducted at least annually. Routine quality control checks, for example checking laboratory notebooks, daily calibrations, quality control sample frequency are also done on a random basis. Results of internal audits *(including the completed checklist, deficiencies, responses and corrective actions)* are documented in the internal audits files *maintained in the QA Office. The results of internal audits are* reported to the Audit Committee designated by the Laboratory management.

A system audit is the physical inspection and review of the entire laboratory operation to verify compliance with the QA Program objectives as stated in the Laboratory's QA Manual. System audits are conducted periodically by external auditors, such as state regulatory agencies, commercial clients or independent auditors representing these clients or agencies.

In response to deficiencies or recommendations from auditing activities, corrective actions reports are required to document the corrective actions taken to correct the deficiencies. The Laboratory management has established an *internal* audit committee to oversee audit activities and establish corrective actions where necessary. *The internal audit committee members will meet quarterly.All committee meeting minutes and memos will be maintained in the QA Office.*

Internal audit procedures are detailed in the SOP for Internal Audits.

When audit findings cast doubt on the effectiveness of the operations or on the correctness or validity of the laboratory' s environmental test or calibration results, the laboratory will notify

clients in writing if investigations show that the laboratory results may have been affected.

The laboratory will notify clients promptly, in writing, of any event such as the identification of defective measuring or test equipment that casts doubt on the validity of results given in any calibration certificate, test report or test certificate or amendment to a report or certificate.

External Proficiency Testing and Verification Practices

The QA Department is responsible for organizing Proficiency Testing (PT) Programs, including WS and WP Studies, and other studies as required by accrediting agencies.

Proficiency Testing samples are obtained from NELAP approved external sources on a semi-annual basis. Results must be satisfactory (within acceptance limits) or a corrective action report is initiated. Proficiency Testing samples are analyzed semiannually or more often for all NELAP accredited tests. PT samples for ELAP accredited tests may be analyzed annually or semiannually. To demonstrate proficiency under NELAP guidelines, the laboratory must pass two of the three most recent PT samples for each accredited test.

Corrective Action Reports and Departures from Documented Policies

A Non-Conformance Document (NCD) may be required when certain Quality Control criteria are exceeded in a sample analysis batch.

1. Non-conformances such as a sample exceeding holding time, QA limit failures which can not be corrected by re-analyses, client requirements which cannot be met, or standard method modifications are documented by initiating a Non-Conformance Document Form (NCD). A copy of the NCD Standard Operating Procedure and Form is attached (Appendix F).

2. The NCD form is initiated by the analyst in the event of a sample exceeding holding time, Quality Control sample results outside control limits or other known non-conformance to the analytical method or client requirements. The NCD form may also be initiated by the project manager or department manager in the event client requirements are not met or other analytical problems are discovered.

3. After the NCD Form is initiated, the corrective action, if any, must be agreed upon by the department manager or supervisor and the QA Manager. If appropriate, the procedure for corrective actions starts with an investigation of the root cause(s) of the problem. This is documented and signed by the department manager in the second part of the NCD Form. The form is then forwarded to the QA Manager.

4. The QA Manager then completes and signs the final part of the form. If necessary, verification of the corrective action is documented in this section. If necessary the results will be monitored to ensure that the corrective actions taken have been effective.

5. A copy of the form is included in the affected data package or the client is notified as appropriate. The original is filed in the Corrective Actions File which is maintained by the QA Manager.

When there are deviations from the requirements by the specific method, such as insufficient sample volume, improper preservation, the client *will* be notified as soon as possible. If the client agrees to the deviation, then an explanation of the deviation or non-compliance is required to be attached to the data package and final report.

Laboratory Standard Operating Procedures and QA Manual

The QA Department is responsible for ensuring that all Laboratory Standard Operating Procedures and the QA Manual are current. A tracking system is in place to ensure that copies of Standard Operating Procedures are controlled such that only current approved versions are in use in the laboratory.

Procedures for tracking SOP documents are detailed in the Standard Operating Procedure for SOPs.

MANAGEMENT REVIEWS

In accordance with a predetermined schedule and procedure, the laboratory's executive management will periodically and at least annually conduct a review of the laboratory's quality system and environmental testing and/or calibration activities to ensure their continuing suitability and effectiveness, and to introduce necessary changes or improvements. The review shall take account of:

a) The suitability of policies and procedures;
b) Reports from managerial and supervisory personnel;
c) The outcome of recent internal audits;
d) Corrective and preventive actions;
e) Assessments by external bodies;
f) The results of inter-laboratory comparisons or proficiency tests;
g) Changes in the volume and type of the work;
h) client feedback;
i) complaints;
j) other relevant factors, such as quality control activities, resources and staff training.

Findings from management reviews and the actions that arise from them shall be recorded. The management shall ensure that those actions are carried out within an appropriate and agreed timescale. The laboratory shall have a procedure for review by management and maintain records of review findings and actions.

PERMITTED DEPARTURES FROM DOCUMENTED POLICIES AND PROCEDURES

Any departures from documented policies and procedures or changes in standard methods must be approved by a Laboratory Director or the QA Director. The deviation from standard methodology must be explained on the final report and the results flagged to indicate the use of

a non-standard method. The * flag or qualifier is used to note non-standard methodology and the explanation is noted in the comments section of the Lab Report.

PREVENTIVE ACTIONS

Preventive action is a process to identify opportunities for improvement rather than a reaction to the identification of problems or complaints. Needed improvements and potential sources of nonconformance, either technical or concerning the quality system, are identified. If preventive action is required, action plans are developed, implemented and monitored to reduce the likelihood of the occurrence of such non- conformances and to take advantage of the opportunities for improvement. Procedures for preventive actions include the initiation of such actions and application of controls to ensure that they are effective.

EQUIPMENT MAINTENANCE

Written records are kept for each analytical instrument to document inspections, maintenance, troubleshooting, or modifications. Records contain the date, nature of the problem, repair/corrective action taken and the name of the person performing the work. A Maintenance Log Book may be kept for each individual instrument for the purpose of recording any maintenance, repairs, and other associated downtime.

Operational performance of analytical instrumentation is monitored by daily, documented performance checks and calibration verifications in accordance with the Standard Operating Procedures for each type of instrumentation.

Support equipment such as analytical balances, ovens, refrigerators and water baths are checked daily for performance within acceptance limits. This information is recorded in a log book maintained for the equipment. Weights used to check the balances are traceable to NIST standards. In addition all balances are inspected and certified by a licensed specialist at least annually.

REFERENCES:

NELAC Quality Systems, Revision 16, July 12,2002.

NELAC Quality Systems Checklist, Revision Ch5 Rev1e.

QUALITY ASSURANCE MANUAL REVISION HISTORY

Revision 09/2004: QA Manual all sections re-written to incorporate NELAC guidelines.
Added sections for:
- Demonstration of Capability
- Review of New Projects
- Protection of Client Confidentiality
- Calibration and Verification Procedures

Updated Appendix A, Laboratory Job Descriptions
Updated Appendix B, Standard Operation Procedures for Sample Receiving
Updated Appendix D, Equipment Inventory

Revision 05/2005: QA Manual re-written to incorporate more NELAC requirements.
Added Appendix G, Organization Chart
Added Appendix H, Listing of CA Accredited Methods
Added references to SOPs for Document Control

Revision 10/2005: Sections added in response to NELAC Audit.
Added section for personnel qualifications, pg. 8.
Added training program requirements, pg. 8.
Rewrote Demonstration of Capability, pg.10.
Rewrote procedures for reporting analytical results, pgs. 19-21.
Added section for ensuring the validity of environmental tests, pg.22.
Added section for essential Quality Control Procedures, pg. 24.
Edited section for Internal Audits, pg. 25.
Added section for management review, pg. 27.
Rewrote sample handling practices and chain of custody, pg. 13.

APPENDIX A

LABORATORY JOB DESCRIPTIONS

Technical Director (Lab Director)

Education: Bachelors degree or equivalent in the chemical, environmental, biological sciences, physical sciences or engineering, with at least 24 college semester credit hours in chemistry.

Experience: At least two years of experience in the environmental analysis of representative inorganic and organic analytes for which the laboratory seeks or maintains accreditation. A masters or doctoral degree in one of the above disciplines may be substituted for one year of experience

Job Description: The technical director(s) means a full-time member of the staff of an environmental laboratory who exercises actual day-to-day supervision of laboratory operations for the appropriate fields of accreditation and reporting of results. This person's duties shall include, but not be limited to, monitoring standards of performance in quality control and quality assurance; monitoring the validity of the analyses performed and data generated in the laboratory to assure reliable data.

Responsibilities: Overall responsibility for management of all laboratory operations.

Quality Assurance Manager

Education: Bachelor's degree in chemistry or other scientific/engineering discipline or equivalent experience.

Experience: Three or more years experience in a chemistry laboratory.

Job description: The quality manager (and/or his/her designees) shall:

1. Serve as the focal point for QA/QC and be responsible for the oversight and/or review of quality control data;

2. Have functions independent from laboratory operations for which they have quality assurance oversight;

3. Be able to evaluate data objectively and perform assessments without outside (e.g., managerial) influence;

4. Have documented training and/or experience in QA/QC procedures and be knowledgeable in the quality system as defined under NELAC;

5. Have a general knowledge of the analytical test methods for which data review is performed;

6. Arrange for or conduct internal audits as per 5.4.13 annually; and,

7. Notify laboratory management of deficiencies in the quality system and monitor corrective action.

Responsibilities: Overall development and management of the laboratory quality assurance system as defined by California Dept of Health / ELAP and NELAP requirements.

Laboratory Supervisor

Education: Bachelor's degree in chemistry or other scientific/engineering discipline or equivalent experience.

Experience: Three or more years experience in a chemistry laboratory.

Job Description: Responsible for the overall technical and personnel management of a laboratory area or work group. This includes:

1. Interfacing with and taking direction from the Department Head or immediate supervisor.

2. Proper training of personnel in analytical techniques, reporting, quality, assurance and lab safety.

3. Maintaining the orderly flow of work and the timely analyses of samples.

4. Organizing and assigning work duties of the group supervised.

5. Checking QA/QC records for completeness and proper frequency.

6. Providing for technical expertise as required in the group or department.

7. Evaluating and working to constantly improve the quality of data that is being generated (including QA data)

Responsibility, Supervisors are ultimately responsible for:

1. The accuracy, completeness and integrity of all analyses completed by their group or department.

2. Safe practices of their employees.

3. Maintaining effective communication with their employees and upper management of the laboratory.

4. Complete documentation of all analyses and related QA/QC.

5. Any deviation from standard methods or laboratory standard operating procedures.

Analyst

Education: Requires minimum of Bachelor's degree in chemistry or any scientific/engineering discipline or equivalent experience.

Experience: Once or more years experience in a chemistry laboratory operating and maintaining analytical instrumentation such as AA, ICP, GC, HPLC, etc.

Job Description: Conducts analyses in laboratory using specialized analytical equipment. Analyses are done using standard protocols such as EPA, EPA/CLP, or in-house SOP's). Must understand the theory, use and maintenance of specialized analytical equipment. Must be able to follow written procedures and SOP's and calculate final results, including QA results. Must understand the importance of good lab practices and quality assurance and be able to evaluate the quality of data that is being generated.

Responsibility: Analysts are responsible for the accuracy, completeness and integrity of all work that they have been assigned. If they have questions or problems, this must be communicated to their immediate supervisor. No deviations from standard methods are permitted unless approved by the lab supervisor.

Lab Technician

Education: Requires high school diploma with one year of chemistry course work or one year of Chemistry course work or one year experience in a laboratory.

Experience: One or more years experience in a laboratory (preferably a chemistry lab). Must have proficiency in operation of analytical balance, pipetting and common laboratory equipment and glassware.

Job Description: Conducts analyses in laboratory using standard methods (EPA, AOAC, USP, ASTM, or in-house methods). Must understand lab nomenclature and be proficient in the use of standard lab equipment such as pipets , balances, separatory funnels burets, etc. Must be able to follow written procedures and SOP's and calculate final results. Must understand the importance of good lab practices and quality assurance.

Responsibility: Lab Technicians are responsible for the accuracy, completeness and integrity of all work that they have been assigned. If they have questions or problems, this must be communicated to their immediate supervisor. No deviations from standard methods are permitted unless approved by the lab supervisor.

APPENDIX B

STANDARD OPERATING PROCEDURE FOR SAMPLE RECEIVING

TABLE OF CONTENTS

I. INITIAL RECEIPT OF SAMPLES

This section describes how samples are received and logged into the laboratory. "Logging" refers to the process of documenting receipt of each sample, verification of the analyses requested and entry of information about the sample into the laboratory computer system (LIMS). The sample logging process generates one label for each sample container, a Lab Request Summary on blue paper and a blue Results Worksheet for each department. A copy of the Lab Request Summary and the blue Results Worksheet is transferred to each department which will be analyzing the sample. No sample is analyzed without being properly logged into the laboratory data system, even if the sample is not to be billed.

A. Handling of Samples Received by Client Delivery:

When a client delivers a sample for analysis, it is important that information about the sample be as complete as possible. This is best done with a properly completed and signed Chain of Custody form. The following information must be obtained before the sample can be accepted:

1. Client's name and address

2. Person to contact regarding the sample(s) and phone number (also fax number if information is to be faxed).

3. Method of payment, does client have an account? If client does not have an account, payment will have to be in advance or "pickup and pay". If the client has an account, a purchase order number is often needed.

4. If the Client wishes to open an account, the accounting department should be notified to be sure the client receives the proper forms and information, this is currently handled by Bill Utter.

5. Before entering a new client into the computer system a unique account code number must be obtained from the accounting department or office supervisor.

6. Both the client and lab employee receiving the sample must both sign the completed Chain of Custody form. The Chain of Custody will normally contain detailed information on the samples. Refer to Section II for a list of required information to be included on this form.

7. The client receives the pink copy of the Chain of Custody. The other copies are attached to the Lab Request Summary.

8. Samples must be checked for temperature and sample preservation as noted in B.2. and B.6 below.

B. Sample pick-up by our personnel:

1. All samples received from our drivers should be accompanied by a completed Chain-of-Custody form - signed by the client and by the driver.

2. All coolers received must have a temperature reading immediately upon opening.

   a. This reading will be taken by placing the metal probe of the thermometer either into a temperature blank (if provided) or between the respective samples and the cooling media (ice, dry ice, or blue ice).

   b. The thermometer should remain in place for 60 seconds to ensure a proper reading.

   c. The exact temperature will then be read from the thermometer. The temperature should be in the range of 2 - 6 degrees C. Samples that are hand delivered to the laboratory immediately after collection are considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice.

   d. The temperature will be noted on the Sample Receipt Form.

3. The Chain of Custody and samples must be checked to make sure that all information is in agreement.

4. When the driver relinquishes the samples to the Sample Receiving Department, he or she must require that the Associated Laboratories Chain of custody be signed by an employee of the Sample Receiving Department. A sample receipt form must be filled out for all coolers received by the Department.

5. All samples brought to the laboratory by a driver will remain under his or her custody until the Associated Laboratories Chain of custody is signed by an employee of the Sample Receiving Department.

6. The pH of all chemically preserved aqueous samples, except volatile samples, must be checked and documented upon receipt at the laboratory. If discrepancies are noted, the laboratory must contact the project manager or client immediately. The pH is measured and reported on a pH reporting form. This form is attached to the Chain of Custody. The procedure for checking pH is detailed in the SOP for pH Measurement.

7. Any problems with improper preservation, sample container type, volumes, etc. are to be noted on the Sample Receipt Form. This is to document problems which may interfere with a proper analysis of the sample. The project manager should be notified so that the client can be contacted as soon as possible.

8. Information on the sample pickup is also logged into the bound Driver's Logbook.

9. All organic volatile samples (VOA) must be stored in the Sample Receiving refrigerator until they are labeled.

10. All information is checked to be sure it is complete as noted in Section A.1-6 (Client's name/ address/ contact name/ phone number/ account information/ PO number/ complete sample information/ analyses requested).

11. All samples are checked to be sure they match the paperwork.

12. The client must be contacted if the information is not complete or if there are any questions about the samples, analyses requested, or if samples are received broken or missing.

C. Samples received by mail, UPS, Federal Express, etc.

Samples received by mail, UPS and Federal Express are handled in the same manner as samples received from our drivers with the exception that samples are not relinquished by the client. All coolers received must have a temperature reading as in section B.2. and all samples must be verified against the Chain of Custody or paperwork as noted above.

D. In-house samples

In-house samples consist of samples such as QA/QC check samples and hazardous waste disposal samples. These samples are written up using the same procedures as any other sample. (They will not normally be billed.)

E. Priority samples

1. Samples are logged in the following priority:

   a. Bacteriology

   b. Rushes (Same Day, 24 Hour, 48 Hour)

   c. Tests such as BOD, Chlorine, pH, Dissolved Oxygen, Sulfite, Sulfide, Hexavalent Chromium, fish toxicity, nitrate, nitrite, MBAS, turbidity must be logged the same day as received due to the very short holding times.

   d. Regular Turn-Around

2. NOTE: It is important that this priority be followed for all customers to insure that accurate results are obtained for samples which have a very short holding time.

3. Regular turn-around samples are written up in the order received and may be held to the next day if necessary.

4. When a client requests a completion date, or we commit to a completion date, this information must be clearly stated (and highlighted) on the lab request summary.

Note: the affected lab manager must be consulted prior to committing to a completion date.

5. If a client wishes samples to be handled on a priority basis, such as 24 or 48 hours, there is an additional charge. The priority charge is determined by lab management, and should be clearly stated to the client.

6. Priority samples are written up and labeled before being transferred to the laboratory. These

samples are recorded in the Sample Rush Log Book and the lab personnel receiving the samples must sign for all priority samples (which include a copy of the chain of custody).

F. Special Handling of Samples for Microbiological Testing

1. Due to the short holding times for microbiological samples, these must be handled on a first- priority basis.

2. The Chain-of-Custody for samples for microbiological testing must state the date and time of sampling, as well as complete sample identification. For potable water samples this should also include the system name and sample location.

3. Drinking water samples (potable water) should be analyzed as soon as possible after sampling (30 hours maximum time from sampling to analysis). Samples must be maintained at 2 - 6 degrees C during transport and storage. Potable water samples cannot be analyzed after 30 hours, these samples should be refused.

4. Waste water and surface water samples must be analyzed within 6 hours after collection (6 hours maximum holding time). Samples must be maintained at 2 - 6 degrees C during transport and storage. Water/ waste water samples older than six hours should be refused.

5. Upon receipt in Sample Receiving, check samples immediately for proper temperature and holding time. Samples should be transported in a cooler with blue ice or regular ice. Check Chain-of-Custody form to be sure samples are within holding times. If samples are outside holding time or not held at proper temperature, notify the Microbiology Department supervisor or project manager immediately. The Chain-of-Custody shall also state the conditions of the samples as received (cooled, frozen, room temp. etc.).

6. Check condition of samples received for microbiological testing for potential contamination of samples. Containers must be sealed with no evidence of leakage. Containers must be protected from melted ice or other potential contamination. Notify the Microbiology supervisor if problems are noted. If there is evidence of contamination the client should be notified that the samples are potentially contaminated.

7. Samples should be refrigerated or placed in a cooler with blue ice upon receipt and logged in immediately. The Microbiology Department will sign the original chain of custody to show receipt of samples prior to logging.

G. **Sample storage during login process**

1. When possible samples are written up as soon as received.

    3. A designated sample storage refrigerator is used for storage of samples which need to be refrigerated during the login process (samples for volatile organics analysis are stored in a separate refrigerator).

3. As soon as possible after each group of samples is logged in, they are transferred to the

Sample Custodian in the Sample Storage Area. Most samples are stored in refrigerators or the walk-in cooler until analyses are completed. The sample storage refrigerators and the walk-in cooler are kept locked overnight for sample security.

4. If special handling instructions are provided with the sample, these instructions must be noted on the Chain of Custody and sample login analysis request forms.

H. **Hold samples**

1. When a client wishes to put samples on hold, this must be clearly noted on a Chain-of-Custody form. The length of time requested for hold should be noted.

2. If the hold order is given over the phone, a note is made on the COC referring to the person authorizing the hold, with complete information on the samples to be held. The person taking the call should sign and date the note. Any changes to the Chain of Custody by the client should be followed by a fax from the client detailing the changes in writing.

3. Complete information on hold samples are filed with the Chain-of-Custody and given with the samples to the Sample Custodian for storage until the Client or project manager releases the samples from hold status. If hold samples are disposed of, they are logged out by the Sample Custodian.

4. After 7 days, if the client has not contacted us regarding the samples, sample receiving personnel or the project manager should call the client for instructions.

5. Maximum holding time is 30 days unless special arrangements are made and authorized by the lab management.

6. Unless authorized by the customer, disposal of hold samples must be authorized by the Lab Manager.

I. **Safety Precautions**:

1. The lab does not accept radioactive samples for analysis. A Radiation Monitor is available in the Sample Receiving Department for screening samples if radiation is suspected in any sample.

   a. Any samples received from Department of Energy (DOE) contracts or associated clients must be screened to insure that no radioactivity is present.

   b. If any sample tests higher than background 25 cpm level radiation, the Radiation Safety Officer must be notified immediately.

2. All sample shipments received from hazardous waste sites or labeled as highly toxic must be initially opened in a fume hood or in a well-ventilated area.

3. Plastic gloves are available in the Sample Receiving Area for handling potentially hazardous

samples or samples which are leaking.

4. When in doubt about the safe handling of any sample, the Lab Safety Officer or appropriate Lab Manager must be consulted before the sample is logged in.

II. CHAIN OF CUSTODY FORM

A. The purpose of the Chain of Custody Form is to legally document the transfer of the sample(s)from the customer to the laboratory. Since any sample may potentially be used as evidence in legal proceedings, it is important that the Chain of Custody Form be filled in completely and accurately.

B. The Chain of Custody Form should furnish an accurate record of the samples received, analyses requested, and any important information from the Client regarding the samples. The information entered on the form should be as complete as possible, including:

1. Client's name and address with zip code

2. Client project manager's name and telephone number

3. Information on custody seals - If present are they intact?

4. Information on Samples:

    a. Is the number of samples listed correctly?

    b. Are all samples individual, or sub-samples of one sample?

    c. Is the description of the samples complete?
    (are samples soil, waste-water, drinking water (if samples are chemicals, a complete description and MSDS information should be furnished.)

    d. Are samples identified correctly? Sample ID numbers or markings should be checked against the Chain of Custody. The date sampled should also be on the chain of custody.

    e. The condition of the samples should be noted.
    - Are samples cool or frozen?
    - Are containers leaking or broken?
    - Damaged containers should be noted on the Sample receipt form under "important information section" and reported to the project manager immediately.

    f. The type of containers must be noted (glass jar, plastic container, brass tube, VOA vial, etc.)

    g. All preservatives added to the samples must be noted on the sample containers and is indicated on the sample pH log form attached to the chain-of-custody.

h. Any inconsistencies in the documentation and samples should be thoroughly investigated. The ideal time to solve a problem is during the log-in process.

5. Analyses requested by the Client must be specific and correspond EXACTLY to our listed analyses profile. If there is any doubt as to the analyses required, the Sample Receiving Person should contact the Client, or the appropriate Lab Manager.

   - In the case where subsamples of the same sample are submitted, and different analyses are requested for each sub-sample, all information and the labeling of each container must be made VERY CLEAR to avoid confusion in the laboratories. EACH CONTAINER MUST HAVE A LAB REQUEST NUMBER and an ORDER NUMBER.

6. Any problems with improper preservation, sample container type, volumes, etc. are to be noted on the Chain of Custody. This is to document problems which may interfere with a proper analysis of the sample. A written copy should also be given to the Lab Project Manager or Customer Representative who may need to contact the customer.

7. The Client should sign in the " Relinquished by " space and also in the " Authorization " space when appropriate.

8. The person receiving the sample(s) must sign the Chain of Custody Form in the "Received by Laboratory for Analysis" space, and record the date and time.

9. When the sample is entered into the Laboratory computer system (a Lab Request Summary is generated) the Lab Request Number should be recorded on the Chain of Custody.

10. Distribution of copies:

    a. Attach the White and Yellow Copy to the Blue Lab Request Summary.

    b. The Pink Copy is given to the Client.

    c. A copy of the Chain of Custody should be attached to all copies of the Lab Request Summary.

    d. All Lab Requests are checked by the appropriate Project Manager.

III. **SAMPLE CONTROL RECORD** (Internal Chain of Custody)

A. A separate Sample Control Record for sample tracking through the laboratory may be initiated by the Sample Receiving Department if this is required by a client or contract (such as EPA/CLP).

B. Information to be entered into the Sample Control Record (refer to the attached copy):

1. The Lab Request Number is written at the top of the Form.

2. The Client's Name and Date is recorded.

3. All individual samples are recorded in the Sample ID space. Samples are identified by the Lab Request Number assigned at the time of sample Log-In. This number is generated by the computer when the sample(s) are logged-in to the computer system.

C. Storage of samples requiring Sample Control Record (Legal Samples).

1. After the samples are logged into the computer system and labeled, they are transferred to a locked storage refrigerator in the Sample Storage Area.

2. Document the transfer of all samples to and from the Sample Custodian with the date and time samples were transferred. Both the Sample Receiving person and Sample Custodian sign the Sample Control Record.

3. For Legal Samples (including EPA/CLP samples), the samples must be kept in locked storage. In this case the Sample Control Record is kept by the designated Sample Custodian who also controls access to the samples. When samples are removed from storage they are logged out on the Sample Control Record which records the date, time and person removing the samples. When the samples are returned they are logged back in with the date, time and initials of the person returning the samples. Samples are not removed from locked storage overnight. The person who removes the samples is responsible for the custody of the samples, and for their return to storage before the end of the working day.

D. Sample Control Record Tracking

1. Each time samples are transferred to or from the Sample Custodian, the Sample Control Record for those samples must be signed.

2. Each person receiving the samples in each department must sign for those samples received and also note the date and time samples are received. Fill in Received By - Dept., Person and Date/Time when samples are delivered to each department and again when the samples are returned to the Sample Custodian.

3. Only one sample control record will be completed for each lab request number (Sample Log In Sheet). No copies are to be made unless clearly labeled as a copy.

4. The Sample Control Record is kept on file by the Sample Custodian and attached to the file when all analyses are completed.

IV. **SAMPLE ACCEPTANCE POLICY**

Sample acceptance policy determines if the sample is identified correctly, with proper documentation, packaging, adequate volume for the analyses requested and correct preservatives.

1. Sample identification (is the sample waste water, drinking water, hazardous waste,

unknown?). For accurate analysis, the sample and sample source must be identified correctly. If there is an obvious discrepancy between the sample and documentation, this is normally investigated first by the Sample Receiving Personnel. If the problem cannot be resolved, then the appropriate lab manager is notified.

2. Documentation with the sample (is it adequate?). Sufficient documentation should be supplied with the sample to fill in the Chain of Custody completely. If there are any doubts as to the sample identification or analyses requested, the client should be called immediately.

3. Documentation generated during sample login. All communications and decisions regarding the client samples should be documented and signed in writing and attached to the original Lab Sheet (and all copies if necessary).

4. Sample condition (sufficient volume, correct preservative, correct container type, condition of sample, etc). The employee receiving the sample must note on the Chain-of-Custody form or an attached Sample Receipt Form the following information for each sample and fraction:

    a. Container Type (Glass, Amber glass, plastic, brass tube, etc.).

    b. Volume in container (1 L, 500 ml, etc.)

    c. Temperature (Room temp., cool, frozen)

    d. If samples are in a cooler, the temperature in the cooler.

    e. Preservatives added must be listed on the sample container and/or the Chain of Custody form.

    f. The sample must be within the specified holding times for the analyses requested.

    g. Any irregularities noted in the samples (leaking, air bubble in VOA vial, improper packaging, etc.).

5. Responsibility for contacting the customer about problems. The Sample Receiving personnel have primary responsibility for contacting the project manager or client immediately for routine problems with samples. Each client is normally assigned to a project manager, and the person logging the sample is also responsible for informing the project manager of any problems. This may be done with notes on a copy of the lab sheet or chain of custody. Generally all information and decisions must be documented in writing with a date and signature.

6. *A sample receiving checklist must be completed and attached to the final report. See Appendix I for Sample Receiving Checklist.*

V. SAMPLE LOGGING PROCEDURES

A. Description of Computer Logging Procedure:

1. The LIMS system will be used to record and track all samples received at the laboratory. Completed test results should be turned in to the project manager as designated on the Lab Request Summary.

2. Each Department should report the results of all analyses on the blue Results Worksheet and turn this in to the project manager, along with all worksheets and raw data generated in analyzing the samples.

3. When samples are logged into the LIMS system, the system will create one label for each sample container, a Lab Request Summary on blue paper, and a Results Worksheet for each lab department on blue paper. When samples are logged into the LIMS, they are assigned a unique sample number (order number) and all samples in the same group, received on the same day are normally assigned to a unique Lab Request Number.

4. The Sample Receiving personnel will make copies of the login documents as follows: A copy of the Lab Request Summary and the chain-of-custody for each Results Worksheet.

5. Copies of the login documents will be distributed as follows:

   a. Project Manager: The Lab Request Summary and one copy of the Chain of Custody.

   b. Each Department: The blue (original) Results Worksheet + copy of the Lab Request Summary + copy of the Chain of Custody.

   c. Attach the original Chain of Custody to the original Lab Request Summary.

   d. A Posting Log Book is maintained to verify that a copy of the Lab Request and Worksheets was distributed to each affected Department.

6. If problems are noticed with the test codes, analyte list or detection limits (DLR) please correct the Worksheet and give a copy to Jim or Steve as soon as possible so corrections can be made in the LIMS.

B. Description of Lab Request Summary

1. A Lab Request Summary is prepared which includes:

   a. Client name, address and client ID number.

b. Person to whom final report is to be sent.

c. Date sample received.

d. A complete description of the sample(s) including client identification number(s), sample matrix, date /time sampled.

e. A Lab Request Number and an order Number is generated by the computer for each sample.

f. A complete list of all analyses to be completed on each sample, including Method Number, Profile and Service Group / Department.

g. Login information including ID of person logging in the sample, date and time.

h. Order numbers and corresponding customer ID numbers for each sample.

i.A Sample Control Record (Internal Chain of Custody) is completed if needed. This document is used to record the transfer of the samples to departments (see section III).

See Appendix J for a sample of Lab Request Summary.

C. Sample Labeling

Each sample is labeled with the label generated by the computer. The label contains the Lab Request Number, Order Number, Client sample ID and log date.

For Orders where multiple containers are submitted (multiple fractions for different analyses), each separate container (fraction) should be labeled with the order number + A , B , C , etc. to designate fractions for each separate analysis. This fraction designation is then recorded by the custodian and analyst on the sample preparation log to document that the correct sample fraction was analyzed for each analysis method.

D. Procedure for Logging in Additional Analyses.

1. If additional analyses are requested by a client after the samples have been initially logged in and distributed to the labs, an amended Lab Request Summary may be generated for the additional analyses (using the same Lab Request number). The amended Lab Request Summary will note the additional tests in the Comments section.

2. Additional analyses may also be noted using a yellow edit / additional analyses request form to notify all affected departments of the additional tests. Information required is as follows:

a. Name of client

b. Previous Lab ID#
c. Sample type
d. Sample ID
e. Additional analyses
f. Date of request
g. Signature of employee

3. A new Lab Request will be generated if necessary. The new Lab Request Summary will have a new Lab Request Number for the additional analyses, and the samples will be relabeled with the new Lab Request Number. The original Lab Request Number will be retained on the samples.

a. The new Lab Request Summary must clearly reference the original Lab Request number and explain that analyses requested are in addition to the previous analyses (or other reasons for the new Lab Request Summary).

b. Copies of the new Lab Requests are forwarded to all departments affected.

E. **Backup Logging Procedure in Event of Computer System Failure.**

1. Temporary lab Request Summaries have been designed and are available in the Sample Receiving Department.

2. In the event the computer system is non-functional, the Sample Receiving Supervisor will issue temporary lab Request Summaries along with a temporary login reference number (eg. A100).

3. The supervisor will keep a list of assigned numbers and corresponding information (client, departments receiving lab Request Summaries, person writing the ticket).

4. When the computer is functional, standard lab Request Summaries will be issued.Samples that have received temporary numbers will be retrieved and re-numbered with the computer assigned lab Request Numbers. The standard lab Request Summaries will be attached to each corresponding temporary lab Request Summary that was issued.

VI. HANDLING OF THE SAMPLES AFTER LOGGING

A. Handling of the logged-in samples in the laboratory

1. After the samples are logged into the computer system and labeled, they are transferred to the Sample Custodian in the Sample Storage Area. All samples are logged into the Sample Control Log Book organized by Lab Request number. The client name, number and type of containers are entered. The Sample Custodian must sign the Log Book for all containers received.

2. The samples are stored in locked refrigerators or the locked walk-in cooler prior to

analysis.

3. All samples transferred to the Sample Storage Area are logged into a Sample Logbook in the Sample Storage Area. The Sample Logbook is maintained by the Sample Custodian.

4. When samples are picked up by laboratory personnel for analyses, the samples are signed out, and when returned, they are signed back into Sample Storage.

5. When samples are disposed of, this is noted in the Sample Logbook.

6. During weekends and evenings, only designated personnel have access to the Sample storage areas. All samples removed must be documented in the Sample Custodian Logbook.

B. Handling of samples to be sent out to other labs.

1. Arrangements to send samples out for analysis are handled by the project manager and must have the Client's consent.

2. Samples to be transferred to another lab are logged into the LIMS for "Send Out" and the Information is posted on the "Out Board" similar to posting to an in-house department. Samples to be sent out are subsampled and shipped by the Sample Custodian.

2. A portion of each sample to be sent out is retained in the original container. Procedures for sending out samples to other labs is described in the SOP for Subcontracting Analyses and the SOP for Soil Sub-Sampling and Compositing Procedures.

C. Returning samples to the client.

1. When a client requests that the samples be returned to them upon completion of the analyses, the sample receiving personnel should make sure that a notification is made on the lab sheet and that it is clearly visible

2. When all analyses are completed, a note is given to the Sample Custodian listing the samples to be returned and address to be used.

3. If the sample is returned by UPS, the sample pickup record will document that the sample was returned. If the sample is delivered by our driver or picked up by the client, the client should sign the chain of custody or a receipt to show the samples were returned to them. A record book is maintained in Sample Receiving to document the return of samples.

APPENDIX C

Sample Container and Preservation Guide

Updated: March 20, 2002

	Method	Container(1)	Suggested Volume	Preservative	Holding Time(2)
Volatile Organics					
(VFH) Gasoline	(5030) 8015	VOA-glass	2 40ml vials	Cool 4 C	7 days(3)/14 soil
(VFH) Gasoline/BTEX	(5030) 8015/8021	VOA-glass	2 40ml vials	Cool 4 C	7 days(3)/14 soil
Halocarbons	601/8021	VOA-glass	2 40ml vials	Cool 4 C	14 days
Aromatics	602/8021	VOA-glass	2 40ml vials	Cool 4 C	7 days(3)/14 soil
Purgeables	624/8260	VOA-glass	2 40ml vials	Cool 4 C	14 days
Purgeables in DW	524.2	VOA-glass	2 40ml vials	Cool 4 C, Ascorbic acid and HCl	14 days
Semi-Volatile Organics					
(EFH) Diesel	8015 Mod.	glass-amber	1 L	Cool 4 C	7 days/14 soil(4)
Semi-Volatiles (BNAs)	625/8270	glass-amber	1 L	Cool 4 C	7 days/14 soil(4)
Pesticides & PCBs	608/8081	glass-amber	1 L	Cool 4 C	7 days/14 soil(4)
Phosphorous Pests.	614, 622/8140	glass-amber	1 L	Cool 4 C	7 days/14 soil(4)
Herbicides	615/8150	glass-amber	1 L	Cool 4 C	7 days/14 soil(4)
Polynuclear Aromatics	610/8310	glass-amber	1 L	Cool 4 C	7 days/14 soil(4)
Haloacetic Acids	552.2	glass-amber	250 ml	Cool 4 C, 5mg NH4Cl/50ml	14 days(4)
Carbamate Pesticides	632	glass-amber	1 L	Cool 4 C	7 days(4)
Metals					
Mercury	245.1/7470	poly	500 ml	HNO3 to pH<2	28 days
Chromium VI	218.4/7199	poly	500 ml	Cool 4 C	24 hours
Organic Lead	DHS (LUFT)	glass-amber	1 L	Cool 4 C	14 days
All Other Metals	200/6000/7000	poly	500 ml	HNO3 to pH<2	6 months
Inorganic & Wet Chemistry					

Alkalinity	310.1	poly or glass	500 ml	Cool 4 C	14 days
COD	410.4	poly or glass	500 ml	Cool 4 C, H2SO4 to pH<2	28 days
Chloride	300	poly or glass	500 ml	None	28 days
Cyanide	335.1/335.2/9010	poly or glass	1 L	Cool 4 C, NaOH to pH>12(5)	14 days
Flashpoint	1010	poly or glass	500 ml	None	N/A
Fluoride	300.0/340.2	poly or glass	500 ml	None	28 days
Hardness	130.2/SM314B	poly or glass	500 ml	HNO3 or H2SO4 to pH<2	6 months
Nitrate/Nitrite	353.2	poly or glass	500 ml	Cool 4 C	48 hours
Oil & Grease	413.1/413.2	glass-amber	1 L	Cool 4 C, H2SO4 to pH<2	28 days
Phenols	420.1	glass-amber	1 L	Cool 4 C, H2SO4 to pH<2	28 days
Phosphorous	365.2	poly or glass	500 ml	Cool 4 C, H2SO4 to pH<2	28 days
PH	150.1	poly or glass	500 ml	None	Immediate
Solids (TDS, TSS, TS)	160.1/160.2/160.3	poly or glass	500 ml	Cool 4 C	7 days
Specific Conductance	120.1	poly or glass	500 ml	Cool 4 C	28 days
Specific Gravity	SM2710F	poly or glass	500 ml	None	N/A
Sulfate	375.4	poly or glass	500 ml	Cool 4 C	28 days
Sulfide	376.2	poly or glass	500 ml	Cool 4 C, ZnCO2CH3+NaOH pH>9	7 days
TRPH	418.1	glass-amber	1 L	Cool 4 C, H2SO4 to pH<2	28 days
TOC	415.1	glass-amber	250 ml	HCL to pH<2	7 days
TOX	9020	glass-amber	500 ml	HNO3 to pH<2	28 days
Radioactivity	900	Any	1 L	HNO3 to pH<2	7 days
Bioassay (Effluent)	600/4-85/01	poly or glass	5 Gallons	Cool 4C	24 hours

Notes:

(1) Soil samples are typically collected in brass or steel tubes and wide mouth jars (500ml)

(2) Unless otherwise stated, holding times apply to soil and water matrices.

(3) To extend the holding time to 14 days, prepare bottle with HCL to pH<2

(4) Holding times shown are days until extraction. Samples have a 40-day (7-day for 552.2) holding time after extraction.

(5) If chlorinated, add 0.6g Ascorbic Acid

APPENDIX D

Capital Equipment Inventory

Last Update: October 2006

Department	Instrument Description	Quantity	Serial No.	Date
Chemistry	Perkin Elmer FIMS400 Flow Injection Mercury Analyzer with AS90 Autosampler and Data System	1	4543/3670	
Chemistry	Lachat FIA+ Quickchem 8000 Flow Injection Analyzer with Autosampler and Data System	1	A83000-1315	
Chemistry	Lachat Colorimeter (10mm path)	1		
Chemistry	Lachat Manifold (NO2/NO3)	1	10_107_04_O	
Chemistry	Lachat Manifold (NH3-N)	1	10_107_06_1-A	
Chemistry	Lachat Manifold (TKN)	1	10_107_06_2-E	
Chemistry	Lachat Manifold (CN)	1	10_204_00_1-A	
Chemistry	Lachat Manifold (TKP)	1	10_115_01_1-P	
Chemistry	Dionex 2000 Ion Chromatograph with Autosampler, ASRS Supressor, CD20 Conductivity Detector and data system – System I	1	96030596	
Chemistry	Dionex 2000 Ion Chromatograph with Autosampler, ASRS Supressor, ED40 Electrochemical Detector and data system – System I	1	97020907D991001	
Chemistry	Dionex 2000 Ion Chromatograph with Autosampler, ASRS Supressor, CD25 Conductivity Detector and data system (perchlorate analysis) – System II	1	01090605	
Chemistry	Dionex 2000 Ion Chromatograph with Autosampler, AD25 Absorbance Detector and data system	1	01120109	

	(hexavalent chromium analysis) – System I1			
Chemistry	Tekmar Dohrman DX-2000 TOX Analyzer with data system	1	98023001	
Chemistry	Horizon Oil and Grease Analyzer System	1	06-2059	2006
Chemistry	Thermo Spectrophotometer	1	AQA 12200B	2004
Chemistry	Mettler AE163 Scale	1	D14314	
Chemistry	Mettler AE163 Scale	1	WB1225	
Chemistry	Mettler AE200 Scale	1	J79480	
Chemistry	Mettler PE3000 Scale	1	F17120	
Chemistry	Denver APX-323 Scale	1	A33015028	
Chemistry	Sartorius BA61 Scale	1	30701480	
Chemistry	Labconco 65200-00 Rapidstill II		051044717E	
Chemistry	Labconco 65200-00 Rapidstill II	1	990192069E	
Chemistry	Fisher Scientific Coulomatic K-F Titrimeter	1	842	
Chemistry	Beckman TJ-6 Centrifuge	1	7A055	
Chemistry	Eppendorf 5415C Centrifuge	1	5415B67934	
Chemistry	Drying Oven Precision/Thelco130DM	1	605031244	
Chemistry	Drying Oven – Scientific Products DX31	1	124030	
Chemistry	PH Meter Beckman 31	1	K711071	
Chemistry	PH Meter Thermo ORION 720A	1	67511	
Chemistry	PH Meter Thermo ORION 710A	1	57736	
Chemistry	Turbidity Meter Hach 2100N	1	99020000-5174	
Chemistry	Conductivity Meter Cole Palmer 19101-10	1	02050211056-101	
Chemistry	Fume Hoods	6		
Chemistry	Water Baths	2		
Chemistry	BOD Incubator	2		
Chemistry	Refrigerator	1		
Chemistry	Rapid Digestor Labconco 23012	1	990891743E	
Chemistry	Heater/Stirrer Fisher Isotemp	1	504N0178	
Chemistry	Heater Thermolyne Cimerac 3	1		
Fish Toxicity	4 Gallon Tanks	40		
Fish Toxicity	Disposable Tanks (approx. 3 Gallons each)	100		
Fish Toxicity	30 Gallon Tank	3		
Fish Toxicity	20 Gallon Tank	1		
Fish Toxicity	Air Pumps	10		
Fish Toxicity	Circulation Pump	1		
Fish Toxicity	pH Meter	1		
Fish Toxicity	Recording Thermograph	1		
Fish Toxicity	YSL Model 50B DO Meter	1		

GC	Varian 3400 GC with FID & PID (#3w), concentrator LSC 2000 and Data System	1		1991
GC	Varian 3400 star GC with FID & PID, Archon autosampler, concentrator Tekmar 3000 and data system (# 1)	1		1989
GC	Varian 3300 GC with FID & PID, Archon Aautosampler, concentrator LSC 2000 and data system (# 2)	1		1989
GC	Varian 3400 GC with FID, autosampler 8200 and data system (# 3)	1		1989
GC	Agilent 6890N GC with FID, autosampler 7683B and data system (# 9)	2	CN44130843 CN10540091	2005
GC	Varian CP-3800 GC with FID & PID, Archon autosampler, concentrator LSC 2000 and data system (# 14)	1		1999
GC	Varian CP-3800 GC with FID & PID, Archon autosampler, Tekmar 3000 concentrator and data system (# 15)	1		2004
GC	Varian 3300 GC with FID, and data system (# 12)	1		1986
GC	Varian 3400 GC with PID (Traacor 1000 HALL Detector attached), Archon autosampler, Tekmar 3100 and data system (# 4)	1		1989
GC	Varian 3400 GC with FID, Varian 8100 autosampler and data system (# 5)	1		1990
GC	Varian 3400 GC with TCD (# 8)	1		1988
GC	TCLP Rotary Agitators - ZHE	1		
GC	TCLP ZHE Extractors	4		
GC	TCLP Pressure Filters	2		
GC/MS	Varian Model 3800 gas chromatograph with Varian Saturn 2200 MS Detector, Archon Autosampler, Tekmar concentrator and Data Station (#7)	1	04575-10060	2003

GC/MS	Varian Model 3800 gas chromatograph with Varian Saturn 2000 MS Detector, Archon Autosampler, Tekmar LSC 3100 and Data Station (#6)	1	4443-6028	2001
GC/MS	Varian Model 3800 gas chromatograph with Varian Saturn 2000 MS Detector, Archon Autosampler, Eclipse 4660 and Data Station (#5)	1	3810-3780 0632466635	1999
GC/MS	Varian Model 3800 gas chromatograph with Varian Saturn 2000 MS Detector, Archon Autosampler, LSC 3100 and Data Station (#4)	1	3811-3781	1999
GC/MS	Varian Model 3800 gas chromatograph equipped with Varian Saturn Model 2000 MS Detector (#3), Archon Autosampler, Tekmar autosampler and Data Station	1		2005
GC/MS	Varian Model 3800 gas chromatograph equipped with Varian Saturn Model 2000 MS Detector, 2 flame ionization detectors, and a Lotus air sampling system.	1		
Microbiology	Castle Thermatic 60, 20x24 Autoclave, Automatic	1		
Microbiology	Market Forge Sterilmatic Autoclave	1		
Microbiology	Wesco, 4 Objective Microscope	1		
Microbiology	B&L Dissecting Microscope	1		
Microbiology	"Filamatic" Media Pipettor	1		
Microbiology	Blue M Magni-Whirl Constant Temperature Bath	3		
Microbiology	Neslab 500 Water Bath	3		
Microbiology	Lab-Line Imperial III Incubator	1		
Microbiology	Thelco Incubator	1		
Microbiology	Precision Scientific Incubator	1		
Microbiology	Baush & Lomb Refractometer	1		
Microbiology	VWR 1555 Incubator	1		
Microbiology	VWR Incubator, 40 cubic ft.	1		
Microbiology	Lab-Line Orbiter Environmental Shaker	1		
Microbiology	Bio-Rad Mini-Transilluminator	1		
Microbiology	Bio-Rad AC Power Supply	1		

Microbiology	Baxter Scientific Product Vortex Mixer	1		
Microbiology	Sartorium Universal Balance	1		
Microbiology	Quebec Colony Counter	1		
Office Data Handling	Toshiba Fax	2		
Office Data Handling	Canon Copiers	4		
Office Data Handling	LIMs Computer System (39 stations)	1		
Office Data Handling	HP Laserjet Printers	3		
Office Data Handling	Lexmark Printers	13		
Pesticides	Agilent 6890N gas chromatograph with a Agilent 5973 Mass Selective Detector and a Agilent 7683B automatic injector	1	CN10502043 US44647151 Cn45131647	2005
Pesticides	Shimadzu 2010 GCMS	1	C70384350031	2006
Pesticides	Hewlett Packard 5890A Series II GC, dual ECD detectors, Autosampler and Data Station	1	3022A28956	1990
Pesticides	Varian 3400 GC, dual ECD detectors, Autosampler (GC-3400)	1	14304	1991
Pesticides	Varian 3800 GC, dual ECD detectors, Autosampler (GC#1)	1	2771	
Pesticides	Varian 3800 GC, dual ECD & PFPD detectors, Autosampler (GC#2)	1	6056	2000
Pesticides	Varian 3800 GC, dual ECD & PFPD detectors, Autosampler (GC#3)	1	9085	2000
Pesticides	Varian 3400 GC, FID detector, Autosampler (GC-Alcohol)	1	6692	1989
Pesticides	Waters Dimension II GC, ECD & FID detectors, data system	1	GC2-8901009	
Pesticides	Shimadzu SCL-10A VP System Controller, LC-10AT Pumps, Autosampler, SPD-M10A VP Diode Array Detector, Data System	1	C2103750927US	2000
Pesticides	Shimadzu GC-2010, dual injectors, dual ECD detectors (ECD#1, ECD#2), Autosampler and workstation	1	C11324101922	2003

Pesticides	Dionex ASE 200 Accelerated Solvent Extractor and Controller	1	1060057	2001
Pesticides	Dionex ASE 200 Accelerated Solvent Extractor and Controller	1	97060620	2000
Pesticides	Zymark Turbo Vap II Concentration Workstations	3		2000
Pesticides	Ohaus Brainweight B1500D Toploader Balance	1	11532	
Pesticides	Boekel 1494 Steambath	1		
Pesticides	Fisher Isotemp 228 Steambath	2		2000
Pesticides	Fume Hoods	5		
Pesticides	Varian 3300 GC (Drying Oven)	1	5415	1988
Pesticides	B. Braun Braun-Sonic U Ultrasonic probe and generator	1		
Pesticides	VWR 1350G Drying Oven, gravity	1		
Pesticides	Precision Scientific 16 Drying Oven, gravity	1		
Pesticides	National Appliance Drying Oven, gravity	1		
TOC/RAD	Gas-Flow proportional counting system -- Protean Instr., Model 9025.	1		1991
TOC/RAD	Geiger-Mueller Counter (portable) -- S.E. Intl. Model 4EC	1		1991
TOC/RAD	Infrared Heater and Stand (Fisher Scientific, Model 11-504-5	1		1991
TOC/RAD	Labconco Model 59000 Chemical Fume Hood	1		1991
TOC/RAD	Mettler Model H35AR Analytical Balance	1		
TOC/RAD	Dessicator, Nalgene Model 8-642-21	1		1991
TOC/RAD	TOC Analyzer, Shimadzu, TOC-5000	1		
TOC/RAD	Shimadzu TOC-VCSH Total Organic Carbon Analyzer, A/S and Data System	1		2004
AA/ICP Metals	PE Sciex Elan 6100 ICP-MS with auxiliary data system and Cetac autosampler/diluter	1	1680004	2000
AA/ICP Metals	Perkin Elmer Optima 4300DV ICP with AS93+ autosampler and data system		077N1091901	2001
AA/ICP Metals	Perkin Elmer Aanalyst 100 AA	1	040S0110603	2001
AA/ICP Metals	MSI Computer	1		2006

AA/ICP Metals	TCLP Rotary Agitators	2		
AA/ICP Metals	Air Compressor – Craftsman	1		
AA/ICP Metals	Fume Hood – 6 Ft.	2		
AA/ICP Metals	Safeaire Fume Hood – 4 Ft	2		
AA/ICP Metals	Environmental Express Hot Blocks	3		

APPENDIX E

STANDARD OPERATING PROCEDURE FOR DETERMINATION AND UPDATING OF MDL/DLR DETECTION LIMITS

PURPOSE

1. This Standard Operating Procedure summarizes the procedure for determining MDLs (Method Detection Limit) and DLR (Reporting Detection Limit), in addition to the procedure for updating and revising current MDLs and DLRs.

DETERMINATION OF MDL

1. Prepare and analyze seven replicate spike solutions:

    1.1. Prepare one spiked bulk solution for each matrix at 1-5 times the estimated detection limit. The volume should be sufficient to prepare and analyze seven or more samples. The solution should be spiked with all analytes of interest.

    1.2. Prepare seven or more aliquots of the spiked solution per the normal method of preparation (process through the entire analytical method).

    1.3. Analyze all the aliquots by normal analysis procedures (QA samples such as spikes, duplicates, LCS and PB are not required).

    1.4. Calculate the standard deviation (n-1) of the seven results. For seven replicates multiply by 3.14 to calculate the MDL value for each analyte. (**NOTE:** Use the factor 3.14 only for seven replicates, other factors are given in the EPA reference noted below).

    1.5. More than 7 aliquots can be analyzed. If more than 7 aliquots are analyzed, then all values must be used in calculating the MDL. Use the Student's t value at the 99% confidence level for the number of replicates.

2. The MDL should be determined at least once a year for each analyte, each analytical method and each matrix (solid, water, etc). The MDL should be re-run whenever there is a significant change in instrumentation or procedure.

3. An MDL check sample at approximately 2 x MDL should be analyzed to verify the reasonableness of the MDL values obtained. The MDL check sample should be prepared the same way as the MDL check solutions. All analytes should be detected in the MDL check sample, or the MDL study should be modified and repeated for the analytes which are not detected.

DETERMINATION OF REPORTING DETECTION LIMIT (DLR)

1. Prepare and analyze one or more samples at the estimated reporting limit:

   1.1. Prepare one or more samples at the estimated reporting limit using the normal preparation procedure (process through the entire analytical method). QA samples such as spikes, duplicates, LCS and PB are not required.

   1.2. Analyze the sample by the normal analysis procedure.

   1.3. The analytical result must be 75-125 percent of the spike value. If not, increase the concentration until this accuracy can be achieved.

2. The concentration at which the spike recovery of 75-125% can be achieved is the Reporting Detection Limit (DLR).

UPDATING & REVISING MDL/DLR VALUES:

1. Every year, each department is required to submit their MDLs for each analyte and each analytical method to the QC department.

2. The QC department will then incorporate the current MDLs into the LIMS system for each analytical method (**NOTE:** In the LIMS, there may be several test codes for a particular analytical method. It is important that the MDLs for ALL test codes in the LIMS be updated).

3. After the MDLs for a particular test have been changed, the specs for that test are printed out and kept on file by the QC department, and a copy is returned to the analyst.

4. The QC department shall keep track of all changes in the MDLs through an MDL Master Tracking List, which contains the following information:

   4.1. The date the MDL for a particular test was updated.

   4.2. The date the MDL was run.

   4.3. The LIMS test code and test name for each test in which the MDLs have been updated.

   4.4. The corresponding analytical method for each test.

   4.5. Any additional comments for documenting any pertinent information or noting any unusual peculiarities in the database (e.g., some analytes that are missing DLRs, MDLs that are greater than the DLR, etc.).

5. The MDL must never exceed the DLR. If the MDL is equal to or greater than the DLR then the following steps must be taken:

   5.1. If the MDL is greater than the DLR for one or more analytes, then the MDL should be re-run or the DLR should be adjusted if possible.

5.2. If the MDL is equal to the DLR, then this must be reviewed by the QC department as well as the department supervisor to determine if such a scenario is acceptable.

5.3. All cases in which the MDL is greater than or equal to the DLR, including any steps taken to remedy the situation, must be noted in the MDL Master Tracking List.

REFERENCES:

1. 40 CFR, Chapter 1, Pt. 136, App.B (7-1-86 Ed).

2. NELAC Quality Systems Revision 16, July 12, 2002.

APPENDIX F

NON-CONFORMANCE CRITERIA AND DOCUMENTATION PROCEDURES

QA Samples - Corrective Actions:

1. Lab Control Sample (LCS- W for water samples, S for soil samples), the acceptance criteria for the LCS is 80 - 120 percent of true value or the current control limits. If not, all samples in the batch must be re-prepared and re-analyzed.

2. Method Blank (MBW for water samples, MBS for soil samples), the result must be less than the reporting limit for each element, or less than 1/10 the lowest sample in the batch. If not, all samples in the batch must be re-prepared and re-analyzed.

3. Matrix Spike Sample (MS), recovery should be 75 - 125, if not the sample result should be flagged for potential matrix interference for each element showing poor recovery. (For metals analyses, a post- digestion spike should be done for any element with poor matrix spike recovery).

4. Matrix Spike Duplicate (MSD), the relative percent difference between the MS and MSD should be less than 20 percent. If not the analysis should be repeated or the result flagged for precision out of limits.

5. Surrogate Recovery, the surrogate recoveries should be within the current control limits for all methods where surrogate recoveries apply. If the surrogate recoveries are outside control limits, the results should be flagged for potential matrix interference for each analyte showing recovery outside the control limits. If the surrogate recoveries for the LCS or Method Blank are outside control limits, all samples in the batch must be re-prepared / re-analyzed, unless it can be determined that the poor recovery was due to a problem specific to that sample only.

Non-conformance Documentation Form (NCD):

1. Non-conformances such as QA limit failures which can not be corrected by re-analyses, client requirements which cannot be met or standard method modifications are documentated by initiating a Non-Conformance Document Form (NCD). A copy of the NCD Form is attached.

2. The NCD form is initiated by the analyst in the event of a QC sample exceeding control limits or other known non-conformance to the analytical method or client requirements. The NCM may also be initiated by the project manager or department manager in the event client requirements are not met or other analytical problems are discovered.

3. After the NCD Form is initiated, the corrective action must be determined and agreed upon by the department manager or supervisor and the QA Manager. This is documented and signed by the department manager in the second part of the NCD

Form. The form is then forwarded to the QA Manager.

4. The QA Manager then completes and signs the final part of the form. If necessary, verification of the corrective action is documented in this section.

5. A copy of the form is included in the affected data package or the client is notified as appropriate. The original is filed in the Corrective Actions File which is maintained by the QA Manager.

Associated Laboratories

Non-Conformance Document

Date: _____ Document File #:

_____

Lab Request: _____ Type of

NCD:_____

Client ID: _____ *(QA Limits, Client Req, Other)*

Department: _____

Description of Non-Conformance:
Signed (Initiator) _____ Date: _____

Description of Corrective Action:
Signed (Supervisor): _____ Date: _____

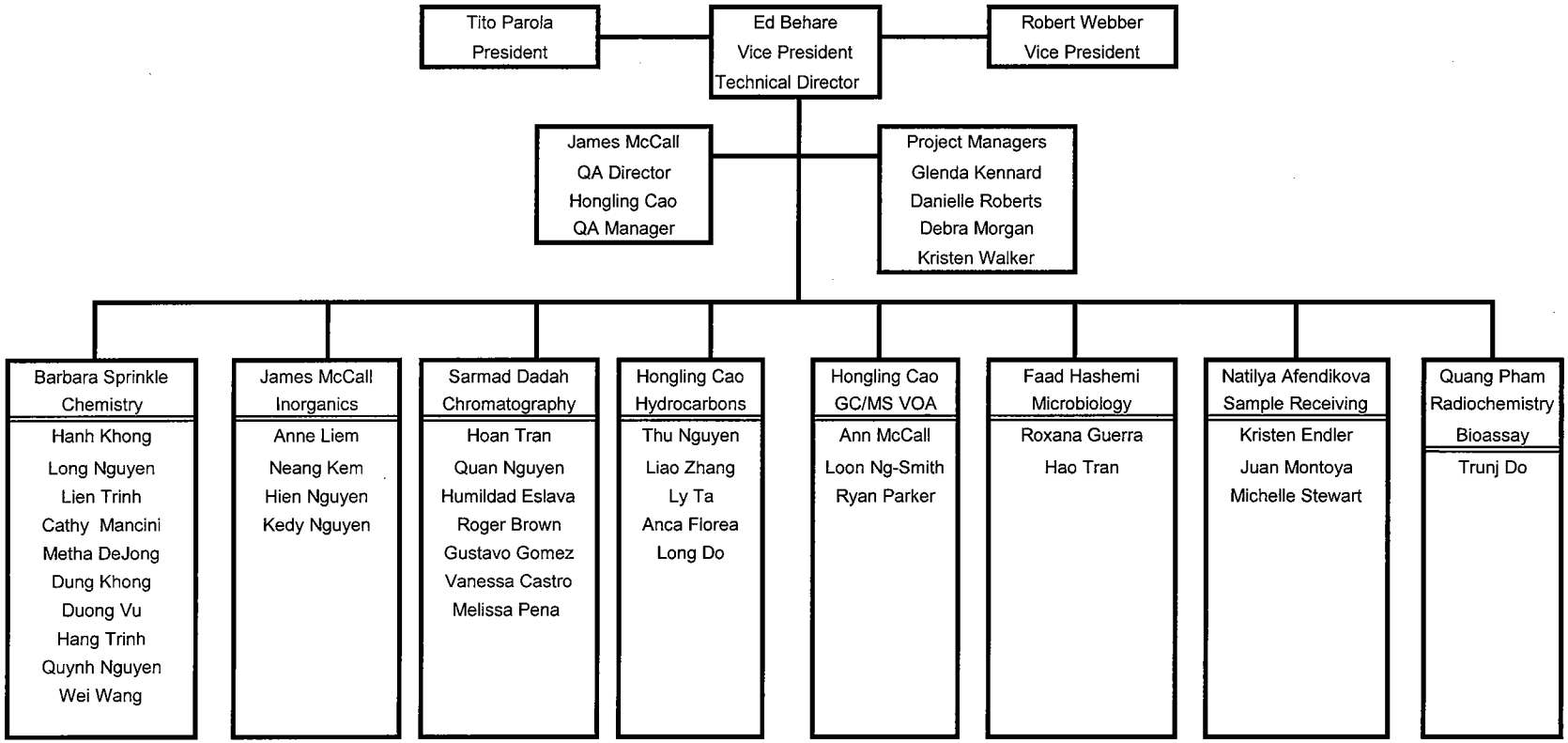
QA Manager Approval:
Signed (QA Manager): _____ Date: _____

APPENDIX G

ORGANIZATION CHART

ASSOCIATED LABORATORIES

LAB ORGANIZATION CHART



APPENDIX H

CURRENT STANDARD OPERATING PROCEDURES

Document #	**SOP**	**Test Method (if applicable)**	**Department**
A-0001	SOP for Writing SOPs		QC
A-0002	Updating/Control of SOPs		QC
QA Manual	SOP for MDLs		QC
A-0004	Control Charts		QC
QA Manual	Non-Conformance		QC
A-0006	Data Packaging		QC
A-0007	Ethics and Data Integrity Policies and Training		QC
A-0008	Internal Quality Audit Program		QC
A-0009	Purchasing services and supplies		QC
A-0010	Document Control		QC
A-0011	Subcontracting Laboratory Analyses		QC
A0012	Data Backup and Verification Procedure		QC
A0013	Data Auditing and Access Procedures		QC
B-0001	14	EPA 502.2	Gas/BTEX
B-0002	Purgeable Organics	EPA 601/601	Gas/BTEX
B-0003	8015 Diesel SOP	EPA 8015 Diesel	Gas/BTEX
B-0004	8015 gas/BTEX SOP	EPA 8015 Gas/8021 BTEX	Gas/BTEX
B-0005	TRPH SOP	EPA 418.1	Gas/BTEX
B-0006	HVO/AVO	EPA 8021B	Gas/BTEX
B-0007	Dissolved Gas in Water by GC Headspace	RSK - 175	
C-0001	Purgeable Organics	EPA 524.2	GC/MS
C-0002	Purgeable Organics	EPA 624	GC/MS
C-0003	SVOCs by GC/MS	EPA 625	GC/MS
C-0004	VOCs by GC/MS	EPA 8260B	GC/MS
C-0005	SVOCs by GC/MS	EPA 8270C	GC/MS
D-0001	Acidity	EPA 305.1 / SM 2310B	Chemistry
D-0002	Alkalinity	EPA 310.1 / SM 2320B	Chemistry
D-0003	pH	EPA 150.1 / SM 4500H-B	Chemistry
D-0004	TDS	EPA 160.1 / SM 2540C	Chemistry
D-0005	TSS	EPA 160.2 / SM 2540D	Chemistry

D-0006	Volatile Solids	EPA 160.4 / SM 2540E	Chemistry
D-0007	Anions by IC	EPA 300 / SM 4110	Chemistry
D-0008	Bromide by IC	EPA 300.1	Chemistry
D-0009	Perchlorate	EPA 314	Chemistry
D-0010	Cyanide	EPA 335.1 & 335.2 / SM 4500-CN / SW846 9010B	Chemistry
D-0011	Ammonia-N	EPA 350.1 / SM 4500-NH3-G	Chemistry
D-0012	TKN	EPA 351.2 / SM 4500-Norg	Chemistry
D-0013	TKN	EPA 351.3 / SM 4500-Norg	Chemistry
D-0014	Nitrate/Nitrite-N	EPA 353.2 / SM 4500-NO3-E	Chemistry
D-0015	Total/Ortho-P	EPA 365.2	Chemistry
D-0016	TKP	EPA 365.4	Chemistry
D-0017	Mercury in Water	EPA 245.1 / SW846 7470A	Chemistry
D-0018	Reactive Cyanide	SW846-7.3.3	Chemistry
D-0019	Reactive Sulfide	SW846-7.3.4	Chemistry
D-0020	Oil & Grease	EPA 1664	Chemistry
D-0021	BOD	EPA 405.1 / SM 5210B	Chemistry
D-0022	COD (Hach)	EPA 410.4	Chemistry
D-0023	Silica	EPA 370.1 / SM 4500 Si-D&E	Chemistry
D-0024	Sulfide (Iodometric)	EPA 376.1 / SM 4500S / SW846 9034	Chemistry
D-0025	Oil & Grease	SM 5520	Chemistry
D-0026	Total Phenolics	EPA 420.1 / SM 5530 / SW846 9065	Chemistry
D-0027	Chlorine	EPA 330.5 / SM 4500Cl-G	Chemistry
D-0028	UV absorbance	SM 5910B	Chemistry
D-0029	Settleable Solids	EPA 160.5 / SM 2540F	Chemistry
D-0030	Conductivity	EPA 120.1 / SM 2510 / SW846 9050A	Chemistry
D-0031	Turbidity	EPA 180.1 / SM 2130B	Chemistry
D-0032	Corrosivity	EPA 1110	Chemistry

D-0033	COD (Titrimetric)	EPA 410.1, 410.2 & 410.3 / SM 5220B	Chemistry
D-0034	TOX	SM 5320B / SW846 9020B	Chemistry
D-0035	Ignitability	SW846 1010	Chemistry
D-0036	Sulfide (Colorimetric)	EPA 376.2 / SM 4500S-D	Chemistry
D-0037	Fluoride	EPA 340.2 / SM 4500F-C / SW846 9214	Chemistry
D-0038	Cyanide	EPA 335.4 / SW846 9012A	Chemistry
D-0039	Ammonia-N (Titration)	EPA 350.2 / SM 4500-NH3-C	Chemistry
D-0040	Total Solids	EPA 160.3 / SM 2540B	Chemistry
D-0041	Color	EPA 110.2 / SM 2120B	Chemistry
D-0042	Cr (VI)	SM 3500 Cr-D / SW846 7196A	Chemistry
D-0043	Cr (VI) by IC	EPA 218.6	Chemistry
D-0044	Sulfate	EPA 375.3 / SM 4500-SO4 C	Chemistry
D-0045	MBAS	EPA 425.1 / SM 5540C	Chemistry
D-0046	Chloride (titration)	EPA 325.3 / SM 4500-Cl	Chemistry
D-0047	DO (Probe)	EPA 360.1 / SM 4500-O-G	Chemistry
D-0048	DO (Titration)	EPA 360.2 / SM 4500-O-C	Chemistry
D-0049	pH in Soil	SW846 9045C	Chemistry
D-0050	Mercury in Solid	SW846 7471A	Chemistry
D-0051	Total Sulfides	SW846 9030B	Chemistry
E-0001	Micro- CC	Control Cultures	Microbiology
E-0002	Micro-CPA	Coliform by CPA	Microbiology
E-0003	Micro-WS	Water Suitability	Microbiology
E-0004	Micro-HPT	Heterotrophic Plate Count	Microbiology
E-0005	Micro-MNO/MUG	Coliform by MNO-MUG	Microbiology
E-0006	Micro - Coliform (MF)	Coliform by MF in Drinking Water	Microbiology
E-0007	Micro - Coliform (MF)	Coliform by MF in Wastewater	Microbiology
E-0008	Micro - Strep (MF)	Strep by MF	Microbiology

E-0009	Micro - Coliform (MTF)	Coliform by MTF in Drinking Water	Microbiology
E-0010	Micro - Coliform (MTF)	Coliform by MTF in Waste Water	Microbiology
E-0011	Micro - Strep (MTF)	Strep by MTF	Microbiology
E-0012	Micro - Autoclave		Microbiology
E-0013	Micro - Inhibitory Residue		Microbiology
E-0014	Micro Sampling		Microbiology
F-0001	Metals by ICP	EPA 200.7	Metals
F-0002	Metals by ICP	EPA 6010B	Metals
F-0003	Metals by ICP-MS	EPA 200.8	Metals
F-0004	Metals by ICP-MS	EPA 6020	Metals
F-0005	Metals by AA	EPA 7420 / SM 3111B	Metals
F-0006	STLC	STLC	Metals
F-0007	TCLP	EPA 1311	All applicable labs
F-0008	Metals Prep	EPA 3010A	Metals
F-0009	Metals Prep	EPA 3050B	Metals
G-0001	TOC	EPA 415.1 / SM 5310B	Radio/Bioassay
G-0002	Gross Alpha/Beta	EPA 900	Radio/Bioassay
G-0003	Gross Radium	EPA 900.1	Radio/Bioassay
G-0004	Gross Alpha by Co-precipitation	SM 7110C	Radio/Bioassay
G-0005	Aquatic Bioassay 013	EPA 600/4-85/013	Radio/Bioassay
G-0006	Reference Toxicant 013	EPA 600/4-85/013	Radio/Bioassay
G-0007	Aquatic Bioassay 027F	EPA 600/4-85/027F	Radio/Bioassay
G-0008	Reference Toxicant 027F	EPA 600/4-85/027F	Radio/Bioassay
G-0009	Aquatic Bioassay in Hazardous Waste		Radio/Bioassay
G-0010	Reference Toxicant in Hazardous Waste		Radio/Bioassay
H-0001	Organochlorides	EPA 608	Pesticides
H-0002	Organochlorides	EPA 8081	Pesticides
H-0003	PAHs	EPA 8310	Pesticides
H-0004	PCBs	EPA 8082	Pesticides
H-0005	Chlorinated Phenoxy-Herbicides by GC	EPA 8151	Pesticides
H-0006	L-L Extraction	EPA 3510C	Pesticides
H-0007	Ultrasonication	EPA 3550B	Pesticides

H-0008	PF Extraction	EPA 3545	Pesticides
H-0009	EDB, DBCP & TCP by GC	EPA 504.1	Pesticides
H-0010	EDB & DBCP by GC	EPA 8011	Pesticides
H-0011	OP Pesticides by GC	EPA 8141	Pesticides
H-0012	Haloacetic Acids	EPA 552.2	Pesticides
J-0001	Inorganics Glassware Cleaning		All applicable labs
J-0002	Thermometer Cal.		All applicable labs
J-0003	Balance Calibration		All applicable labs
J-0004	Reagent Water Mon.		All applicable labs
J-0005	Pipette Calibration		All applicable labs
J-0006	Sample Receiving		Sample Receiving
J-0007	Soil Sub-Sampling and Compositing		All applicable labs
J-0008	Field Sampling		Sample Receiving
J-0009	Organic Glassware Cleaning		All applicable labs
J-0010	Laboratory Hazardous Waste Disposal		All applicable labs
J-0011	Analytical Standards		All applicable labs
J-0012	Project Management		All applicable labs
J-0013	Retention Time Windows		All applicable labs

SOP Revision Schedule

Department	Document #	SOP Revision Month
QC	A-#####	July
Gas/BTEX	B-#####	July
GCMS	C-#####	July
Chemistry	D-#####	July
Microbiology	E-#####	July
Metals	F-#####	August
Radiochemistry/Bioassay/ TOC	G-#####	August
Pesticides	H-#####	September
Others	J-#####	September

APPENDIX I

SAMPLE RECEIVING CHECKLIST

ASSOCIATED LABORATORIES
806 North Batavia – Orange, California 92868 – 714-771-6900 *FAX 714-538-1209*

SAMPLE ACCEPTANCE CHECKLIST

Section 1
Client:_____ Project:_____
Date Received:_____
Sample(s) received in cooler: Yes No (Skip Section 2)

Section 2
Was the cooler packed with: ____ Ice ____ Ice Packs ___ Bubble Wrap ___ Styrofoam
____ Paper ____None ___ Other_____
Cooler or box temperature: _____

(Acceptance range is 2 to 6 Deg. C.)

Section 3	YES	NO	N/A
Was a COC received?			
Were custody seals present?			
If Yes – were they intact?			
Were all samples sealed in plastic bags?			
Did all samples arrive intact? If no, indicate below.			
Did all bottle labels agree with COC? (ID, dates and times)			
Were correct containers used for the tests required?			
Was a sufficient amount of sample sent for tests indicated?			
No head space in VOA vials?			
Were the correct preservatives used?			
Were the samples scanned for presence of radioactivity?			

Section 4
Explanations/Comments

Section 5
Was Project Manager notified of discrepancies: Y / N N/A

Completed By: _____ Date: _____

APPENDIX J

SAMPLE OF LAB REQUEST SUMMARY

ASSOCIATED LABORATORIES LAB REQUEST SUMMARY

Client ID: **1000**

Some Client
Attn: BB
1234 Marvel Way
New York, NY 20007

Phone:209-200-2001 Fax: 209-200-2002

Submitter: Client

Project: Some Project

Lab Request: 158450

Date Received: 10/17/2005

Project Mgr.: JMM

REVIEW	BY	DATE
LOG IN		
DATA		
QC		
FINAL RPT		

FAX RESULTS

Order No.: 658819 **Matrix:** WATER **Log Date:** 10/17/2005@15:15 **Due Date:** 10/24/2005
Client Smpl. ID: Sample 1 **Sampled:** 10/17/2005 **Status:** Logged

Method	Profile	Test Name	Analyte	Service Group
120.1		120.1 Conductivity	All	CHEM
150.1		150.1 pH	All	CHEM
1664		1664 Oil and Grease	All	CHEM
300.0		300.0 Nitrate as NO3 by Ion Chromatography	All	CHEM
300.0		300.0 Sulfate by Ion Chromatography	All	CHEM
300.0		300.0 Chloride by Ion Chromatography	All	CHEM

Order No.: 658820 **Matrix:** WATER **Log Date:** 10/17/2005@15:15 **Due Date:** 10/24/2005
Client Smpl. ID: Sample 2 **Sampled:** 10/17/2005 **Status:** Logged

Method	Profile	Test Name	Analyte	Service Group
200.7		200.7 ICP Total Metals - Water Only	Calcium	AA/ICP
200.7			Copper	AA/ICP
200.7			Lead	AA/ICP
200.7			Magnesium	AA/ICP
200.7			Potassium	AA/ICP
200.7			Sodium	AA/ICP
245.1		245.1 Mercury in Water by Manual Cold	All	CHEM

Logged By: JIM

ASSOCIATED LABS RESULTS WORKSHEET FOR LAB REQUEST 158,450

Order #: 658819 **Client Smpl ID:** Sample 1 **Matrix:** WATER

Test #	Analyte	An. Date	Init.	DF	Result	DLR	Units
120.1	Conductivity					1.0	umhos/cm
150.1	pH						NA
1664	Non-Polar Oil and Grease					5	mg/L
1664	Total Oil and Grease					5	mg/L
300.0	Chloride					1.0	mg/L
300.0	Nitrate (as NO3)					0.44	mg/L
300.0	Sulfate					1.0	mg/L

Comments: _____

Order #: 658820 **Client Smpl ID:** Sample 2 **Matrix:** WATER

Test #	Analyte	An. Date	Init.	DF	Result	DLR	Units
245.1	Mercury					0.0004	mg/L

Comments: _____

DLR = Detection limit for reporting purposes. DF = Dilution factor. An. Date = Date of analysis. Init = Analyst initials

ASSOCIATED LABS RESULTS WORKSHEET FOR LAB REQUEST 158,450

Order #: 658820 **Client Smpl ID:** Sample 2 **Matrix:** WATER

Test #	Analyte	An. Date	Init.	DF	Result	DLR	Units
200.7	Calcium					0.10	mg/L
200.7	Copper					0.010	mg/L
200.7	Lead					0.005	mg/L
200.7	Magnesium					0.10	mg/L
200.7	Potassium					0.50	mg/L
200.7	Sodium					0.10	mg/L

Comments: _____

_____

DLR = Detection limit for reporting purposes. DF = Dilution factor. An. Date = Date of analysis. Init = Analyst initials

APPENDIX K

LISTING OF CALIFORNIA ELAP ACCREDITED ENVIRONMENTAL METHODS

Associated Laboratories

California DHS Accredited Tests

Back

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CALIFORNIA DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

ASSOCIATED LABORATORIES
Certificate No: 1338

Field of Testing: 01 - Microbiology of Drinking Water and Wastewater

01.01A	01	Total and Fecal Coliform	SM9221A,B,E
01.01B	01	Total Coliform and E. coli;	SM9221A,B,C/CFR 141 .21(f)(6)(i)
01.02A	01	Total and Fecal Coliform	SM9222A,B,C, 9221E
01.03	00	Total Coliform and E. coli	SM9223
01.03	02	Total Coliform and E. coli	Colisure
01.05	01	Heterotrophic Plate Count	SM9215B
01.06	01	Total Coliform	SM9221 B
01.07	01	Fecal Coliform	SM9221C,E
01.08	01	Total Coliform	SM9222B
01.09	01	Fecal Coliform	SM9222D
01.10	01	Fecal Streptococci/Enterococci	SM9230B
01.11	01	Fecal Streptococci/Enterococci	SM9230C
01.12	01	Total Coliform	SM9221A,B,C
01.13	00	Fecal Coliform	SM9221E
01.14	01	Total Coliform	SM9222A,B,C
01.15	01	Fecal Coliform	SM9222D

Field of Testing: 02 - Inorganic Chemistry and Physical Properties of Drinking Water

02.01	01	Alkalinity	SM2320B
02.02	01	Calcium	SM3500-Ca D
02.02	02	Calcium	SM3111B
02.02	03	Calcium	SM312OB
02.02	04	Calcium	EPA 200.7
02.03	02	Chloride	SM411OB
02.03	03	Chloride	EPA 300.0
02.05	03	Fluoride	SM4500-F C
02.05	04	Fluoride	SM41 Lob
02.05	05	Fluoride	EPA 300.0
02.06	02	Hardness	SM2340B
02.07	01	Magnesium	SM3111B
02.07	02	Magnesium	SM31 20B
02.07	03	Magnesium	EPA 200.7
02.08	01	MBAS	SM5540C
02.09	02	Nitrate	SM41 IOB
02.09	03	Nitrate	EPA 300.0
02.09	05	Nitrate	SM4500-N03 F
02.09	06	Nitrate	EPA 353.2
02.10	01	Nitrite	SM4500-N02 B
02.10	02	Nitrite	SM41 IOB
02.10	03	Nitrite	EPA 300.0
02.10	05	Nitrite	SM4500-N03 F
02.10	06	Nitrite	EPA 353.2
02.11	01	Sodium	SM3111B
02.11	02	Sodium	SM3126B
02.11	03	Sodium	EPA 200.7

02.12	01	Sulfate	SM411OB
02.12	02	Sulfate	EPA 300.0
02.12	03	Sulfate	SM4500-S04 C,D
02.I3A	01	Total Dissolved Solids	SM2540C
02.13B	01	Conductivity	SM251 OB
02.16	01	Phosphate, Ortho	SM4500-P E
02.17	01	Silica	SM4500-Si F
02.17	02	Silica	SM4500-Si D
02.17	03	Silica	SM4500-Si E
0217	05	Silica	EPA 200.7
02.18	01	Cyanide	SM4500-CN C, G
02.18	02	Cyanide	SM4500-CN C, E
0218	03	Cyanide	SM4500-CN C, EPA 335.4
02.19	01	Potassium	SM3111B
02.19	03	Potassium	SM31 20B
02.19	04	Potassium	EPA 200.7
02.20	01	Chlorate	EPA 300.0
02.21	01	Chlorite	EPA 300.0
02.22	01	Bromate	EPA 300.0
02.23	01	Bromide	EPA 300.0
02.24	01	Perchlorate	EPA 314.0
02.25	03	Combined & Total Chlorine	SM4500-Cl G
02.29	01	Total Organic Carbon	SM531OB
02.29	02	Total Organic Carbon	EPA 415.1
02.30	01	TOC/DOC	SM531 OB
02.31	01	UV254	SM591 OB
Field of Testing: 03 - Analysis of Toxic Chemical Elements in Drinking Water			
03.01	05	Arsenic	EPA 200.7
03.01	06	Arsenic	EPA 200.8
03.02	04	Barium	EPA 200.7
03.03	04	Cadmium	EPA 200.7
03.03	05	Cadmium	EPA 200.8
03.04	04	Chromium, Total	EPA 200.7
03.04	05	Chromium, Total	EPA 200.8
03.05	05	Copper	EPA 200.7
03.05	06	Copper	EPA 200.8
03.06	01	Iron	SM3111B
03.06	05	Iron	EPA 200.7
03.07	03	Lead	EPA 200.8
03.08	05	Manganese	EPA 200.7
03.08	06	Manganese	EPA 200.8
03.09	02	Mercury	EPA 245.1
03.09	04	Mercury	EPA 200.8
03.10	04	Selenium	EPA 200.8
03.11	05	Silver	EPA 200.7
03.11	06	Silver	EPA 200.8
03.12	03	Zinc	EPA 200.7
03.12	04	Zinc	EPA 200.8
03.13	05	Aluminum	EPA 200.7
03.13	06	Aluminum	EPA 200.8
03.15	03	Antimony	EPA 200.8
03.16	04	Beryllium	EPA 200.7
03.17	05	Nickel	EPA 200.7
03.17	06	Nickel	EPA 200.8
03.18	02	Thallium	EPA 200.8
03.19	01	Chromium (VI)	EPA 218.6

03.20	01	Boron	EPA 200.7
03.20	02	Boron	EPA 200.8
03.21	01	Vanadium	EPA 200.8
Field of Testing: 04 - Organic Chemistry of Drinking Water by GC/MS			
04.02A	01	Volatile Organic Compounds	EPA 524.2
04.02B	01	Unregulated Volatiles	EPA 524.2
04.020	01	Vinyl Chloride	EPA 524.2
04.02D	01	Trihalomethanes	EPA 524.2
04.02E	01	MTBE, DIPE, TAME, ETBE	EPA 524.2
04.02E	01	MTBE, DIPE, TAME, ETBE	EPA 524.2
04.02F	01	Freon 11 & 113	EPA 524.2
Field of Testing: 05 - Organic Chemistry of Drinking Water (excluding GC/MS)			
05.04A	01	Volatile Organic Compounds	EPA 502.2
05.04B	01	Unregulated Volatiles	EPA 502.2
05.04C	01	Vinyl Chloride	EPA 502.2
05.04D	01	Trihalomethanes	EPA 502.2
05.04E	01	MTBE, DIPE, TAME, ETBE	EPA 502.2
05.04F	01	Freon 11 & 113	EPA 502.2
05.06	01	EDB and DBCP	EPA 504.1
05.26	02	Haloacetic Acids	SM6251 B
Field of Testing: 06 - Radiochemistry			
06.01	01	Gross Alpha and Beta Radiation	EPA 900.0
06.02	01	Total Alpha Radium	EPA 903.0
06.11	01	Gross Alpha by Coprecipitation	EPA 00-02
Field of Testing: 08 - Aquatic Toxicity Bioassays			
08.03.01		Fathead Minnow (P. promelas)	EPA 600/4-85/013, Static
08.18.01		Fathead Minnow (P promelas)	EPA 600/4-90/027F, Static
Field of Testing: 09 - Physical Properties Testing of Hazardous Waste			
0901	01	Ignitability	EPA 1010
09.02	01	Corrosivity - pH Determination	EPA 9040B
09.02	02	Corrosivity - pH Determination	EPA 9045C
09.03	01	Corrosivity - towards Steel	EPA 1110
09.04	00	Reactivity	Section 7.3 SW-846
Field of Testing: 10 - Inorganic Chemistry and Toxic Chemical Elements of Hazardous Waste			
10.01	04	Antimony	EPA 6010B
10.01	05	Antimony	EPA 6020
10.02	04	Arsenic	EPA 6OlOB
10.02	05	Arsenic	EPA 6020
10.03	03	Barium	EPA 6010B
10.03	04	Barium	EPA 6020
10.04	03	Beryllium	EPA 6010B
10.04	04	Beryllium	EPA 6020
10.05	03	Cadmium	EPA 6010B
10.05	04	Cadmium	EPA 6020
10.06	03	Chromium, Total	EPA 6010B
10.06	04	Chromium, Total	EPA 6020
10.07	03	Cobalt	EPA 6010B
10.07	04	Cobalt	EPA 6020
10.08	03	Copper	EPA 6010B
10.08	04	Copper	EPA 6020
10.09	01	Lead	EPA 7420
10.09	03	Lead	EPA 6010B
10.09	04	Lead	EPA 6020
10.10	01	Mercury	EPA 7470A
10.10	02	Mercury	EPA 7471A
10.11	03	Molybdenum	EPA 6010B

10.11	04	Molybdenum	EPA 6020
10.12	03	Nickel	EPA 6010B
10.12	04	Nickel	EPA 6020
10.13	04	Selenium	EPA 6010B
1013	05	Selenium	EPA 6020
10.14	03	Silver	EPA 6010B
10.14	04	Silver	EPA 6020
10.15	03	Thallium	EPA 6010B
10.15	04	Thallium	EPA 6020
10.16	03	Vanadium	EPA 6010B
10.16	04	Vanadium	EPA 6020
10.17	03	Zinc	EPA 6010B
10.17	04	Zinc	EPA 6020
10.18	02	Chromium (VI)	EPA 7196A
10.19	01	Cyanide	EPA 9012A
10.20	02	Fluoride	EPA 9214
10.21	01	Sulfide	EPA 9034
Field of Testing: 108 - Inorganic Chemistry of Wastewater			
108.120	001	Bromide	EPA 300.0
108.120	002	Chloride	EPA 300.0
108.120	003	Fluoride	EPA 300.0
108.120	004	Nitrate	EPA 300.0
108.120	005	Nitrite	EPA 300.0
108.120	006	Nitrate-nitrite, Total	EPA 300.0
108.120	008	Sulfate	EPA 300.0
Field of Testing: 11 - Extraction Tests of Hazardous Waste			
11.01	01	Waste Extraction Test (WET)	CCR Chapterl 11, Article 5, Appendix
11.03	01	Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311
Field of Testing: 12 - Organic Chemistry of Hazardous Waste by GC/MS			
12.03A	01	Extractable Organics	EPA 8270C
12.036	01	PCBs	EPA 8270C
12.030	01	Chlorinated Pesticides	EPA 8270C
12.06A	01	Volatile Organic Compounds	EPA 8260B
12.066	01	Oxygenates	EPA 8260B
I2.07A	01	Total Petroleum Hydrocarbons-Gasoline	LUFT
Field of Testing: 13 - Organic Chemistry of Hazardous Waste (excluding GC/MS)			
13.02	01	Nonhalogenated Volatiles	EPA 8015B
13.11	01	Organophosphorus Pesticides	EPA 8141A
13.120	01	Chlorinated Herbicides	EPA 8151A
13.13	01	Polynuclear Aromatic Hydrocarbons	EPA 8310
13.16	01	Total Petroleum Hydrocarbons - Diesel	LUFT
13.17	01	TRPH Screening	EPA 418.1
13.18	01	EDB and DBCP	EPA8O11
13.19A	01	Halogenated Volatiles	EPA 8021B
13.196	01	Aromatic Volatiles	EPA 8021B
13.190	01	BTEX	EPA 8021B
13.240	01	PCBs	EPA 8082
13.250	01	Organochlorine Pesticides	EPA 8081A
Field of Testing: 16 - Wastewater Inorganic Chemistry, Nutrients and Demand			
16.01	01	Acidity	SM231OB (4a)
16.02	01	Alkalinity	SM2320B
16.03	01	Ammonia	SM4500-NH3 B,C
16.03	03	Ammonia	SM4500-NH3 B,E
16.03	04	Ammonia	EPA 350.2
16.03	07	Ammonia	SM4500-NH3 B,H

16.03	08	Ammonia	EPA 350.1
16.04	01	Biochemical Oxygen Demand	SM521OB
16.04	02	Biochemical Oxygen Demand	EPA 405.1
16.07	01	Calcium	SM3111B
16.07	02	Calcium	EPA 215.1
16.07	03	Calcium	SM31 20B
16.07	04	Calcium	EPA 200.7
16.07	05	Calcium	SM3500-Ca D
16.07	06	Calcium	EPA 215.2
16.08	01	Carbonaceous BOD	SM5216B
16.09	01	Chemical Oxygen Demand	SM52200
16.09	02	Chemical Oxygen Demand	EPA 410.1
16.09	03	Chemical Oxygen Demand	EPA 410.2
16.09	04	Chemical Oxygen Demand	EPA 410.3
16.09	05	Chemical Oxygen Demand	EPA 410.4
16.09	06	Chemical Oxygen Demand	SM5220D
16.11	01	Chlorine Residual, Total	SM4500-Cl D
16.11	10	Chlorine Residual, Total	EPA 330.5
16.12	01	Cyanide	SM4500-CN C,D
16.12	02	Cyanide	SM4500-CN C,E
16.12	03	Cyanide	EPA 335.2
16.13	01	Cyanide, amenable	SM4500-CN C,G
16.13	02	Cyanide, amenable	EPA 335.1
16.14	01	Fluoride	SM4500-F B,C
16.14	02	Fluoride	EPA 340.2
16.15	01	Hardness-Total as CaCO3	SM23400
16.15	03	Hardness - Total as CaCO3	EPA 130.2
16.15	04	Hardness -Total as CaCO3	SM312OB
16.15	05	Hardness -Total as CaCO3	EPA 200.7
16.16	01	Kjeldahl Nitrogen	SM4500-NH3 B,C,E
16.16	02	Kjeldahl Nitrogen	EPA 351.3
16.16	08	kjeldahl Nitrogen	EPA 351.2
16.17	01	Magnesium	SM3111B
16.17	02	Magnesium	EPA 242.1
16.17	03	Magnesium	SM31 20B
16.17	04	Magnesium	EPA 200.7
16.18	04	Nitrate	SM4500-NO3 F
16.18	05	Nitrate	EPA 353.2
16.20	01	Oil and Grease	SM5520B
16.20	03	Oil and Grease	EPA 1664
16.21	01	Total Organic Carbon	SM531OB, C, D
16.21	02	Total Organic Carbon	EPA 415.1
16.22	01	Oxygen,dissolved	SM4500-O C
16.22	02	Oxygen,dissolved	EPA 360.2
16.22	03	Oxygen,dissolved	SM4500-O G
16.22	04	Oxygen,dissolved	EPA 360A
16.23	01	pH	SM4500-H+ B
16.23	02	pH	EPA 150.1
16.24	01	Phenols	EPA 420.1
16.25	02	Phosphate, Ortho	SM4500-P E
16.25	03	Phosphate, Ortho	EPA 365.2
16.26	02	Phosphorus, Total	SM4500-P B5, E
16.26	03	Phosphorus, Total	EPA 365.2
16.27	01	Potassium	SM3111B
16.27	02	Potassium	EPA 258.1
16.27	03	Potassium	SM31 20B

16.27	04	Potassium	EPA 200.7
16.28	01	Residue, Total	SM2540B
16.28	02	Residue, Total	EPA 160.3
16.29	01	Residue, Filterable	SM2540C
16.29	02	Residue, Filterable	EPA 160.1
16.30	01	Residue, Non-filterable	SM2540D
16.30	02	Residue, Non-filterable	EPA 160.2
16.31	01	Residue, Settleable	SM2540F
16.31	02	Residue, Settleable	EPA 160.5
16.32	01	Residue, Volatile	EPA 160.4
16.33	01	Silica, Dissolved	SM4500-Si D
16.33	02	Silica, Dissolved	EPA 370.1
16.33	03	Silica, Dissolved	SM312OB
16.33	04	Silica, Dissolved	EPA 200.7
16.34	01	Sodium	SM3111B
16.34	02	Sodium	EPA 273.1
16.34	03	Sodium	SM31 20B
16.34	04	Sodium	EPA 200.7
16.35	01	Conductivity	SM251 OB
16.35	02	Conductivity	EPA 120.1
16.36	02	Sulfate	SM4500-S04 C,D
16.36	03	Sulfate	EPA 375.3
16.37	01	Sulfide	SM4500-S= E
16.37	02	Sulfide	EPA 376.1
16.37	03	Sulfide	SM4500-S= D
16.37	04	Sulfide	EPA 376.2
16.39	01	Surfactants	SM5540C
16.39	02	Surfactants	EPA 425.1
16.41	01	Turbidity	SM21 30B
16.41	02	Turbidity	EPA 180.1
16.44	01	Total Recoverable Petroleum Hydrocarbons	EPA 41 8.1
16.45	01	Total Organic Halides	SM5320B
Field of Testing: 17 - Toxic Chemical Elements in Wastewater			
17.01	05	Aluminum	EPA 200.7
17.02	05	Antimony	EPA 200.7
17.03	07	Arsenic	EPA 200.7
17.03	10	Arsenic	EPA 200.8
17.04	06	Barium	EPA 200.7
17.04	07	Barium	EPA 200.8
17.05	06	Beryllium	EPA 200.7
17.05	08	Beryllium	EPA 200.8
17.06	07	Cadmium	EPA 200.7
17.06	09	Cadmium	EPA 200.8
17.07	03	Chromium (VI)	SM3500-Cr D
17.08	08	Chromium, Total	EPA 200.7
17 08	10	Chromium, Total	EPA 200.8
17.09	07	Cobalt	EPA 200.7
17.09	08	Cobalt	EPA 200.8
1710	07	Copper	EPA 200.7
1710	09	Copper	EPA 200.8
1711	01	Gold	SM3111B
1711	02	Gold	EPA 231.1
17.13	01	Iron	SM3111B
17.13	07	Iron	EPA 200.7
17.14	01	Lead	SM3111B
17.14	07	Lead	EPA 200.7

17.14	09	Lead	EPA 200.8
17.15	06	Manganese	EPA 200.7
1715	08	Manganese	EPA 200.8
17.16	02	Mercury	EPA 245.1
17.16	05	Mercury	EPA 200.8
1717	06	Molybdenum	EPA 200.7
17 17	07	Molybdenum	EPA 200.8
17.18	07	Nickel	EPA 200.7
17.18	09	Nickel	EPA 200.8
17.24	04	Selenium	EPA 200.7
17.24	06	Selenium	EPA 200.8
17.25	07	Silver	EPA 200.7
1725	08	Silver	EPA 200.8
17.27	05	Thallium	EPA 200.7
17.27	06	Thallium	EPA 200.8
17.28	05	Tin	EPA 200.7
17.30	05	Vanadium	EPA 200.7
17.30	06	Vanadium	EPA 200.8
17.31	06	Zinc	EPA 200.7
17.31	08	Zinc	EPA 200.8

Field of Testing: 18 - Organic Chemistry of Wastewater by

18.01	01	All Volatile Organics	EPA 624
18.02	01	All Acid/base/neutral Compounds	EPA 625
18.020	01	Polynuclear Aromatic Hydrocarbons	EPA 625
18.02D	01	Adipates	EPA 625
18.02E	01	Phthalates	EPA 625
18.02F	01	Herbicides	EPA 625
18.02G	01	Other Extractables	EPA 625

Field of Testing: 19 - Organic Chemistry of Wastewater (excluding GC/MS)

19.01	01	Halogenated Volatiles	EPA 601
19.02	01	Aromatic Volatiles	EPA6O2
19.08	01	PCBs and Organochlorine Pesticides	EPA 608
19.08B	01	PCBs	EPA 608
19.10	01	PolynuclearAromatics	EPA 610
19.15	01	Chlorophenoxy Herbicides	SM6640B
19.16	01	Organochlorine Pesticides	EPA 608

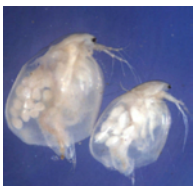
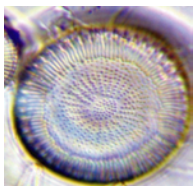
As of 04/11/2003, this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

APPENDIX B: PERIPHYTON TAXONOMY QUALITY ASSURANCE PROJECT PLAN EcoAnalysts

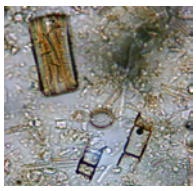
EcoAnalysts

Periphyton Taxonomy Quality Assurance Project Plan

105 E. 2nd Street, Suite #1
Moscow, ID 83843
(208) 882-2588 Ph
(208) 883-4288 Fx





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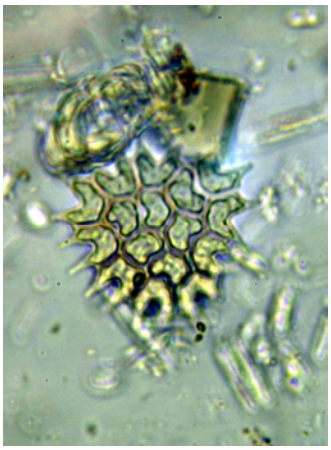
Quality Assurance (QA) of Taxonomic Identifications

This series of steps represents a proven method to help ensure the accuracy of our taxonomy.

- High quality digital images are taken of each taxon encountered in the project. This is one of the best voucher systems for permanently archiving soft algae specimens. These images include taxa names, photographer/taxonomist name, date, and project ID number.
- Diatom slides are archived in slide boxes with the project name.
- A minimum of 10% of all samples will be analyzed by an independent phycologist to ensure taxonomic accuracy and reproducibility of the processing and analysis methods.
- Taxonomists meet via phone conference to discuss any discrepancies. In some cases it is necessary to re-examine the digital images and/or specimens to resolve discrepancies.
- The final data are adjusted according to the recommendations of both taxonomists.

QA Methods

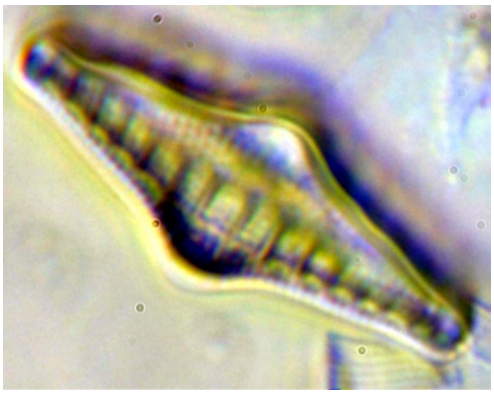
- Soft-bodied algae and diatom proportional counts will be subject to the following criteria:
    - The common algae identified by both taxonomists should match.
    - Diatom taxa accounting for more than 10% relative abundance should be identified similarly by both taxonomists (synonyms are acceptable).
    - The percent community similarity index calculated from the two diatom counts will meet established criteria.



- If any of these criteria are not met, the sample will be re-analyzed and any discrepancies will be resolved.
- A quality control report describing results and corrective steps taken, if necessary, will be provided concurrently with data delivery.

Vouchering

- Each microscope slide will be labeled with all information necessary for the identification of the sample, including water body name, site identification number, and sampling date.
- Samples will be placed into slide boxes in an orderly fashion and shipped to you upon completion of the project.



Data Management and Reporting

- Data are entered into a custom-built taxonomy counting program which creates an electronic file for each project.
- Since the counting program automatically tallies the number of cells for each taxon, no handwritten bench sheets are required – this entirely eliminates the potential for transcription error. We can print an electronic benchsheet on demand if the Commission requests such during any point in the contract period.
- Sample identifier information is entered, followed by the taxa and counts and notes.
- After all samples in the project are identified, the data are formatted in the output specified by the client.
- A CD of taxa photographs will be compiled.
- Any remaining sample materials are retained until final disposition is determined by the client, thereby always being available for additional QC.