

Soil Control Lab
Quality Assurance Plan

December 1, 2010

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Laboratory Director:

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I. Purpose & Objectives

A. Purpose

This document describes the quality assurance program that has been designed to define the quality assurance goals and the methods for attaining these goals.

B. Quality Assurance Policy Objectives

1. Maintain data integrity, validity, and usability. Data Quality Objectives (DQO) are quantitative and qualitative statements describing the quality of the data required to be usable for the client.
 - a. The DQO process facilitates the determination of:
 - (1) Information and data requirements for the specified project.
 - (2) Where, when, and how to collect samples to allow the most precise measurements as possible.
 - (3) Field and Laboratory Quality Assurance/Quality Control required to defend the data quality.
 - (4) Required number of observations.
 - b. The DQOs are usually expressed in terms of:
 - (1) Precision.
 - (a) Measures the reproducibility of measurements under a given set of conditions.
 - (b) Is a quantitative measure of the variability of a group of measurements on the same parameter compared to their average value.
 - (c) Is usually stated in terms of standard deviation but other estimates such as the coefficient of variation (relative standard deviation), relative percent difference, range (maximum value, minimum value) and relative range can be used.
 - (2) Accuracy.
 - (a) Measures the bias in a measurement system.
 - (b) Is difficult to measure for the entire data collection activity; sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and chemical analytical techniques.
 - (c) May be assessed through the use of blanks, standard reference materials (SRMs), and matrix spikes.
 - (3) Representativeness.

- (a) The degree to which data accurately represent a particular characteristic of a population or environmental parameter.
 - (b) A qualitative parameter that is most concerned with the proper design of the sampling program.
 - (c) The criterion is best satisfied by making certain that sampling locations are selected properly and a sufficient number of samples are collected.
- (4) Comparability.
- (a) The measure of the confidence in comparing results in one experiment with the results of the same experiment on different samples.
 - (b) Sample data are comparable with other measurement data for similar samples and sample conditions.
 - (c) Standard techniques are used to collect and analyze representative samples and to report analytical results in appropriate units.
 - (d) Comparability is limited to the other above parameters because only when precision and accuracy are known can data sets be compared with confidence.
- c. The above are the attributes of the data that make them suitable for reiterating into the decision making and planning process. These provide defensible data for litigation or as to professional credibility. DQOs are not only attainable by the chosen methods of sampling, sample preparation, and analysis. These show the minimum data quality for project management to draw valid conclusions based on the objectives of the test program. These also support specific decisions or regulatory actions.
2. Ensure that analytical measurement systems are maintained in an acceptable state of stability and reproducibility. All analytical instruments and equipment are checked and calibrated by the analyst each time the instrument or equipment is used. In addition, the instrument or equipment is rechecked and recalibrated depending on the usage either on a time basis or sample basis according to the Standard Operating Procedures (SOPs). Besides daily checks, a schedule of preventive maintenance is kept to reduce the likelihood of total failures. Instrument calibration and precision statistical records are kept to insure stability and reproducibility.
 3. Detect problems through data assessment and establish corrective action procedures that keep the analytical process reliable. Data reporting procedures start at the laboratory bench level. The review of the final data package report is done by the QA Officer and Laboratory Director. Specific items are within quality

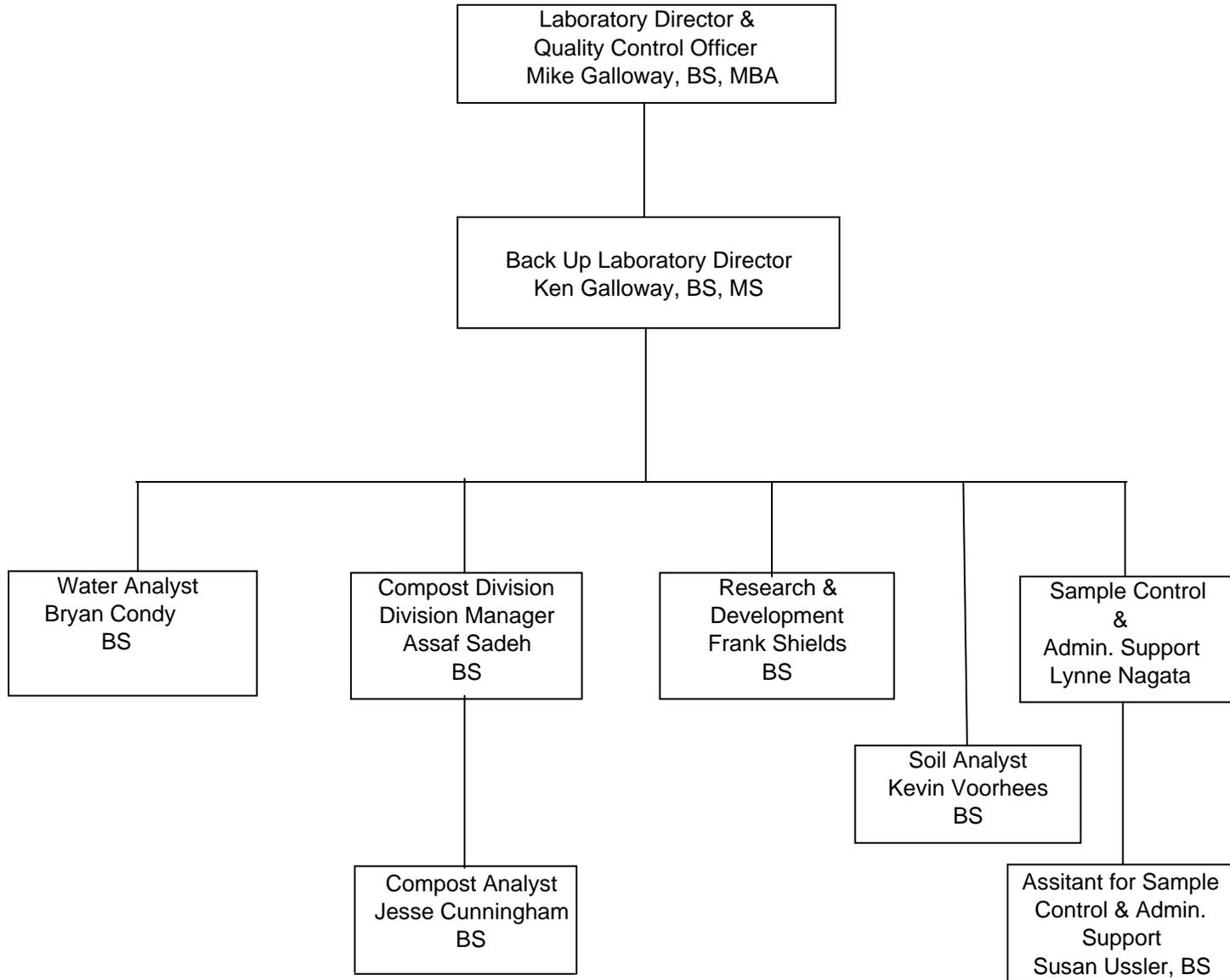
- assurance limits at each step of the process. A corresponding set of corrective actions exist that prescribe a solution or call for corrective actions at each level of data validation.
4. Document all aspects of the measurement process to provide data that are technically sound and legally defensible. All analytical tests provided by Soil Lab are designed to conform to the latest approved procedures.
 - a. The major sources for these analytical procedures when regulated are:
 - (1) Environment Protection Agency - EPA
 - (2) Occupational Safety and Health Act - OSHA
 - (3) Food and Drug Administration - FDA
 - (4) American Water Works Association - AWWA
 - (5) Standard Methods for the Examination of Water and Wastewater
 - b. Other sources for analytical procedures where no regulatory agency exists are:
 - (1) American Society for Testing and Materials - ASTM
 - (2) Association of Official Analytical Chemists – AOAC
 - (3) Western States Laboratory Proficiency Testing Program –Soil and Plant Analytical Methods 1997, Version 4.00

II. Organization and Personnel

A. Organization

1. See Organization Chart next page.

Soil Lab - Organizational Chart



2. Assignment of Quality Control and Quality Assurance Responsibilities
 - a. Laboratory Director
 - (1) Supervising and administering the general operations of Soil Lab, including administrative assistance, business office, sample acquisition, and all analytical divisions.
 - (2) Supervising and administering the quality assurance program and providing an environment, in which quality work is produced.
 - (3) Ensuring that all general and client-specific quality assurance requirements are strictly followed.
 - (4) Resolving the approval/rejection of deliverable client sample data package reports.
 - b. Quality Assurance Officer (QA Officer) – Currently the Lab Director is also filling this role.
 - (1) Reports to and is responsible directly to the Laboratory Director for all matters on laboratory quality assurance.
 - (2) Responsible for implementation and monitoring of the laboratory quality assurance program.
 - (3) Ensuring that all data generated is scientifically sound, legally defensible, and of known precision and accuracy.
 - (4) Monitoring the QA plan on a periodic basis to ensure compliance with the QA objectives of the laboratory.
 - (5) Developing and implementing new QA procedures within the corporation to improve data quality.
 - (6) Conducting audits and inspections of all division sections on a periodic basis; reporting the results of the audits to the Laboratory Director; and implementation of corrective actions to ensure compliance with the QA plan.
 - (7) Coordinating the analysis of performance evaluation (PE) samples for all analytical divisions on a periodic basis. Evaluating the results; reporting the results to the Laboratory Director and appropriate analysts; and applying corrective actions as needed.
 - (8) Establishing and maintaining statistical and data records that accurately reflect the quality assurance performance of all analytical divisions.
 - (9) Maintaining and overseeing the master sources of all SOPs and completed/full laboratory notebooks.
 - (10) Establishing and monitoring the corrective actions for the resolution of out-of-control events with the analysts and the Laboratory Director.
 - (11) Serving as the in-house client representative on all project inquiries involving data quality issues.

- (12) Preparing QA project plans when required.
 - (13) Assisting analysts in the writing of SOPs.
 - (14) Maintaining records and archives of all QA data, results, audit comments, and customer inquiries concerning data quality.
- c. Sample Acquisition
- (1) Sample Control Manager
 - The Sample Control Manager is responsible for overseeing sample log-in, proper documentation, sample tracking, and initial sample storage. Sample Control Manager also has primary responsibility for client contact, price quotations, prepares all data recording sheets and project tracking sheets, and distributes packages of this information to each applicable analyst.
- d. Analysts
- (1) Understand, assist, and support the implementation of the quality assurance plan.
 - (2) Have working knowledge of all pertinent SOPs relating to the responsibilities of the division.
 - (3) Assist in maintaining SOPs to the current state of the art methods and responsible for insuring that SOPs accurately reflect the actual bench procedures.
 - (4) Assist in maintaining a work environment that emphasizes intelligent and responsible approaches to producing high data quality and accuracy according to the standard laboratory procedures.
 - (5) Maintain specific quality assurance records and perform data validation procedures as described in the SOPs at the division level.
 - (6) Provide the QA Officer and/or the Laboratory Director with immediate notification of quality assurance problems that cannot be rectified by the SOP corrective action procedures.

B. Personnel Training Program

1. Certification of Operator Competence

Before analysts are permitted to do any reportable work, they must first show an understanding of Soil Lab's QA plan. Then they must qualify for each test that they will be responsible for running by demonstrating competence for each individual analysis. Make a minimum of four replicate analyses of an independently prepared check sample having a concentration between 5 and 50 times the method detection limit for the analysis. General limits for acceptable work are shown in the table below; certain methods may specify more stringent limits.

Recovery of Known Additions ¹ %	Precision of Low-Level Duplicates ^{1,2} ± %	Precision of High-Level Duplicates ^{1,2,3} ± %
80 - 120	25	10

1- Additions calculated as % of the known addition recovered, duplicates calculated as the relative percent difference ($100 \cdot (x_1 - x_2) / ((x_1 + x_2) / 2)$)

2- Low-level refers to concentrations less than 20 times the MDL. High-level refers to concentrations greater than 20 times the MDL.

3- Also acceptance limits for independent laboratory control standards and certification of operator competence.

III. Facilities and Equipment

A. Security Systems:

1. The facilities have one main entrance which remains unlocked during business hours. This entrance is monitored by Soil Lab and/or ToxScan lab personnel during business hours. All visitors, guests, and other non-laboratory personnel are escorted within the facilities always. All health and safety precautions are explained and required for these personnel. This entrance and all other entrances are locked after business hours.
2. There are many other doors in the facilities for emergency purposes. These entrance/exits are locked from outside entrance, but allow for an emergency exit from within the building without restriction.
3. During the non-business hours, the building is secured by an alarm system that is connected to enforcement and emergency agencies.

B. Material Procurement and Control

1. Equipment Management
 - a. Information on the actual performance of the equipment is obtained before purchase request for a piece of equipment is made.
 - b. The availability of the supplier's service to install and test it against specifications as part of purchase price is also considered.
 - c. When first installed, an internal calibration of the instrument is performed using the manufacturer's manual.
 - d. Analytical reference standards are analyzed for qualitative and quantitative checks on the instrument performance during the sample run.
 - e. Routine preventive maintenance of the instruments/or equipment is done on a regular scheduled basis.
2. List of Instrumentation
 - a. A list of instrumentation is found in Appendix A, Laboratory Equipment List.
3. Preventative Maintenance Activities and Schedules
 - a. Instruments are maintained according to the Standard Operating Procedures using the manufacturer documentation. Repairs are conducted as needed, either by manufacturer representatives or by in-house personnel. Routine maintenance (lamp replacement, etc.) is conducted as needed to maintain instrument integrity.
 - b. Each Standard Operating Procedure that uses equipment describes setup, maintenance, and service of the equipment required for the analytical test. SOPs may refer to other SOPs that deal specifically with all aspects of some particular type of equipment.
 - c. Critical equipment and instrumentation are maintained on a scheduled basis to minimize the downtime of measurement systems.
 - d. Maintenance log books are kept for all pieces of equipment. The log books must contain at a minimum: title page with equipment name manufacture, date of acquisition, serial number, and reference to manuals provided with the equipment. Each entry must contain at a minimum: date, initials of person doing maintenance, and description of action taken.
4. Supplies Management
 - a. Materials, reagents, standards, solvent, and gases are carefully selected to meet specifications defined in the method analyses.
 - b. Each new supply of these items is verified for its performance capabilities, freedom from impurities that interfere with the analysis, and background levels measured to check the degree of contamination.
 - (1) Primary standards are obtained from a reliable, certifiable source, and of

- highest purity.
- (2) Analytical standards used for instrument/methodological calibration and preparation of QC samples are traceable to EPA standards and/or standard reference materials.
- c. Materials are dated upon receipt to establish their order of use, "as first in, first out basis," and to minimize the possibility of exceeding their shelf-life.
 - (1) Pertinent information such as name of supplier, lot number, expiration date, concentration, date opened, and date of preparation documented in the standard preparation logbook.
 - (2) Stock and working standards solutions are prepared fresh as often as required by their stability. These are checked for signs of deterioration (e.g., formation of precipitates, discoloration, and changes of concentration through calibration results).
 - (3) Standard solutions are properly labeled as to name of solution, concentration, solvent, date of preparation, and preparer. Standard preparation is documented in the standard preparation logbook.
- d. These items are stored in places where these are protected from degradation and contamination.
 - (1) Acids and bases are segregated in terms of storage.
 - (2) Various types of solvent are stored in flammable storage cabinets.
 - (3) Dry chemicals used are stored in the chemical storage cabinet.
- e. Services such as electricity, water, air, gas, and vacuum are checked for proper specifications for efficient and reliable performance of the instruments.
- 5. Waste Disposal
 - a. Laboratory generated wastes are classified into various waste streams and are disposed according to the local, state, and federal regulations.

IV. Sample Handling Practices and Chain-of-Custody (COC)

A. Sample Collection

1. Soil Lab does not have in-house capabilities of sample collection. Sampling is done by outside contractors and mostly by clients.

B. Sample Preparation

1. For most commercial clients, Soil Lab prepares all sample containers.
2. Sample preparation and analyses follow the specified method requested for analysis.
 - a. Specific QA/QC criteria for the QC samples such method blanks, matrix spike/matrix spike duplicate, duplicate, laboratory control sample, field blank, etc. are defined in the method used for analysis and/or the project QA/QC requirement. (See Analysis of QC Samples and Documentation for details.)
 - b. Analyses performed by the Soil Lab are listed in Appendix C, Laboratory Analysis and Method Detection Limit List.

C. Sample Tracking

1. Samples received at Soil Lab are considered physical evidence and are handled according to the procedural safeguards established by EPA.
2. Sample Verification and Log-in
 - a. A sample custodian receives a sample shipment or delivery. An alternate person is designated to receive samples if the sample custodian is not available.
 - b. When opening a container for which we are not familiar with what it's contents will be (i.e. non-routine samples), the shipping container is opened under an approved fume hood.
 - c. The temperature inside the container as well as the condition of the shipping container and the samples received is noted on the COC and/or the sample worksheet.
 - d. The condition of custody seals on the shipping container and the samples is noted on the COC and/or the sample worksheet.
 - e. Sample labels are compared to the COC to verify agreement regarding sample identification, sample matrix, sampling date, container type and sample preservation. Any discrepancies between sample labels and the COC are noted on the COC and/or the sample worksheet.

- f. Each sample container is stored in an appropriate storage area.
 - g. If required by a specific client/project an internal COC can be generated to track the storage location for individual sample bottles.
 - h. The COC accompanying the samples is signed and dated.
 - i. If a COC is necessary and the samples are received without a COC, a Soil Lab COC is generated.
 - j. If samples are found to be out of hold time the client should be notified immediately and advised that, if run, the results will not be considered valid for regulatory purposes. This conversation should be noted on the COC and in the comments section for the work order in the LIMS. If results are issued for analytes run out of hold time the data will be flagged to identify they were analyzed beyond hold time.
 - k. If any discrepancies are found during sample log-in:
 - (1) The client is notified either by telephone or in writing (or directly if they are personally delivering the sample).
 - (2) A decision is made between Soil Lab and the client regarding the sample(s) which have exceeded Quality Control limits whether to analyze the samples or return/or discard the samples.
 - (3) If the above actions do not correct the out-of-control situation, the sample control personnel informs the analyst, QA Officer, or Laboratory Director.
 - (4) Following are some common examples:
 - Missing samples.
 - Samples are received which are not listed on the COC.
 - Broken sample containers.
 - Leaking samples.
 - Contaminated samples.
 - Improperly preserved samples.
 - Samples whose holding times are expired or will expire before the initiation of analysis
 - Discrepancies exist between sample labels and COC designations.
 - l. All the information for the work order is entered into the Laboratory Information Management System (LIMS). Information includes: Client, project, sample IDs, date/time of collection, analyses needed, detection limits, due dates, and necessary QA/QC.
3. Sample Labeling
- a. To maintain sample identity, a Soil Lab laboratory number; "sample-number", is assigned to the sample set and recorded on all documents received with the samples.

- b. This unique identifier is affixed to the sample container on a sample label and is recorded on the COC.
4. Chain-of-Custody (COC)
 - a. Chain-of-custody procedures are used for a variety of samples in the laboratory. The purpose is to establish a detailed legal documentation of all transactions in which the samples are transferred from the custody of one individual to another. These procedures are used from the point at which the samples are collected. These include the opening of the sample in the laboratory and samples brought by couriers.
 - b. A COC form documents sampling efforts and sample transfer from the field to a testing facility or between testing facilities. A COC may be presented in various formats but must include at minimum:
 - Client name.
 - Sampler name(s).
 - Project identification.
 - Sample identification(s).
 - Sampling date(s).
 - Sample container description(s)/Sample Matrix.
 - Analysis(es) requested.
 - Signatures of personnel relinquishing the samples.
 - Date/time of transfers between facilities/sites
 - c. If a COC is necessary, a COC form provided by Soil Lab is used for a set of samples received without a client's COC or equivalent form. It is used to document any sampling and analysis information contained on the sample label or as provided via FAX, telephone, or mail by the client.
 - d. If samples need to be sent out to a subcontractor, a photocopy of the original COC is made to accompany samples delivered outside the laboratory.
5. The traceability of the samples that are transferred to or from the laboratory is tracked by the use of Soil Lab laboratory number and client sample identification. These are monitored from the point of acquisition by the laboratory through the sample preparation, analysis, data reduction, data validation, final report generation, and sample disposal.

D. Sample Storage

1. Samples received in the laboratory are either stored in a designated section of the lab bench or in the appropriate refrigerated storage area which is restricted to authorized laboratory personnel. Soils should be turned over to the soil

- technician the same day they are received so that they can be dried before leaving overnight.
2. The temperatures of the refrigerated storage appliances are monitored for acceptable temperature ranges.
 - a. Acceptable refrigerator temperature range is $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$.
 - b. Acceptable freezer temperature range is $-20^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
 - c. Temperature of the sample storage appliances is monitored daily for acceptable working temperature range.
 - d. Temperature of the storage appliance is calibrated with NIST traceable thermometer quarterly. The SOP for Thermometer Calibration describes the calibration of thermometers.
 - (1) Electronic thermometers are rechecked annually to confirm the stability of the calibration.
 - (2) Non-electronic thermometers are calibrated at least annually.
 - e. Corrective actions are taken if the refrigerated storage appliances malfunction or temperature is out of acceptable range.

E. Sample Disposal

1. Unused and remaining portions of the samples received in the laboratory are kept for a period that is determined to be appropriate by the analyst.
2. Samples are archived by the laboratory at the request of the client for a certain period until instructed for sample disposal or are returned to the client.
3. Laboratory sample disposal is in accordance with the local, state, and federal regulations.

F. Sample Containers and Labware Preparation

1. To ensure sample integrity, steps are taken to minimize contamination from the containers they are stored in and through the glassware or labware used during sample analysis. If the analyte(s) to be determined is organic in nature, the preferred container is glass. If the analyte(s) is inorganic, then the container is plastic or polyethylene (an exception is mercury, for trace level analysis of mercury the container needs to be glass).
2. Sample containers supplied to the clients are commercially obtained as precleaned containers.
 - a. The laboratory provides chemical preservation in sample containers for clients requesting containers ahead of time before collection.

V. Document Control

A. Laboratory Notebook Policy

1. General Guidelines
 - a. Legibility: All entries must be legible. Printing is preferable, but writing is acceptable for all characters, including notes.
 - b. Recording Entries: All entries are made using indelible ink pens.
 - c. Review all forms before entering information.
 - d. Initialing and Entry: The originator(s) of all entries must be identified by initial(s) or signature(s). In most cases, there are specific places on the data sheet for initials to identify the originator of entries or groups of entries.
 - e. No-Data Entries: All blanks with no data must contain a diagonal line or "Z" out and initialed.
 - f. Abbreviations: The use of abbreviations is kept to a minimum. Only nationally accepted abbreviations (e.g., mph, ft, min, $\mu\text{g}/\text{kg}$) and chemical formula abbreviations (e.g., NaOH, HCl, LC50) may be used without further clarification. Other abbreviations can be used providing the abbreviation can be traced to the corresponding abbreviation explanation.
2. Data Corrections
 - a. All mistakes are corrected at the time the error is discovered.
 - b. Errors: Cross out with a single line so as to remain legible. **Do not** erase, write over, or use correction material. Each cross out will be initialed and dated. If the reason for the change is not obvious, then the reason must be stated. **Note:** If there is insufficient space for all or part of the correction information, enter a footnote call out near the incorrect data and enter the required information as a comment elsewhere on the data sheet, notebook page, etc.
 - c. If an entry is supposed to be recorded, but was not, enter "-E" in the appropriate space, initial, and footnote. Explain why no information has been collected (e.g. instrument broken) in the footnote.
3. Laboratory Notebooks
 - a. The cover of each notebook is identified with subject identification (instrument, analyst, procedure, etc.).
 - b. Project documentation is entered clearly, legibly and in sufficient detail as to permit repeating of the work by someone other than the person(s) originally performing the activity.
 - c. Each entry must be dated by the month, day and year in which the data were recorded and signed by the person(s) performing the work or entering the

preparation and validation. These are treated as above concerning replacement, archiving, and audits.

VI. Analytical Methodology

A. Precision and Accuracy

1. Because of the nature of environmental measurements, it is frequently difficult or impossible to determine a "true" value of a measurement parameter. The accuracy of the measured value is inferred through the use of QC samples of known composition.
2. Precision, accuracy, and completeness are calculated following the equations presented below. The results are reported in QC tables with the final reported results. When the client requests QC data, a blank, duplicate, spike, and a standard reference material are analyzed for each set of samples for precision and accuracy data. The exact quality and quantity of the QC samples are determined by the project or client.
3. Precision: A measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision can be expressed in terms of the relative percent difference (RPD), relative standard deviation (RSD) and/or standard deviation.
4. Analytical Precision: Measured by replicate analyses of individual samples. If calculated from two replicates, use RPD.

$$RPD = \frac{(C_1 - C_2)}{\left[\frac{(C_1 + C_2)}{2} \right]} \times 100$$

Where:

RPD = the relative percent difference

C₁ = the larger of the two observed values

C₂ = the smaller of the two observed values

If calculated from three or more replicates, use RSD or coefficient of variation.

$$RSD = \frac{S}{Y} \times 100\%$$

Where:

RSD = the relative standard deviation

s = the standard deviation

_ = the mean of replicate analyses

Standard deviation, s , is defined as follows:

$$S = \sqrt{\frac{\sum_{i=1}^n (Y_i - \bar{Y})^2}{n - 1}}$$

Where:

- s = standard deviation
- Y_1 = measured value of replicate
- \bar{Y} = mean of replicate measurements
- n = number of replicates

5. Accuracy: A measure of the bias of a system or measurement:
- a. Accuracy is measured by matrix spikes and, when available, standard reference material (SRM).
 - b. For measurements where matrix spikes are used, use percent recovery.

$$\%R = 100 \times \frac{S - U}{C_{sa}}$$

Where:

- $\%R$ = percent recovery
- S = measured concentration in spiked aliquot
- U = measured concentration in unspiked aliquot
- C_{sa} = actual concentration of spike added

- c. For situations where an SRM is used instead of, or in addition to, matrix spikes, calculate the percent recovery based on certified value = 100%.

6. Method Detection Limit: Defined as follows for all measurements:

$$MDL = t_{(n-1, 1-\alpha=0.99)} \times S$$

Where:

- MDL = the method detection limit
- S = the standard deviation of the replicate analyses
- $t_{(n-1, 1-\alpha=0.99)}$ = the Student's t-value appropriate to a 99% confidence level and a standard deviation estimate with $n-1$ degrees of freedom.

7. Control charts are maintained to show the limits within which measurements should fall. The data collected from blanks, duplicates, spikes, and standard reference materials are to be used for the construction of control charts. We will use the means chart format to construct our control charts for blanks, spikes, and SRM control carts. The control charts for our duplicates will use the range chart format.
- a. Means chart: A means chart is simply constructed from the mean and standard deviation of the test results. The mean represents the central line; the mean plus or minus 2 times the standard deviation represents the warning line; and the mean plus or minus 3 times the standard deviation represents the control limit.
 - b. Range chart: Use the standard deviation of the method combined with the factors from the table below to construct the central line and warning and control limits.

Table: Factors for Computing Lines on Range Control Charts

Number of Observations (n)	Factor for Central Line (D ₂)	Factor for Control Limits (D ₄)
2	1.128	3.267
3	1.693	2.575
4	2.059	2.282
5	2.326	2.115
6	2.534	2.004

Perfect agreement between duplicates results in no difference when the values are subtracted, so the base line on the chart is zero. The standard deviation is converted to the range so that the analyst need only subtract the two results to plot the value on the control chart. The mean range is computed as:

$$\bar{R} = D_2 s$$

the control limit as

$$CL = \bar{R} - 3s(R) = D_4 \bar{R}$$

and the warning limit as

$$WL = \bar{R} - 2s(R) = \bar{R} - 2 / 3 (D_4 \bar{R} - \bar{R})$$

where:

D_2 = factor to convert s to the range (1.128 for duplicates, as given in table below).

$s(R)$ = standard deviation of the range, and

D_4 = factor to convert mean range to $3s(R)$ (3.267 for duplicates, as given in the above table).

A range chart is rather simple when duplicate analyses of a standard are used. For duplicate analyses of samples, the plot will appear different because of the variation in sample concentration. To deal with varying concentration the range can be expressed as a function of the relative standard deviation (coefficient of variation). Normalize the range by dividing by the average. Determine the mean range for the pairs analyzed by

$$\bar{R} = (\sum R_i) / n$$

and the variance (square of the standard deviation) as

$$s_R^2 = (\sum R_i^2 - n\bar{R}^2) / (n - 1)$$

Then draw lines on the chart at the mean of $R + 2s_R$ and $+ 3s_R$ and for each duplicate analysis, calculate normalized range and enter the result on the chart.

B. Calibration Procedures and Frequency

1. Calibration is the process for determining the correctness of the assigned values of the physical standards used or the scales of measuring the instruments. It is a reproducible reference point to which all sample measurements can be correlated.
2. The instruments and equipment are calibrated following the requirements of the specific methods of analysis. All calibrations and acceptance criteria are checked for conformance to these method requirements.
3. The data resulting from the instrument calibration and the associated QC procedures used, determine the frequency of the calibration process.
 - a. Quality control is maintained by monitoring the responses of the parameters using control charts. The procedures and control limits are specified by the methods.
 - b. Precision, accuracy, and the continuing calibration are shown by using repeated analyses of spiked and unspiked samples, the use of the laboratory control samples (LCS), and/or the standard reference materials (SRM).
 - c. QA/QC criteria are discussed in the Analysis of QC Samples and Documentation Section.
4. Miscellaneous Equipment
 - a. The analytical balance is calibrated against Class "S" weights before its use. The calibration weights bracket the weight to be measured. This calibration is recorded in the calibration notebook. Analytical balances are calibrated annually by outside service technician.
 - b. Thermometers are calibrated annually against a NIST traceable thermometer. (See Sample Storage Section.)
 - (1) The drying oven temperature needs to be set at $105^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and verified by the analyst before drying samples.
5. Atomic Absorption Spectroscopy.
 - a. A calibration blank of 18 megohm water, free of metal analytes, is used to establish a baseline or zero-point of the calibration curve.
 - b. Initial calibration includes a series of three or more standards that define the lower and upper concentrations of the working curve that all samples concentrations must fall within. If samples fall outside the working curve, they must be diluted and reanalyzed.
6. As a standard procedure instruments are calibrated before sample analysis by using a minimum of a 3-point curve. The 3-point curve brackets all samples to be analyzed and is derived from dilutions of primary standards.

When available, an external certified reference standard is used to verify the initial standard calibration.

7. ICP-AES

- a) Due to the linear range for most elements on the ICP cover several orders of magnitude, extra care has to be taken when calibrating.
- b) The instrument should be calibrated using a blank and three or more standards which are in the lower portion of range that you most commonly expect the results to fall in. If you want to use the upper end of the linear range run a check standard for that portion of the range and make sure it falls within 10% of the true value. The reason for taking this approach was presented at our Perkin Elmer ICP training course: If you calibrate using 5 ppb, 1ppm, and 100 ppm standards, the 100 ppm standard has the potential of severely skewing the y-intercept thus drastically affecting the results that the regression equation gives us at the 5 ppb end of the curve.

8. ICP-MS

- a) Due to the linear range for most elements on the ICP cover several orders of magnitude, extra care has to be taken when calibrating.
- b) The instrument should be calibrated using a blank and three or more standards which are in the lower portion of range that you most commonly expect the results to fall in. If you want to use the upper end of the linear range run a check standard for that portion of the range and make sure it falls within 10% of the true value. The reason for taking this approach is that most samples will fall within the lower part of the range combined with what was explained above under ICP-AES.

C. Analysis of Quality Control Samples and Documentation

1. Objective: To demonstrate that adequate recoveries have been obtained in spiked (fortified) samples, check for matrix interference in samples, check laboratory performance against reference materials, and verify the precision and accuracy of methods.
2. Procedure: Guidelines have been established to guarantee that appropriate QC samples are incorporated in every analytical set and that methodologies have been thoroughly tested prior to use of field samples for ruggedness.
3. Analysis of QC Samples
 - a. General Guidelines for the Analysis of QC Samples
 - (1) Method QA/QC are those measures taken to evaluate the method protocols and provide assurance that the values being obtained are correct. These are run at a frequency of either 5% or 10% of the

samples in a batch (rounded up) – please see individual method SOPs for frequency of required QC. A batch is defined as a group of samples which are analyzed together with the same method sequence and the same lots of reagents and with the manipulations common to each sample within the same time period or in continuous sequential time periods. Samples in each batch must be of similar composition.

- (2) Method blanks are used to determine if any contamination or additive amounts of analyte are being introduced into the sample. The blanks prepared need to contain less than the detection limit for all analytes. If the concentration of the associated blanks is above the detection limit and if the lowest analyte concentration is <10 times the blank detection limit, reanalysis of the sample must occur. If the reanalysis is not done, the data is reported and flagged as an estimated value.
- (3) Matrix Spike/Matrix Spike Duplicate determine accuracy and precision by calculating the amount recovered and the relative percent difference.
 - (a) Acceptance criteria for recoveries of spikes used is the current laboratory generated values (if available) or at least as stringent as the referenced method's criteria.
 - (b) The ratio of spike concentration to sample analyte concentration is normally 1:1 or better to give a valid spike. If the analyte value is high in comparison to the spike, the spike should be considered too low to evaluate and not reported.
 - (c) If a spike is out of the established limits, the sample and spike are diluted to dilute out any possible matrix effect that may be present. Make an appropriate dilution and reanalyze to evaluate if any matrix effects exist.
- (4) Spike recoveries - water
 - (a) Specific recovery criteria should be listed in each method, but the generic acceptable water spike recoveries are 80-120%.
 - (b) Relative percent difference is not to exceed 20%.

D. Limits of Detection

1. General Discussion

- a. Current practice identifies several detection limits, each of which has a defined purpose. These are:
 - (1) Instrument Detection Limit (IDL).
 - (2) Lower Limit of Detection (LLD).

- (3) Method Detection Limit (MDL).
 - (4) Limit of Quantitation (LOQ).
 - (5) Practical Quantitation Limit (PQL).
 - b. Occasionally the instrument detection limit (IDL) is used as a guide for determining the method detection limit (MDL). The relationship among these limits is approximately IDL:LLD:MDL:LOQ = 1:2:4:10.
2. Determining Detection Limits

Soil Lab's methods by which the limit of detection are developed have been based on the EPA Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater Appendix 4A - Definition and Procedure for the Determination of the Method Detection Limit.

- a. The MDL listed in the appendices are typical method detection limits for various matrices. These MDLs are shown with the understanding that the real (actual) detection limit varies with the sample matrix as actually submitted by the client.

E. List of Approved Methods and Certification

- 1. Soil Lab is a State of California approved laboratory certified for the analyses of drinking water and wastewater. See Appendix D for the list of methods certified by the State of California.

F. Decision Process, Procedures, and Responsibility for Initiation of Corrective Action

- 1. Currently SOPs are being written for each analytical methodology performed by Soil Lab. Each individual SOP will contain a section that describes the corrective action procedures. Each corrective action procedure in the SOP will have a corresponding item in either (or more likely) both the Procedure section and the QC Limits section. Each of these sections will contain specific criteria for determining the pass or failure of the check or QC limit. There are several types of out-of-control occurrences that result in corrective actions being taken.
 - a. Observations corrected at the site of the analysis prior to performing the sample analysis. For instance, the instrument calibration may fail. The analyst finds and corrects the problem before continuing. The analyst notes this either on a worksheet or in an instrument logbook.
 - b. Corrective actions taken at the time of analysis. QC samples such as

matrix spike recovery are found to be out-of-control. Other QC controls such as duplicates or standard reference materials may be found to be out-of-control. Many of these QC samples are plotted on control charts in real time by the analysts. The QC limits for control charts are defined in a SOP, if these limits are exceeded, corrective actions are taken at that time.

- c. Corrective actions taken at the time of receipt of sample. If the sample container is damaged, improperly preserved, or incomplete information on the Chain-of-Custody, corrective actions are specified. If Soil Lab can correct the problem, it is noted on worksheets or other logbooks or COC documents. If the problem is not correctable by Soil Lab, the client is contacted to resolve the problem.
- d. Corrective actions are taken at the time of scheduled review of control charts. On a regular basis the QA Officer reviews control charts and updates the statistical control limits. If conditions show that the values are out-of-control, corrective actions are taken. If the QA Officer uncovers out-of-control events the analyst is informed and a plan for corrective action is developed. The QA Officer then is responsible for tracking these events to insure that the situation is brought back into control. If data quality is affected, the QA Officer may halt any further analysis of client samples until the situation is brought back into control.
- e. Methodology changes. If during the course of sample analysis, a problem with the procedure as described in the SOP(s) is uncovered, a non-conformance form must be completed and the appropriate levels of authority notified.

VII. **Data Generation**

Soil Lab reports analytical results to the client via Certified Laboratory Reports (CLR). This report includes client project information, specific requested analysis results, quality assurance results (client specific), and any other project-specific supporting documentation.

A. **Data Reduction Procedures**

All data is entered (normally by the analyst) on a batch basis into the database either directly or by using a spreadsheet that links to the database. The data is then set to the “Analyzed” status. The Lab Director or QA Officer or occasionally an approved analyst then reviews first for data entry accuracy. Then we can query the database in the “Data/Entry and Review” screen to see if any data points are out of compliance by being marked red. This screen alerts us to issues such as 1.) Notification limits reached – client needs to be notified, 2.) samples out of hold time, 3.) Date analyzed before either sampling date or preparation date, 4.) blank hits, 5.) problems with RPDs or % recoveries of QC samples, etc.

Any data that is outside normally accepted limits will be re-analyzed when possible or else be flagged in the report with a qualifier.

B. **Data Validation Procedures**

The integrity of the data is assessed through the use of a variety of measures that include reagent blanks, duplicates, matrix spikes, Laboratory Control Samples (LCS), and Standard Reference Material (SRM). These steps are described in data validation and analytical SOPs along with associated corrective actions. Additional QC measures may also be specified by the client for specific samples. Other checks of the data quality may include the linearity of the calibration curves, the accuracy of the QC check standards and system sensitivity. Data transcriptions are also checked.

C. **Data Reporting and Authorization Procedures**

1. When the QA Officer determines that the results are complete, the results are reviewed for completeness of content, internal consistency, and that client specific requirements are met.

2. When the QA Officer has completed the validation procedures, the data is sent to the administrative staff for final report generation.
3. The final report is signed for approval and is released to the client. Copies of the final report are stored in Soil Lab files.

VIII. Quality Control

A. Solvent, Reagent and Absorbent Check Analysis

1. Solvents are routinely checked as part of the acquisition of the material from the manufacturer. Standard Operating Procedures are being written for each specific solvent. Reagents are checked either directly as specified in SOPs or as a result of utilizing the reagent for specific analysis. SOPs where reagents are used contain procedures for checking viability and corrective actions for handling failing analysis. Logbooks are used to keep a record of these check analysis.

B. Reference Materials Analysis

1. For all analyses that have Standard Reference Materials (SRM) available, an SRM is run with each batch and is reported as a QC value. In addition, various analytical procedures utilize SRMs as part of the corrective action procedures.

C. Internal Quality Control Checks

1. Blank samples are routinely analyzed as specified by SOPs. In addition, the frequency and choice of type of blanks are run in accordance with project or client requirements. The QA Officer and/or the QA Officer may submit blind blanks as required to monitor QC performance.
2. Blank spikes are routinely analyzed as specified by SOPs. Client or project specific requirements may determine whether these are performed and the frequency.
3. Standards are analyzed as part of the initial calibration and ongoing standards are analyzed as required in SOPs or by project or client requirements.
4. Duplicate samples are routinely analyzed as part of the internal QC. The QA Officer may submit blind duplicates as required to monitor the QC.
5. Standard Reference Materials are routinely analyzed as part of SOP QC procedures and may also be required for specific projects or clients. The QA Officer may submit blind SRMs as part of the ongoing QA monitoring.

D. Corrective Action and Determination of Quality Control Limits Procedures

1. Application: Corrective action is required whenever a deficiency from planning documents or procedures is discovered and when there are deviations from established criteria. This procedure provides corrective action guidelines to be followed when these occur.
2. Deficiencies: Corrective action for deficiencies from planning documents or procedures is dependent on the event. In any case, the project manager is responsible for documenting the decision.
3. Deviations: Corrective actions are required when DQOs are exceeded. These actions may include, but are not limited to, data review and calculations, flagging of suspect data, or reanalyses of individual or entire batches of samples. A review that provides a preliminary check of all "out-of-control limit" events is performed as soon as the data for a given parameter and batch are tabulated. If there is any concern over the number of "out of control limit" events, the project manager is notified to determine if any corrective actions are necessary.
4. The following summarizes the corrective action guidelines for DQO deviations:
 - a. Matrix Spikes
 - (1) All matrix spike recoveries and RPDs between spike duplicates that are outside the DQOs are addressed in the narrative and flagged on the final data report.
 - (2) The number of "out-of-control limit" events per batch is submitted to the QA Officer to find out if the problem affected the sample data for that batch and if there is a need for other appropriate corrective action.
 - b. Replicates
 - (1) Precision between replicates that exceeds the DQOs established is noted in the narrative and flagged in the final data report.
 - (2) The number of "out-of-control limit" events per batch is submitted to the QA Officer to find out if the problem affected the sample data for that batch and if there is a need for other appropriate corrective action.
 - c. Standard Reference Materials (SRM)/Laboratory Control Samples (LCS)
 - (1) SRM and LCS values exceeding the DQOs (Percent Difference from the certified value) are noted in the narrative and flagged in the final data report.
 - (2) The number of "out-of-control limit" events per batch is submitted to the appropriate QA Officer to find out if the problem affected the sample data for that batch and if there is a need for other

appropriate corrective action.

d. Method Blanks

- (1) Any blank values detected above the contract specified reporting limit are noted in the narrative and the corresponding data are flagged in the final data report.
- (2) The number of "out-of-control limit" events per batch is submitted to the QA Officer to find out if the problem affected the sample data for that batch and if there is a need for other appropriate corrective action.

IX. Quality Assurance Reports to Management

A. Data Quality Assurance

1. This section describes how the QA Officer checks the procedures outlined in the data generation section, subsection data validation, and reporting.

B. Performance/External Audits

1. Performance Evaluation Samples
 - a. External
 - (1) Soil Control Lab routinely undergoes certification for projects and/or regulatory agencies. These contracts and/or agencies require submission of SRMs or equivalent as PE samples. These PE samples are routinely directed to the QA Officer at time of receipt by Soil Lab. The QA Officer is responsible for scheduling and notifying the analysts of the PE sample requirements. The QA Officer then monitors the progress of analysis through reporting to ensure that the sample is properly handled, processed, and delivered on schedule.
 - c. The QA Officer or the Laboratory Director receives the results of the external PE sample analysis and distributes the results to the appropriate analysts. If corrective actions or deficiencies responses are required, the QA Officer coordinates the activities to ensure the proper responses are made and delivered in a timely manner.
2. External Audits
 - a. Upon notification by an Agency of an upcoming inspection, the QA Officer requests, when possible, from the Agency the nature of the visit (i.e., related to a specific project/contract or general). If the visit relates to a particular project, the client is immediately notified. The client, if desired, may be present during the inspection.
 - b. The Quality Officer issues a memorandum to all analytical personnel and management informing them of the upcoming inspection, the nature of the inspection, and the anticipated dates.
 - c. Ancillary materials are gathered prior to the visit, e.g. QA Plan, External/Internal Audit trail documentation, update training logs, SOPs and floor plans of laboratory areas.
 - d. On the day of the visit, all essential management and client personnel are present to meet with the agency inspection team. The inspection team decides on a prearranged audit schedule for specific items to be audited.

An overview meeting is usually arranged. Following the meeting, the inspection team is usually escorted through the entire facilities and introduced to any staff that they want to interview. Other essential facilities services, such as coffee, snacks, and restrooms are shown.

- e. Depending on the nature of the audit, all personnel provide any information requested by the auditors. Additionally, there are situations where unsolicited information and questions may be highly desirable.
- f. The QA Officer and/or any other personnel may be requested to provide photocopies. This is allowed except that no company or client confidential information is provided to the auditors. No original documentation may be released to auditors. The QA Officer must be aware of the documentation information provided to the auditors.
- g. Each individual personnel involved in the audit process records pertinent information relating to the audit. A written report of the interview may be requested by the QA Officer.
- h. The audit procedure usually ends with a debriefing session by the auditors. This session includes all essential management and client personnel. Detailed notes are taken, by the Soil Lab management personnel and the QA Officer. These notes are collated later for recording impression, interpretations, and questions concerning the auditors' findings.
- i. The agency auditors normally follow the onsite visit with a formal letter of deficiencies. The QA Officer is responsible for disseminating this information to the appropriate analysts. The QA Officer is then responsible for tracking progress on the deficiencies.

D. Corrective Action Procedures

- 1. Application: This procedure provides the methods for addressing non-conformances from planning documents, procedures, and client requirements to ensure that their effect on results are evaluated, and that immediate, as well as long-term corrective action, is taken to preclude recurrence.
- 2. General: Non-conformances are events resulting from unforeseen circumstances that arise during the conduct of a project. Once a staff member has identified that a non-conformance has occurred, he/she promptly notifies the project manager of the non-conformance (usually within one working day).
- 3. The project manager performs the following:
 - a. Assigns a staff member to initiate the Non-conformance Form.

- b. Assists in determining the impact on the project and any required corrective action.
4. The staff member describes/identifies the following on a Non-conformance Form:
 - a. The Project/Study number and title.
 - b. The project manager.
 - c. The non-conformance and how it deviated from the planning document or procedure.
 - d. The impact on the project.
 - e. Corrective action to preclude recurrence.
 - f. Corrective action to correct non-conformance.
 - g. His/her signature and data.
5. Once the evaluation and corrective action of the non-conformance have been determined, the project manager signs and dates the original Non-conformance Form and forwards it to the QA officer. The project manager distributes a copy of the Non-conformance Form to the analyst.
6. Following the expected completion date or notification of completion by the project manager, the QA representative performs a follow-up action to verify proper implementation of corrective action and completion of the corrective action in a timely manner. Once satisfied, the QA representative signs and dates the original Non-conformance Form, provides any necessary comments, and returns the completed Non-conformance Form to the project manager.
7. When impact has been determined, the project manager ensures that a copy of the Non-conformance Form is attached to, or the Non-conformance Form number referenced on, the impacted data sheets, laboratory notebook or other documents used to transcribe the information or data.
8. The project manager ensures that a completed form is kept with the project file.

Appendix A - Laboratory Equipment List

Description	Model #	Manufacturer	Serial #	Location	Maintenance Period
Analytical Balance	A 200 S	Sartorius	36080150	W	as needed
Ion Chromatograph	ICS 2000	Dionex		W	as needed
Digestion Unit		Labconco		W	as needed
Waterbath	50	Precision Scientific		W	as needed
Non-Ratio Turbidimeter	965-10	Orbeco-Hellige	3610	W	as needed
Conductivity Meter	1481-00	Cole-Palmer	8909027	W	as needed
pH meter	Accumet 25	Fisher	C0007164R	W	as needed
Heating Block	17600	Thermodyne		W	as needed
Vortex Mixer	12-810		136344	W	as needed
Drying Oven	DX-58	Amer.Sci.Prod.		W	as needed
Auto Mixer	14-505-21	Fisher	5040029	W	as needed
Automixer	44-505-21	Fisher	142229	W	as needed
SuperMixer II	259-490	Lab-Line Instr.	0388-0237	W	as needed
Deionizer	E Pure	Barnstead		W	as needed
AA	SpectrAA-20	Varian		W	as needed
Graphite Tube Atomizer	GTA-96	Varian		W	as needed
Colorimeter	PC/600	Brinkman		W	as needed
Dissolved Oxygen Meter	50	Yellow Springs	297	W	as needed
Touch Mixer	232	Fisher	10200007	W	as needed
Auto Mixer	14-505-21	Fisher	30400290	W	as needed
Fume Hood		Labconco		W	as needed
Eye Bath				W	as needed
Drying Oven	DX58	American Scientific		S	as needed
Water Bath	000-2	Lab-Line Instr.	1166	S	as needed
pH Meter	Accumet 620	Fisher		S	as needed
Touch Mixer	232	Fisher	30700251	S	as needed
Vacuum Pump	10432	SCA/Precision Scientific	10AH9-50	S	as needed
Spectrophotometer	DU2	Beckmann		S	as needed
Digestion Block #1	MOD Block	CPI		Clean Lab	as needed
ICP #1 Main	iCAP 6300 Duo	Thermo		Lab 4	as needed
ICP #2 Backup	5300DV	Perkin-Elmer	077N4052101	Lab 4	as needed
ICP-MS	X Series II	Thermo	X0644	ICPMS	as needed
Centrifuge	Centra CL3	ThermoIEC	37501181	S	as needed
Nephelometer	40	Designs	406	S	as needed
Integrator	3392A	HP	2450A05509	S	as needed
Motor	5K533C	Dayton	SA55KSE-5808	S	as needed
Soil Grinder	H-4199	Humboldt Testing Equipment		S	as needed
Pyrometer		Brown Electric		S	as needed

W=Water lab;S=Soil lab;C=Compost Lab;B=Bacteria Lab;I=Instrument room

Appendix A - Laboratory Equipment List

Description	Model #	Manufacturer	Serial #	Location	Maintenance Period
Muffle Furnace	FD 1530 M	Thermodyne		S	as needed
Heater/Mixer	Magne 4	Cole-Parmer		S	as needed
laboratory Blender		GE		S	as needed
Isotemp Oven	418F	Fisher		S	as needed
Nephelometer	40	Turner Designs	1986	S	as needed
Top-Loading Balance	GT4800	Ohaus	5081	S	as needed
Centrifuge	228	Fisher	779	S	as needed
Sonic Dismembrater	300	Fisher	3053	S	as needed
Sieve Shaker	5	Fisher	2663423	S	as needed
Autotitrator	716DMS Titrino	Metrohm		C	as needed
Autotitrator	730 Sample Changer	Metrohm		C	as needed
Autotitrator	759 Swinghead	Metrohm		C	as needed
Digestion Block #2	MOD Block	CPI		C	as needed
Digestion Unit		Labconco		C	as needed
Conductivity Meter	19101-00	Cole-Palmer	9406055	S	as needed
Colorimeter, Fiber Optic Probe	PC700	Brinkman	700-54-8	I	as needed
Colorimeter, Flow Injection Analysis	1050	Skalar	154 A.S.	I	as needed
Carbon/Nitrogen Analyzer	Loader 601-8000-8000	Leco: CN2000	3536	I	as needed
Carbon/Nitrogen Analyzer	Furnace 601-900-100	Leco: CN2000	3638	I	as needed
Colorimeter	CN2000 602-000-200	Leco: CN2000	3634	I	as needed
Digestion Unit		Labconco		I	as needed
Ion Chromatograph	DX-120	Dionex	000 91063	I	as needed
Autosampler for Ion Chromatograph	AS40	Dionex	94050038	I	as needed
Top-Loading Balance	1500D	Ohaus	4908	B	as needed
Heating Block	DB17615	Thermolyne	176940678943	B	as needed
Shaker Bath	Fifty	Precision Scientific		B	as needed
Black Light	EA-160	Spectroline	346872	B	as needed
Autoclave	Sterilmatic	Market Forge		B	as needed
Incubator		Precision Scientific	3224000V	B	as needed
Incubator		Precision Scientific		B	as needed
Temperature Control Unit	Freas 815	Precision Scientific		B	as needed
Temperature Control Unit	Freas 815	Precision Scientific		B	as needed
Digital Temperature Control		Fisher	1028891	B	as needed
Water Bath				B	as needed

Appendices B and C (combined)

Method Description	Method	Container/ Preservative	Holding Time	WaterMDL	WaterRL	Units
AA Labs Coliform Pres/abs	Pres/abs	P/4oC,Na2S2O3/100ml	30 hours	N/A	N/A	Pres/abs
Alkalinity, Bicarbonate	310.1	P,G /4oC /100ml	14 days	1	1	mg/L
Alkalinity, Carbonate	310.1	P,G /4oC /100ml	14 days	1	1	mg/L
Alkalinity, Total	310.1	P,G /4oC /100ml	14 days	1	1	mg/L
Biological Oxygen Demand	405.1	P,G /4oC /500ml	48 hours	5	2	mg/L
Bromide by Ion Chromatograph	300	P,G / None/ 200ml	28 days	0.11	1	mg/L
Calcium by Flame AA	215.1	P,G /HNO3/100ml	6 months	0.53	5	mg/L
Calcium by ICP	200.7	P,G /HNO3/100ml	6 months	0.032	5	mg/L
Chemical Oxygen Demand	410.1	P,G/4oC,H2SO4/250ml	28 days	0.222	4	mg/L
Chemical Oxygen Demand	410.1	P,G/4oC,H2SO4/250ml	28 days	0.222	4	mg/L
Chloride by Ion Chromatograph	300	P,G/ None/ 100 ml	28 days	5	5	mg/L
Chloride by Titration	325.3	P,G/ None/ 100 ml	28 days	2	2	mg/L
Chlorine, Residual	330.4	P,G/ None/ 500 ml	Immed.	0.05	0.05	mg/L
Chlorophyll-a	SM 10200	AG or HDPE/4oC,No light	28 days	0.1	0.5	ug/L
Chromium VI	3500.D	P,G /HNO3/100ml	6 months	0.05	0.05	mg/L
Color	110.2	P,G /4oC /250ml	48 hours	3	3	Co/Pt
Conductivity	120.1	P,G/ None/ 100 ml	7 days	10	10	umhos/cm
Corrosivity	2330	P,G/ None/ 100 ml	7 days	N/A	N/A	ratio
Cyanide by Electrode	SM 4500-	P,G/4oC,NaOH/500ml	14 days	0.05	0.1	mg/L
Cyanide by Spectrophotometric	335.2	P,G/4oC,NaOH/500ml	14 days	0.02	0.1	mg/L
E. Coli. MPN by Colilert	SM 9223	Sterile P/4oC,Na2S2O3/100ml	6 hours	1	1	MPN/100 ml
Enterococcus by Enterolert Media	Idexx	Sterile P/4oC,Na2S2O3/100ml	6 hours	1	1	MPN/100 ml
Enterococcus, Multiple Tube	SM 9230B	Sterile P/4oC,Na2S2O3/100ml	6 hours	2	2	MPN/100 ml
Fluoride by Ion Chromatograph	300	P / None / 200 ml	28 days	0.1	0.1	mg/L
Fluoride by Ion Selective Electrode	340.2	P / None / 200 ml	28 days	0.1	0.1	mg/L
Hardness, Total	2340.B	P,G /4oC /250ml	6 months	5	5	mg/L
Hardness, Total	130.1	P,G /4oC /250ml	6 months	1	2	mg/L
Heterotrophic Plate Count	9215B	Sterile P/4oC,Na2S2O3/100ml	24 hours	1	5	CFU/ml
Inorganics	Various	HNO3	Various			
Iodide by Titration	345.1	P,G/ None/ 100 ml	28 days	5	5	mg/L
Irrigation Water Package		unpreserved+125ml HNO3	Various	Various		
Magnesium by Flame AA	242.1	P,G /HNO3/100ml	6 months	0.500*	1	mg/L
Magnesium by ICP	200.7	P,G /HNO3/100ml	6 months	0.0051	1	mg/L
Moisture	160.3	P,G/None/60ml				mg/L
Nitrate by Cadmium Reduction	353.2	P,G /4oC /100ml	48 hours	0.0018	0.01	mg/L
Nitrate by Colormetric, Brucine	352.1	P,G /4oC /100ml	48 hours	0.2	0.4	mg/L
Nitrate by Ion Chromatograph	300	P,G /4oC /100ml	48 hours	0.0077	0.1	mg/L
Nitrite by Ion Chromatograph	300	P,G /4oC /100ml	48 hours	0.005	0.1	mg/L
Nitrite by Spectrophotometric	354.1	P,G /4oC /100ml	48 hours	0.01	0.4	mg/L
Nitrogen, Organic	Calc	P,G/4oC,H2SO4/100ml	28 days	0.5	0.5	mg/L
Nitrogen, Total	Calc	P,G/4oC,H2SO4/100ml	28 days	0.5	0.5	mg/L
Nitrogen-Ammonia by ISE	350.3	P,G/4oC,H2SO4/500ml	28 days	0.032	0.1	mg/L
Nitrogen-Ammonia by Phenate	350.1	P,G/4oC,H2SO4/500ml	28 days	0.018	0.1	mg/L
Nitrogen-Kjeldahl	351.3	P,G/4oC,H2SO4/1L	28 days	0.018	0.1	mg/L
Odor	140.1	G / 4oC / 1L	24 hours	1	1	Threshold
Oil & Grease by Gravimetric	413.1	G/4oC,H2SO4/1500ml	28 days	5	5	mg/L

P=Plastic, G=Glass, 4oC = 4 degrees Celsius

Appendices B and C (combined)

Method Description	Method	Container/ Preservative	Holding Time	WaterMDL	WaterRL	Units
Phenols by Spectrophotometric	420.1	G /4oC, H2SO4 / 1L	28 days	0.1	0.1	mg/L
Phosphate, Dissolved Ortho by	365.2	P,G /Filter /100 ml	48 hours	0.00096	0.05	mg/L
Phosphate, Ortho by Colormetric	365.2	P,G /Filter /100 ml	48 hours	0.00096	0.05	mg/L
Phosphate, Ortho by Ion	300	P,G /Filter /100 ml	48 hours	0.18	1	mg/L
Phosphorous, Total by Colormetric	365.2	P,G/4oC,H2SO4/100ml	28 days	0.00096	0.01	mg/L
Potassium by Flame AA	258.1	P,G /HNO3/100ml	6 months	0.05	0.5	mg/L
Potassium by ICP	200.7	P,G /HNO3/100ml	6 months	0.038	0.5	mg/L
Silica by Colorimeter	370.1	P/4oC /100ml	28 days	0.23	5	mg/L
Silica by ICP	200.7	P/4oC /100ml	28 days	0.056	1	mg/L
Sodium by Flame AA	273.1	P,G /HNO3/100ml	6 months	0.21	1	mg/L
Sodium by ICP	200.7	P,G /HNO3/100ml	6 months	0.018	1	mg/L
Streptococcus, Fecal		Sterile P/4oC,Na2S2O3/100ml	6 hours	2	2	MPN/100 ml
Sulfate (SO4) by Turbidimetric	300	P,G /4oC /100ml	28 days	1	0.5	mg/L
Sulfate by Ion Chromatograph	300	P,G /4oC /100ml	28 days			mg/L
Sulfate by Ion Chromatograph	300	P,G /4oC /100ml	28 days	10	0.5	mg/L
Sulfide	4500.D	Acetate/500ml	7 days	0.1	0.1	mg/L
Sulfide by Titration w/ Iodide	376.1	Acetate/500ml	7 days	0.1	0.1	mg/L
Sulfite by Titration w/ Iodine	377.1	P,G / None / 500 ml	Immed.	0.1	0.1	mg/L
Surfactants (MBAS) by Colormetric	425.1	P,G /4oC /250ml	48 hours	0.01	0.01	mg/L
TOC in soil by C/N Analyzer	9060	G / 4oC / 60ml		0.009	0.1	%
Total & Fecal Coliform by LTB	9221	P/4oC,Na2S2O3/100ml	6 hours		2	MPN/100 ml
Total Aluminum by Flame AA	202.1	P,G /HNO3/100ml	6 months	10	50	ug/L
Total Aluminum by Furnace AA	202.2	P,G /HNO3/100ml	6 months	10	50	ug/L
Total Aluminum by ICP	200.7	P,G /HNO3/100ml	6 months	6.85	50	ug/L
Total Antimony by Furnace AA	204.2	P,G /HNO3/100ml	6 months	2.1	6	ug/L
Total Antimony by ICP	200.7	P,G /HNO3/100ml	6 months	3.9	20	ug/L
Total Antimony by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.044	0.2	ug/L
Total Arsenic by Furnace AA	206.2	P,G /HNO3/100ml	6 months	1.1	2	ug/L
Total Arsenic by ICP	200.7	P,G /HNO3/100ml	6 months	3.7	20	ug/L
Total Arsenic by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.1	2	ug/L
Total Barium by Flame AA	208.1	P,G /HNO3/100ml	6 months	1	1	mg/L
Total Barium by Furnace AA	208.2	P,G /HNO3/100ml	6 months	0.02	0.1	mg/L
Total Barium by ICP	200.7	P,G /HNO3/100ml	6 months	3.1	100	ug/L
Total Barium by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.051	100	ug/L
Total Beryllium By Furnace AA	210.2	P,G /HNO3/100ml	6 months		1	ug/L
Total Beryllium By ICP	200.7	P,G /HNO3/100ml	6 months	0.3	1	ug/L
Total Beryllium By ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.016	0.2	ug/L
Total Boron by Curcumin	212.3	P,G /HNO3/100ml	6 months	10	100	ug/L
Total Boron by ICP	200.7	P,G /HNO3/100ml	6 months	1.3	100	ug/L
Total Boron by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.7	100	ug/L
Total Cadmium by Flame AA	213.1	P,G /HNO3/100ml	6 months	0.5	1	ug/L
Total Cadmium by Furnace AA	213.2	P,G /HNO3/100ml	6 months	0.05	1	ug/L
Total Cadmium by ICP	200.7	P,G /HNO3/100ml	6 months	0.46	1	ug/L
Total Cadmium by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.023	0.2	ug/L
Total Chromium by Furnace AA	218.2	P,G /HNO3/100ml	6 months	0.1	0.01	mg/L
Total Chromium by ICP	200.7	P,G /HNO3/100ml	6 months	0.59	10	ug/L
Total Chromium by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.094	0.5	ug/L
Total Cobalt by ICP	200.7	P,G /HNO3/100ml	6 months	0.51	10	ug/L
Total Cobalt by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.09	1	ug/L
Total Coliform & E. Coli by Colilert	Pres/Abs	Sterile P/4oC,Na2S2O3/100ml	30 hours	N/A	N/A	Pres/Abs
Total Coliform MPN by Colilert	SM 9223	Sterile P/4oC,Na2S2O3/100ml	30 hours	N/A	1	MPN/100 ml

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Appendices B and C (combined)

Method Description	Method	Container/ Preservative	Holding Time	WaterMDL	WaterRL	Units
Total Copper by Flame AA	220.1	P,G /HNO3/100ml	6 months	0.010*	0.05	mg/L
Total Copper by ICP	200.7	P,G /HNO3/100ml	6 months	1.7	50	ug/L
Total Copper by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.65	5	ug/L
Total Dissolved Solids (TFR)	160.1	P,G /4oC /100ml	7 days	10	10	mg/L
Total Gold by Flame AA	231.1	P,G /HNO3/100ml	6 months	0.5	0.5	mg/L
Total Iron	200.7	P,G /HNO3/100ml	6 months	1.48	50	ug/L
Total Iron by Flame AA	236.1	P,G /HNO3/100ml	6 months	23	50	ug/L
Total Iron by ICP	200.7	P,G /HNO3/100ml	6 months	1.48	50	ug/L
Total Iron Digestion	3050					
Total Kjeldahl Nitrogen by	351.1					mg/L
Total Lead by Flame AA	239.1	P,G /HNO3/100ml	6 months	100	5	ug/L
Total Lead by Furnace AA	239.2	P,G /HNO3/100ml	6 months	0.99	5	ug/L
Total Lead by ICP	200.7	P,G /HNO3/100ml	6 months	3.9	50	ug/L
Total Lead by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.12	1	ug/L
Total Manganese by Flame AA	243.1	P,G /HNO3/100ml	6 months	0.0125*	20	ug/L
Total Manganese by ICP	200.7	P,G /HNO3/100ml	6 months	0.54	20	ug/L
Total Mercury by Cold Vapor	245.1	P,G /HNO3/100ml	6 months	0.08	1	ug/L
Total Molybdenum by ICP	200.7	P,G /HNO3/100ml	6 months	1.8	50	ug/L
Total Molybdenum by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.15	1	ug/L
Total Nickel by Flame AA	249.1	P,G /HNO3/100ml	6 months	10	10	ug/L
Total Nickel by ICP	200.7	P,G /HNO3/100ml	6 months	0.84	10	ug/L
Total Nickel by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.33	2	ug/L
Total Organic Carbon	415.1	125ml AG/H2SO4	28 days	0.07	0.5	mg/L
Total Ortho Phosphate	SM4500PE	P / 4oC / 250ml	48hrs	0.001	0.01	mg/L
Total Phosphorus (as P)	SM4500PE	P,G /H2SO4/250ml	28 days	0.001	0.01	mg/L
Total Selenium by Furnace AA	270.2	P,G /HNO3/100ml	6 months	3	5	ug/L
Total Selenium by ICP	200.7	P,G /HNO3/100ml	6 months	4.6	50	ug/L
Total Selenium by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.19	1	ug/L
Total Settleable Solids	160.5	P,G /4oC /100ml	7 days	0.1	0.1	ml/L
Total Silver by Flame AA	272.1	P,G /HNO3/100ml	6 months	20	100	ug/L
Total Silver by Furnace AA	272.2	P,G /HNO3/100ml	6 months	1	10	ug/L
Total Silver by ICP	200.7	P,G /HNO3/100ml	6 months	0.701	10	ug/L
Total Silver by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.048	10	ug/L
Total Solids	160.3	P / 4oC / 1L				mg/L
Total Strontium by ICP	200.7	P,G /HNO3/100ml	6 months	0.24	1	ug/L
Total Suspended Solids (NFR)	SM2540	P,G /4oC /100ml	7 days	0.3	1	mg/L
Total Thallium by Furnace AA	279.2	P,G /HNO3/100ml	6 months	0.2	1	ug/L
Total Thallium by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.004	1	ug/L
Total Thallium by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.004	1	ug/L
Total Tin by ICP-MS	200.8	P,G /HNO3/100ml	6 months	0.04	0.2	ug/L
Total Volatile Solis (TVR)	160.4	P,G /4oC /100ml	7 days	10	10	mg/L
Total Zinc by Flame AA	289.1	P,G /HNO3/100ml	6 months	19	50	ug/L
Total Zinc by ICP	200.7	P,G /HNO3/100ml	6 months	0.99	50	ug/L
Total Zinc by ICP-MS	200.8	P,G /HNO3/100ml	6 months	2.2	20	ug/L
Turbidity by Nephelometer	SM2130	P,G /4oC /100ml	48 hours	0.05	0.10	NTU
Unionized ammonia	350.2	250ml HDPE/H2SO4	28 days	0.001	0.001	mg/L
Yeast and Mold		Sterile P/4oC,Na2S2O3/100ml	24 hours	1	5	CFU/ml

P=Plastic, G=Glass, 4oC = 4 degrees Celsius



CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM BRANCH

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

SOIL CONTROL LABORATORY

42 HANGAR WAY
WATSONVILLE, CA 95076

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site,
proficiency testing studies, and payment of applicable fees.

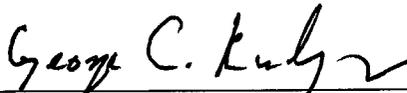
This Certificate is granted in accordance with provisions of
Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **1494**

Expiration Date: **04/30/2011**

Effective Date: **04/01/2009**

Richmond, California
subject to forfeiture or revocation


George C. Kulasingam, Ph.D., Chief
Environmental Laboratory Accreditation Program Branch



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



SOIL CONTROL LABORATORY

Lab Phone (831) 724-5422

42 HANGAR WAY
WATSONVILLE, CA 95076

Certificate No: 1494 Renew Date: 4/30/2007

Field of Testing: 101 - Microbiology of Drinking Water

101.010	001	Heterotrophic Bacteria	SM9215B
101.020	001	Total Coliform	SM9221A,B
101.021	001	Fecal Coliform	SM9221E (MTF/EC)
101.022	001	E. coli	CFR 141.21(f)(6)(i) (MTF/EC+MUG)
101.060	002	Total Coliform	SM9223
101.060	003	E. coli	SM9223
101.120	001	Total Coliform (Enumeration)	SM9221A,B,C
101.130	001	Fecal Coliform (Enumeration)	SM9221E (MTF/EC)
101.160	001	Total Coliform (Enumeration)	SM9223

Field of Testing: 102 - Inorganic Chemistry of Drinking Water

102.030	001	Bromide	EPA 300.0
102.030	003	Chloride	EPA 300.0
102.030	005	Fluoride	EPA 300.0
102.030	006	Nitrate	EPA 300.0
102.030	007	Nitrite	EPA 300.0
102.030	008	Phosphate, Ortho	EPA 300.0
102.030	010	Sulfate	EPA 300.0
102.050	001	Cyanide	EPA 335.4
102.100	001	Alkalinity	SM2320B
102.120	001	Hardness	SM2340B
102.121	001	Hardness	SM2340C
102.130	001	Conductivity	SM2510B
102.140	001	Total Dissolved Solids	SM2540C
102.145	001	Total Dissolved Solids	EPA 160.1
102.191	001	Cyanide, Total	SM4500-CN F
102.192	001	Cyanide, amenable	SM4500-CN G
102.200	001	Fluoride	SM4500-F C
102.270	001	Surfactants	SM5540C
102.510	001	Calcium	SM3120B
102.510	002	Magnesium	SM3120B
102.510	003	Potassium	SM3120B
102.510	004	Silica	SM3120B
102.510	005	Sodium	SM3120B
102.510	006	Hardness (calc.)	SM3120B
102.520	001	Calcium	EPA 200.7

As of 9/6/2007, this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

SOIL CONTROL LABORATORY

Certificate No: 1494
Renew Date: 4/30/2007

102.520	002	Magnesium	EPA 200.7
102.520	003	Potassium	EPA 200.7
102.520	004	Silica	EPA 200.7
102.520	005	Sodium	EPA 200.7
102.520	006	Hardness (calc.)	EPA 200.7
102.533	001	Silica	SM4500-Si D (18th/19th)

Field of Testing: 103 - Toxic Chemical Elements of Drinking Water

103.061	001	Aluminum	SM3120B (18th/19th/20th)
103.061	003	Barium	SM3120B (18th/19th/20th)
103.061	004	Beryllium	SM3120B (18th/19th/20th)
103.061	005	Cadmium	SM3120B (18th/19th)
103.061	007	Chromium	SM3120B (18th/19th/20th)
103.061	008	Copper	SM3120B (18th/19th/20th)
103.061	009	Iron	SM3120B (18th/19th/20th)
103.061	011	Manganese	SM3120B (18th/19th/20th)
103.061	012	Nickel	SM3120B (18th/19th/20th)
103.061	015	Silver	SM3120B (18th/19th/20th)
103.061	017	Zinc	SM3120B (18th/19th/20th)
103.130	001	Aluminum	EPA 200.7
103.130	003	Barium	EPA 200.7
103.130	004	Beryllium	EPA 200.7
103.130	005	Cadmium	EPA 200.7
103.130	007	Chromium	EPA 200.7
103.130	008	Copper	EPA 200.7
103.130	009	Iron	EPA 200.7
103.130	011	Manganese	EPA 200.7
103.130	012	Nickel	EPA 200.7
103.130	015	Silver	EPA 200.7
103.130	017	Zinc	EPA 200.7
103.130	018	Boron	EPA 200.7
103.140	001	Aluminum	EPA 200.8
103.140	002	Antimony	EPA 200.8
103.140	003	Arsenic	EPA 200.8
103.140	004	Barium	EPA 200.8
103.140	005	Beryllium	EPA 200.8
103.140	006	Cadmium	EPA 200.8
103.140	007	Chromium	EPA 200.8
103.140	008	Copper	EPA 200.8
103.140	009	Lead	EPA 200.8
103.140	010	Manganese	EPA 200.8
103.140	012	Nickel	EPA 200.8
103.140	013	Selenium	EPA 200.8
103.140	014	Silver	EPA 200.8

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Certificate No: 1494
 Renew Date: 4/30/2007

103.140	015	Thallium	EPA 200.8
103.140	016	Zinc	EPA 200.8
103.140	017	Boron	EPA 200.8
103.140	018	Vanadium	EPA 200.8
103.160	001	Mercury	EPA 245.1

Field of Testing: 107 - Microbiology of Wastewater

107.010	001	Heterotrophic Bacteria	SM9215B
107.020	001	Total Coliform	SM9221B
107.040	001	Fecal Coliform	SM9221C,E (MTF/EC)
107.242	001	Enterococci	Enterolert

Field of Testing: 108 - Inorganic Chemistry of Wastewater

108.020	001	Conductivity	EPA 120.1
108.090	001	Residue, Volatile	EPA 160.4
108.110	001	Turbidity	EPA 180.1
108.112	001	Boron	EPA 200.7
108.112	002	Calcium	EPA 200.7
108.112	003	Hardness (calc.)	EPA 200.7
108.112	004	Magnesium	EPA 200.7
108.112	005	Potassium	EPA 200.7
108.112	006	Silica	EPA 200.7
108.112	007	Sodium	EPA 200.7
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	007	Phosphate, Ortho	EPA 300.0
108.120	008	Sulfate	EPA 300.0
108.141	001	Alkalinity	EPA 310.2
108.200	001	Ammonia	EPA 350.1
108.210	001	Kjeldahl Nitrogen	EPA 351.1
108.232	001	Nitrite	EPA 353.2
108.232	001	Nitrate-nitrite	EPA 353.2
108.260	001	Phosphate, Ortho	EPA 365.1
108.261	001	Phosphorus, Total	EPA 365.1
108.322	001	Chemical Oxygen Demand	EPA 410.3
108.340	001	Total Organic Carbon	EPA 415.1
108.360	001	Phenols, Total	EPA 420.1
108.381	001	Oil and Grease	EPA 1664A
108.390	001	Turbidity	SM2130B
108.400	001	Acidity	SM2310B
108.410	001	Alkalinity	SM2320B

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Certificate No: 1494
Renew Date: 4/30/2007

108.420	001	Hardness (calc.)	SM2340B
108.430	001	Conductivity	SM2510B
108.440	001	Residue, Total	SM2540B
108.441	001	Residue, Filterable	SM2540C
108.442	001	Residue, Non-filterable	SM2540D
108.443	001	Residue, Settleable	SM2540F
108.447	001	Boron	SM3120B
108.447	002	Calcium	SM3120B
108.447	003	Hardness (calc.)	SM3120B
108.447	004	Magnesium	SM3120B
108.447	005	Potassium	SM3120B
108.447	006	Silica	SM3120B
108.447	007	Sodium	SM3120B
108.464	001	Chlorine	SM4500-Cl F
108.470	001	Cyanide, Manual Distillation	SM4500-CN C
108.471	001	Cyanide, Total	SM4500-CN D
108.480	001	Fluoride	SM4500-F C
108.490	001	pH	SM4500-H+ B
108.492	001	Ammonia	SM4500-NH3 C (19th/20th)
108.492	002	Kjeldahl Nitrogen	SM4500-NH3 C (19th/20th)
108.510	001	Nitrite	SM4500-NO2 B
108.530	001	Dissolved Oxygen	SM4500-O C
108.531	001	Dissolved Oxygen	SM4500-O G
108.540	001	Phosphate, Ortho	SM4500-P E
108.541	001	Phosphorus, Total	SM4500-P E
108.542	001	Phosphate, Ortho	SM4500-P F
108.543	001	Phosphorus, Total	SM4500-P F
108.550	001	Dissolved Silica	SM4500-Si D (18th/19th)
108.560	001	Sulfite	SM4500-SO3 B
108.580	001	Sulfide	SM4500-S= D
108.581	001	Sulfide	SM4500-S= E (18th)
108.590	001	Biochemical Oxygen Demand	SM5210B
108.591	001	Carbonaceous BOD	SM5210B
108.601	001	Chemical Oxygen Demand	SM5220C
108.610	001	Total Organic Carbon	SM5310B
108.640	001	Surfactants	SM5540C
108.650	001	Tannin and Lignin	SM5550B (18th/19th)

Field of Testing: 109 - Toxic Chemical Elements of Wastewater

109.010	001	Aluminum	EPA 200.7
109.010	002	Antimony	EPA 200.7
109.010	003	Arsenic	EPA 200.7
109.010	004	Barium	EPA 200.7
109.010	005	Beryllium	EPA 200.7

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SOIL CONTROL LABORATORY

Certificate No: 1494
Renew Date: 4/30/2007

109.010	007	Cadmium	EPA 200.7
109.010	009	Chromium	EPA 200.7
109.010	010	Cobalt	EPA 200.7
109.010	011	Copper	EPA 200.7
109.010	012	Iron	EPA 200.7
109.010	013	Lead	EPA 200.7
109.010	015	Manganese	EPA 200.7
109.010	016	Molybdenum	EPA 200.7
109.010	017	Nickel	EPA 200.7
109.010	019	Selenium	EPA 200.7
109.010	021	Silver	EPA 200.7
109.010	023	Thallium	EPA 200.7
109.010	024	Tin	EPA 200.7
109.010	026	Vanadium	EPA 200.7
109.010	027	Zinc	EPA 200.7
109.020	001	Aluminum	EPA 200.8
109.020	002	Antimony	EPA 200.8
109.020	003	Arsenic	EPA 200.8
109.020	004	Barium	EPA 200.8
109.020	005	Beryllium	EPA 200.8
109.020	006	Cadmium	EPA 200.8
109.020	007	Chromium	EPA 200.8
109.020	008	Cobalt	EPA 200.8
109.020	009	Copper	EPA 200.8
109.020	010	Lead	EPA 200.8
109.020	011	Manganese	EPA 200.8
109.020	012	Molybdenum	EPA 200.8
109.020	013	Nickel	EPA 200.8
109.020	014	Selenium	EPA 200.8
109.020	015	Silver	EPA 200.8
109.020	016	Thallium	EPA 200.8
109.020	017	Vanadium	EPA 200.8
109.020	018	Zinc	EPA 200.8
109.190	001	Mercury	EPA 245.1
109.192	001	Mercury	EPA 245.7
109.430	001	Aluminum	SM3120B
109.430	002	Antimony	SM3120B
109.430	003	Arsenic	SM3120B
109.430	004	Barium	SM3120B
109.430	005	Beryllium	SM3120B
109.430	007	Cadmium	SM3120B
109.430	009	Chromium	SM3120B
109.430	010	Cobalt	SM3120B

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SOIL CONTROL LABORATORY

Certificate No: 1494
Renew Date: 4/30/2007

109.430	011	Copper	SM3120B
109.430	012	Iron	SM3120B
109.430	013	Lead	SM3120B
109.430	015	Manganese	SM3120B
109.430	016	Molybdenum	SM3120B
109.430	017	Nickel	SM3120B
109.430	019	Selenium	SM3120B
109.430	021	Silver	SM3120B
109.430	023	Thallium	SM3120B
109.430	024	Vanadium	SM3120B
109.430	025	Zinc	SM3120B
109.811	001	Chromium (VI)	SM3500-Cr D (18th/19th)

Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste

114.010	001	Antimony	EPA 6010B
114.010	002	Arsenic	EPA 6010B
114.010	003	Barium	EPA 6010B
114.010	004	Beryllium	EPA 6010B
114.010	005	Cadmium	EPA 6010B
114.010	006	Chromium	EPA 6010B
114.010	007	Cobalt	EPA 6010B
114.010	008	Copper	EPA 6010B
114.010	009	Lead	EPA 6010B
114.010	010	Molybdenum	EPA 6010B
114.010	011	Nickel	EPA 6010B
114.010	012	Selenium	EPA 6010B
114.010	013	Silver	EPA 6010B
114.010	014	Thallium	EPA 6010B
114.010	015	Vanadium	EPA 6010B
114.010	016	Zinc	EPA 6010B
114.020	001	Antimony	EPA 6020
114.020	002	Arsenic	EPA 6020
114.020	003	Barium	EPA 6020
114.020	004	Beryllium	EPA 6020
114.020	005	Cadmium	EPA 6020
114.020	006	Chromium	EPA 6020
114.020	007	Cobalt	EPA 6020
114.020	008	Copper	EPA 6020
114.020	009	Lead	EPA 6020
114.020	010	Molybdenum	EPA 6020
114.020	011	Nickel	EPA 6020
114.020	012	Selenium	EPA 6020
114.020	013	Silver	EPA 6020
114.020	014	Thallium	EPA 6020

As of 9/6/2007, this list supersedes all previous lists for this certificate number.
 Customers: Please verify the current accreditation standing with the State.

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114.020	015	Vanadium	EPA 6020
114.020	016	Zinc	EPA 6020
114.103	001	Chromium (VI)	EPA 7196A
114.140	001	Mercury	EPA 7470A
114.141	001	Mercury	EPA 7471A
114.230	001	Sulfides, Total	EPA 9034
114.231	001	Sulfide	EPA 9215
114.240	001	Corrosivity - pH Determination	EPA 9040B
114.241	001	Corrosivity - pH Determination	EPA 9045C
114.270	001	Fluoride	EPA 9214

Field of Testing: 115 - Extraction Test of Hazardous Waste

115.021	001	TCLP Inorganics	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter11, Article 5, Appendix II

Field of Testing: 126 - Microbiology of Recreational Water

126.010	001	Total Coliform (Enumeration)	SM9221A,B,C
126.030	001	Fecal Coliform (Enumeration)	SM9221E
126.050	001	Total Coliform and E. coli	SM9223
126.080	001	Enterococci	IDEXX