

Section A7. Data Quality Objectives and Acceptability Criteria for Measurement Data

The SWAMP Program deals with characterizing the ambient conditions of the surface waters of California. For this reason, few enforcement, regulatory, or policy decisions will be made directly as a part of this project, although there may certainly be some regulatory actions taken as a direct result of SWAMP information. This is not, however, the focus of most of the RWQCB's for this program. The results of this project will be used, however, to support rulemaking, enforcement, regulatory, or policy decisions. SWAMP data which are collected following the requirements of this QAMP, and more specifically data which are produced by following the Data Quality Objectives (DQO's) as outlined in **Appendix C (Data Acceptability Criteria--DQO Tables, including QA sample types, frequencies, and corrective actions--for all types of analyses done in SWAMP, in all media)**, will be put into the SWAMP database and may be used by the SWRCB, the RWQCB's, other state agencies, federal and local agencies, public organizations and entities, and the general public to support and enhance:

- * establishment of baseline (ambient) water quality conditions;
- * analysis of trends in water quality and comparison to water quality standards;
- * maintenance of surveillance on sensitive aquatic ecosystems and water bodies of high public use and interest;
- * determination of the effectiveness of the implementation of water quality controls;
- * alerting RWRCB personnel to potential water quality violations and, in the case of documented violations, showing whether or not permit violations have contributed to water quality degradation;
- * water quality assessments in the biennial water quality inventory report (the 305(b) report) to the USEPA;
- * establishment of stream segment ranking (303(d) listing); and
- * numerous other region-specific objectives as outlined in their respective SWAMP Work Plans.

GOALS FOR ACHIEVING DATA QUALITY OBJECTIVES (DQO's)

Establishing DQO's is of little value if the proper quality assurance activities are not undertaken to ensure that such objectives will be met. Quality assurance in the SWAMP Program will be achieved by a number of measures, but with emphasis on the following:

- Developing a SWAMP Field Procedures Manual, or FPM (goal during FY02-03), with standardized methods, but using agreed-upon, documented standardized field methods to the extent currently practical and applicable until such time that the SWAMP FPM is developed;

- Implementing a 3rd party, external QA Program which will provide for the oversight of an Interlaboratory Calibration Exercise Program mandatory for all participating SWAMP labs, as well as providing for 3rd party (referee) oversight of SWAMP lab and field performance audits and other QA checks; and providing for QA/QC training and consultations for SWAMP staff as needed to ensure that they are familiar with the methods and able to achieve the DQO's;
- Forming and convening a SWAMP External Scientific Planning and Review Committee (SPARC), which will serve to bring together scientists that are "external" to the SWAMP Program to provide on-going peer review of all SWAMP activities, with QA oversight being one of the primary focuses; and last but certainly not least
- Documenting the comparability of laboratory and field methods that are consistent with the DQO's.

As with all other aspects of this SWAMP QAMP, the intent is to provide for minimum standards and guidelines that all participants should utilize, with strong encouragement to use more stringent criteria and to adopt methodologies that improve upon these minimum standards. The major goal that this SWAMP QAMP can accomplish, if all SWAMP participants abide by the stipulations put forth in this document, is to have representative, comparable, accurate and precise data that can be shared statewide, to the extent possible under the given limitations.

Until such time that a SWAMP Field Procedures Manual is prepared (over the next 12-15 months), **Appendix D** provides a collection of recommended minimum Standard Operating Procedures (SOP's) for Field Sample Collection (except for Bioassessment Procedures, which are documented in **Appendix G**), and **Appendix E** provides SOP's for Field Data Measurement Activities currently being conducted within SWAMP. These two appendices also provide reference citation and documentation of field methods being employed by SWAMP participants currently using alternate, but acceptable, standard methodologies. At the SWAMP Workshop held in July 2001 in Moss Landing, CA, sample collection and processing issues, as well as field data measurement issues, were discussed at length by all SWAMP participants in an attempt to reach consensus on as many points as possible for the use of standardized minimum methods for sample collection/processing activities, as well as field data measurement activities. What was agreed upon for the first several years of the "start-up" of the SWAMP Program was an approach to "standardize where possible; document otherwise". The need for flexibility to accommodate region-specific sample collection needs was acknowledged, but the need for striving for moving towards using standard methods to the extent possible was also agreed upon, as practical and appropriate.

Likewise, a single laboratory procedures manual has not been developed for SWAMP, since each of the participating laboratories have their own internal operating procedures and documented protocols which are available for review. The compilation and centralization of these analytical laboratory protocols (in electronic format) is still underway to ensure that the

SWAMP QA Program does have a copy of any protocol being employed by SWAMP labs, and that, at a minimum, if a standard method is used and is not modified, that this method citation is documented for the SWAMP QA Program.

Laboratory SOP's for Toxicity Testing are provided in **Appendix F**. Field Sample Collection and Field Data Measurement and Habitat Assessment SOP's, as well as Laboratory SOP's (taxonomy, sorting, counting, reporting, QA), for biological/ecological assessment, and for benthic infaunal community assessment of bottom sediment are detailed in **Appendix G**, with QAPP's from the primary entities conducting these services provided therein.

Data quality will be attained by maximizing and documenting the accuracy and precision of the methods used. Any changes in procedures due to equipment changes or to improved precision and accuracy will be documented. Analyses and determinations must be performed by qualified personnel in conformance with the United States Environmental Protection Agency (EPA) or DHS approved test procedures described in the current Code of Federal Regulations (CFR) (Title 40, Part 136); "Test Methods for Evaluating Solid Waste," SW-846; or Title 22, CFR, Article 11, as appropriate. The test procedures may be modified subject to the application and approval of alternate test procedures under the CFR (Title 40, Part 136.4). The SWAMP Program strongly encourages the use of "performance-based methodology" (PBM) for conducting analytical procedures and therefore recognized the use of modified standard procedures, as appropriately documented following CFR 40, Part 136.4. The use of PBM allows for approved procedures to be modified according to these guidelines, which provide results that are equal to or better than (more stringent than) the standard protocol that was modified.

Any project undertaken by SWAMP-participating entities will employ only methods and techniques which have been determined to produce measurement data of a known and verifiable quality and which are of quality sufficient to meet the overall objectives of the water quality monitoring investigation.

Representativeness

The representativeness of the data is mainly dependent on the sampling locations and the sampling procedures adequately representing the true condition of the sample site. Requirements for selecting sample sites are discussed in more detail in the SWAMP PM. Sample siting, sampling of relevant media (water, sediment and biota), and use of only approved/documented analytical methods will determine that the measurement data does represent the conditions at the investigation site, to the extent possible. The goal for meeting total representation of the site will be tempered by the types and number of potential sampling points and media as well as the potential funding required for meeting complete representativeness.

It is well known that water flowing past a given location on land is constantly changing in response to inflow, tidal cycle, weather, etc. Sampling schedules will be designed with respect to frequency, locations and methodology in order to maximize representativeness, where

possible and applicable. Likewise, however, for the collection of bed sediment samples, for instance, a built-in bias occurs due to focusing on collecting fine, recently deposited sediment, which may or may not be representative of specific sampling sites. Therefore, the samples collected from bed sediment may not be as thoroughly representative of the typical bed sediment within a particular sampling site, in many cases, since this program is focusing sediment collections on fine, recently-deposited bed sediment.

Comparability

The comparability of data produced by and for SWAMP is predetermined by the commitment of its staff and contracted laboratories to use standardized methods, where possible, including EPA-approved analytical methods, or documented modifications thereof which provide equal or better results. These methods have specified units in which the results are to be reported.

Measurements are made according to standard procedure, or documented modifications thereof which provide equal or better results, using common units such as Celsius, feet, feet/sec, mg/L, Φ g/L, mg/kg, etc. Analytical procedures are set by the USEPA approval list published in 40 CFR 136.

Completeness

The completeness of data is basically a relationship of how much of the data are available for use compared to the total potential data before any conclusion is reached. Ideally, 100% of the data should be available. However, the possibility of 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% data completeness.

- Therefore, 90% data completeness is required by SWAMP for data usage in most cases; for tissue studies involving deployment and retrieval of bagged bivalves, and involving the collection of finfish for contaminant analysis, an 85% data completeness level is required.

Precision and Accuracy

The precision and accuracy of data are 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). 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.

It is the responsibility of the program manager to verify that the data are representative while the analytical data's precision, accuracy, and comparability are mainly the responsibility of the laboratory supervisor. The program manager also has prime responsibility for determining that the 90% data completeness criteria (85% for tissue analyses as outlined previously) are met or for justifying acceptance of a lesser percentage.

Laboratories performing the analysis of samples for this project have developed precision and accuracy limits for acceptability of data. For parameters and matrices which have USEPA established criteria, the limits are either equal to, or more stringent than, the established limit.

For matrices without USEPA established criteria, the laboratories have developed control limits following the procedures published in the USEPA Handbook for Analytical Quality Control in Water and Wastewater Laboratories. These DQO's are used to evaluate the acceptability of each set of results. If the objectives are not passed for a particular analysis, the lab will immediately determine the cause of the discrepancy and resolve the problem.

Data Acceptability Criteria, QC sample purposes, QC sample frequencies, and resulting corrective actions for specific QC sample types, for each type of media, and for each analytical group (such as trace metals, organics, conventional constituents, etc.), are provided in Appendix C, rather than in the body of this QAMP, due to the length of the tables.

Appendix C also contains Target Reporting Limit Tables (for all analytical groups in all media), and contains the Sample Handling Requirements Tables (for all analytical groups in all media). This was done so that these QA/QC measures could be utilized in a stand-alone fashion, if desired, since those elements are "the meat" of the analytical and field criteria that flow from a QAMP, in large part.