

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION

111 JACKSON STREET, ROOM 6040
OAKLAND 94607Phone: Area Code 415
464-1255

September 26, 1986

File No. 2189.8009(TJB)

H.H. Davis, Jr.
Captain, U.S. Navy
Commanding Officer
Naval Air Station Moffett Field
Moffett Field, CA 94035

SUBJECT: REVIEW OF QUALITY ASSURANCE PROJECT PLAN FOR MOFFETT
FIELD NAVAL AIR STATION, SANTA CLARA COUNTY

Dear Commander Davis:

I am enclosing a copy of Regional Board staff's comments regarding the Quality Assurance Project Plan (QAPP) dated July 1986 prepared by Kennedy/Jenks/Cilton. The enclosed comments include those received from the Environmental Protection Agency, Santa Clara Valley Water District, and the State Water Resources Control Board. I have also included a copy of the Regional Board's Quality Assurance Project Plan Format for your information. The Format may assist you in revising the QAPP.

All of the comments will need to be addressed prior to receiving Regional Board approval. Regional Board staff is available to meet with your staff to discuss the comments. If you have any questions or comments please contact Tom Berkins of my staff at (415) 464-1249.

Sincerely,

Stephen I. Morse, Chief
South Bay Division

Enclosures

cc: Chuck Armstrong, DOHS/TSCD
Craig Von Bargaen, Camp, Dresser & McKee
Alex Dong, Western Div., NAVFACENGCOM
Michael Evans, Kennedy/Jenks/Cilton
Tom Iwamura, Santa Clara Valley Water Dist.
Lewis Mitani, EPA Region 9
Cmdr. Sims, Public Works Office, Moffett Field
Gil Torres, State Water Resources Control Board

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REVIEW OF QUALITY ASSURANCE PROJECT PLAN (QAPP)
FOR MOFFETT FIELD NAVAL AIR STATION

The following comments are in response to the QAPP for Moffett Field prepared by Kennedy/Jenks/Chilton dated July 16, 1986. The following includes comments received from EPA.

MAJOR COMMENTS

1. Section 3, Project Description - More information is needed to ensure the reviewer's comprehension of the project, and to provide a basis for defining the data quality objectives and the levels of quality assurance needed. Background information on the project should include, briefly, the operational history of the sites, the nature of the wastes deposited, results of previous investigations, the substances detected, and their measured concentration ranges. The relevance to the sites of the A, B, and C aquifers, which was not described, needs explanation. The experimental design of the current project should be outlined, naming the substances which will be analyzed, and presenting the rationale for selecting or omitting from analysis compounds on the priority pollutant or HSL lists. The intended uses of the data should be considered in determining the data quality objectives. The reason for analyzing the metals and BNA's in new wells but not in existing wells, and the criteria for deciding the need for quarterly monitoring of the metals and BNA's in the new wells, as stated in Section 6, Table 2 (Chemical Analyses to Be Performed), should be given. The minimum sampling interval which will provide the "complete set of analyzed data on the specified frequency" referred to in Section 14, page 1, should be indicated.

2. Section 3, Scope - A schedule of activities and anticipated completion dates should be included. This may include, but is not limited to, initiation of sample collection, sample analysis, data review and reporting, data validation, and final report preparation.

3. Section 3, Page 2, last paragraph - A general list of chemical groups to be analyzed is presented. For each soil and water sample analyzed by GC/MS, the Navy should produce a tabulated list of the highest probable match for each of the major compounds not listed as a priority pollutant (up to 10 compounds per volatile fraction and up to 20 compounds per semi-volatile fraction) including the CAS (Chemical Abstracts Registry) number, tentative identification and estimated concentration. Methods for tentative identification and semi-quantification of non-priority pollutant compounds should coincide with Contract Laboratory Program (CLP) contract language.

The QAPP should also be modified to state that it will be necessary to analyze quarterly samples for BNA's and metals depending on the results of the initial sampling rounds.

4. Section 3, Page 2, Scope - In order to adequately define the character and extent of contamination associated with source areas on Moffett Field NAS, both priority pollutants and non-priority pollutants will need to be analyzed for in both soil and water. Priority pollutants are proposed by the Navy to be analyzed for in soil and groundwater. In order to determine what additional non-priority pollutant chemicals should be analyzed, the Navy needs to produce a list of chemicals associated with source areas and risk that each chemical poses. In cases where many chemicals are associated with single products (i.e., JP-5, MoGas, Paint), a list of chemicals contained in the product, which may pose a risk to the environment and/or public, needs to be produced. These potential contaminants should then be analyzed for during the initial and subsequent phases of the investigation.

5. Section 5, Quality Assurance Objective - The data quality objectives for precision and accuracy for both field and laboratory analyses need to be specified. The setting of objectives is intended to ensure that the data produced will accomplish the project goals (and may also be used to screen data for acceptability.) In reverse of the sequence which apparently was followed, the data quality objectives for the project should be specified first; these are then used to guide the selection of appropriate sampling analytical methods, quality control measures, and analytical laboratory. The intended uses of the data, theoretical values from published methods or laboratory records, and observed values from hazardous waste sites, are all considerations. For example, analyses performed to characterize the extent of contamination are likely to need more rigorous control than those used for logging wells, and this is reflected in the data quality objectives. The values given by the EPA methods are not EPA goals, but indicators of the capabilities of the methods. In Section 10, Data Reduction, Validation, and Reporting, the statement that "water levels are reported to the nearest 0.05 ft after two measurements agree" indicates the precision of the agreement. Goals should likewise be set for the other analytical parameters. In cases where the setting of accuracy goals are irrelevant, this may be explained.

In Table 1 or elsewhere in the Plan, all of the substances to be measured should be tabulated and the analytical procedures identified. If bicarbonate and carbonate analyses will be performed using the method for alkalinity, as implied in Table 3, this should be indicated. The statement in Section 6, page 2, that the groundwater metals samples will be filtered through 0.45u filters, suggests that dissolved metals will be analyzed; this should be made clear, as the review of the preservation method and holding time is dependent on this knowledge. The soil extraction method should be identified, out of the choices

provided by the analytical methods. EPA Methods 625 and 8270 for the analysis of BNA's are not equivalent methods -- Method 625 is a packed-column GC technique, while Method 8270 uses a capillary column. A capillary column may be substituted in Method 625 only after validation for precision and accuracy as dictated by the method. If the two methods are intended to be used interchangeably in this project, their comparability should also be documented beforehand.

6. Section 6, Sampling Procedures - The following items describe protocols suggested for reconsideration (items a, b, and d) and elements which need to be addressed more fully (items c and e):

a. The equipment decontamination measures may be inadequate. The following procedure is recommended:

Wash with non-phosphate detergent (to avoid analytical interference);

Water rinse;

Nitric acid rinse (for metals analyses);

Distilled-deionized water rinse;

Solvent rinse (pesticide-grade hexane), then organic-free water rinse (for organics analyses)

b. Sample containers should be secured with custody seals over the caps.

c. The sample-splitting procedures, the provision for transport, and the anticipated transit time to the laboratory for the split-sample analyses, should be described. This information is important with respect to sample preservation and holding times.

d. Ice chests containing samples should be maintained at 4 C. Blue ice may suffice for same-day transport, but regular ice is recommended for longer storage periods.

e. Clarification of several items in Table 3 (Sample Containers, Preservation, Methods, and Holding Times) is needed. If mercury will be analyzed, the holding time is 28 days, in contrast to 6 months for other metals. The sample bottle from which aliquots for analyses of the metals, magnesium, potassium, and sodium will be drawn should be specified. Table 2, Chemical Analyses to Be Performed, categorizes these as major ions, which will not be preserved with acid; however, samples for magnesium analysis require this treatment. The title for Table 3 is inaccurate.

7. Section 9, Analytical Procedures - For each parameter to be analyzed in the laboratory, cite the analytical method, detection

limit, and method reference. A tabular summary is best, for example:

<u>Parameter</u>	<u>Analytical Method</u>	<u>Detection Limit</u>	<u>Method Reference</u>	<u>Method No.</u>	<u>Source</u>
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EPA approved procedures should be used unless a procedure does not exist or interferences create analytical problems. If unusual compounds are of interest or a non-EPA approved method is to be used, a copy of the method including precision and accuracy information should be provided. Actual detection limits obtained during chemical analyses needs to be reported in monitoring reports.

TECHNICAL COMMENTS

8. Section 6, Page 2, Groundwater Sampling - Standard protocol calls for purging a minimum of three well casing volumes prior to sampling. Purging should continue, after the minimum of three purging volumes, until 1) pH, specific conductance, and temperature stabilizes or 2) ten purging volumes are evacuated. Purging parameters should be recorded in the field, with data presented to the Agencies. Rope used with a bailer or a submersible pump should be used in such a manner as to not cross-contaminate the sample and/or bias the data. Criteria for the use of rope with the sampling method needs to be presented.

9. Section 6, Table 2 - The following is recommended:

- a) Two rounds of sampling and analysis will be performed on new wells during the first two months after installation. EPA Method 601 and 602 will be used for chemical analyses. PH, TOC, TDS, EC, and major anions/cations will also be analyzed.
- b) Existing wells and the first quarterly sampling of newly installed wells will be tested with EPA Method 624 and 625, and for Priority Pollutant Metals, pH, EC, TOC and TDS. GC/MS Method 624 and 625 will have tentative identification and semi-quantification of up to 10 volatile and 20 semi-volatile non-Priority Pollutants.
- c) Newly installed wells and existing wells which have been adequately tested for compounds listed under item (b) will be sampled and analyzed quarterly. Quarterly samples will be collected and analyzed for EPA Method 601 and 602 compounds, along with pH, EC, and TOC. Additional analyses will be performed quarterly if contaminants have been previously identified or if evidence exists that chemicals are potentially present.

- d) VOC analyses (EPA Methods 601, 602, or 624) should be analyzed for cis-1,2-Dichloroethene, freon 113, freon 11, and xylenes.

In addition, the following language should be added to Table 2 for GC/MS analyses:

- Whenever EPA Method 624 or 8240 is used to analyze a sample collected, the laboratory data report will include all of the volatile Priority Pollutant compounds. In addition, up to 10 non-Priority Pollutant substances of greatest apparent concentration will be tentatively identified via a forward search of the EPA/NIH mass spectral library. Substances with responses less than 10% of the internal standard are not required to be searched in this fashion. Tentative identifications will only be assigned after a visual comparison of the sample spectra with the nearest library searches by a mass spectral interpretation specialist. Substances which have been tentatively identified in this way will be semi-quantified by the internal standard method. The tentative identifications and semi-quantified concentrations of such substance will be tabulated in the laboratory data report.

- Whenever EPA Method 625, 8250, or 8270 is used to analyze a sample collected, the laboratory data report will include all of the acid, base, and neutral extractable Priority Pollutants. In addition, up to 20 non-Priority Pollutant substances of greatest apparent concentration will be tentatively identified via a forward search of the EPA/NIH mass spectral library. Substances with responses less than 10% of the internal standard are not required to be searched in this fashion. Tentative identifications will only be assigned after a visual comparison of the sample spectra with the nearest library searches by a mass spectral interpretation specialist. Substances which have been tentatively identified in this way, will be semi-quantified by the internal standard method. The tentative identifications and semi-quantified concentrations of such substances will be tabulated in the laboratory data report.

Additional criteria for chemical analysis is presented under item 3 and 4 of this review. Chemicals identified under item 8 need to be initially analyzed with the item 9(b) sampling effort.

10. Section 8, Calibration Procedures and Frequency - The calibration frequencies for the OVA and the HNu should be specified. pH meter temperature compensation should be considered. All calibrations and repairs should be recorded in a logbook.

11. Section 11, Internal Quality Control Checks and Frequency - Recommendations for field quality control checks which vary from

those proposed, are listed below:

Travel blanks for VOCs: organic-free water; one blank/shipping container/day;
Field duplicates: greater of one/matrix/day or 10% of samples;
Blanks and duplicates are submitted blind to the laboratories;
Soil background samples: one/day.

Some clarification of the laboratory quality control protocol is needed, as follows:

- a. The frequency of blank analyses with respect to "runs of samples" is unclear; what constitutes a run?
 - b. The resolution of problems involving reagent water blank contamination should involve identification of the source of the contamination instead of instrument adjustment.
 - c. State whether an out-of-control situation regarding accuracy will be identified by comparison with limits given by the EPA method as expressed in this section, or with the laboratory control limits, as described in Section 14, Specific Routine Procedures to Assess Data Precision, Accuracy, and Completeness.
 - d. The laboratory quality control measures which will be carried out by the laboratory analyzing the split samples should be included.
12. Section 3, Page 2, Scope - As stated "The following elements are included in the study:
- "Visual examination of soil samples for classification purposes." It is unclear what this statement implies. If it means "lithologic logging of all boreholes" this should be so stated.
 - "Pump tests to estimate aquifer characteristics." Aquifer testing should be determine hydraulic parameters in both aquifers and aquitards.
13. Section 6, page 1, sixth paragraph - From which of the tubes (upper, middle, or lower) will the soil samples be taken? Clarify. Be consistent in using the same (relative position) tube for each sample. The top and bottom of the tube chosen for analysis should be clearly labeled. Soil samples analyzed should be cores taken from the center of the sampling tubes.
14. Section 6, Pages 1 & 2, Collection of Soil Samples - References are made for cleaning equipment with "soap", "detergent"

and "another approved cleaning compound", in paragraphs 4, 6, and 7. These cleansers should be specified. Cleansers should not be used which will potentially bias results of the sampling effort.

15. Section 7, Page 1, Sample Custody - The sample label should also identify the place of collection. The sample custody record should show the time of analysis, which is especially significant for analyses requiring short holding times.

PROCEDURAL AND MINOR COMMENTS

16. Section 3, Page 1, Purpose - This section outlines the purpose and objectives of the Confirmation Study. It would be preferable to clearly identify objectives in an outline format with specific bullets. Essential objectives of the investigation are: a) Define both the lateral and vertical extent of contamination, along with quantities, concentrations and characteristics of contaminated soils, groundwater and potentially surface water; b) Evaluate hydrologic and geochemical factors which influence movement and concentrations of site-related chemicals; c) Evaluate specific risks and hazards to public health and the environment that result from site-related contamination; and d) Identify the appropriate cleanup criteria and provide a quantitative basis for a feasible selection of an effective remedial action. These four objectives are not considered to be the only objectives of the Characterization Study, but do provide additional clarification of objectives needed to guide a study to support a Remedial Investigation, Endangerment Assessment and Feasibility Study.

17. The Title page should include provisions for approval by the the contractor's quality assurance officer, the Navy's project officer(s), and the California Regional Water Quality Control Board quality assurance officer (see attached QAPP Format - element 1).

18. Section 2, Table of Contents - It is recommended that an Introduction section be added to the Table of Contents. The Introduction should state what documents the Quality Assurance Project Plan (QAPP) is based upon. The QAPP should be based on and be consistent with the following:

- Work Plan for Step II, Confirmation Study (Characterization Step) for NAS, Moffett Field, California (February 1986).
- U.S. EPA, National Contingency Plan, 40 CFR 300, 50 FR 47912 (November 20, 1985).
- U.S. EPA, Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80 (December 29, 1980).

- U.S. EPA, Draft Supplement to: Interim Guidelines and Specification for Preparing Quality Assurance Project Plans, QAMS-005/80, (January 1986).
- Guidance on Remedial Investigations Under CERCLA (June 1985).

19. Section 4, Project Organization and Responsibility - It should be clearly stated that the QA Coordinator will evaluate and monitor both field and laboratory QA/AC procedures. A statement needs to be included that if QA/QC problems or deficiencies requiring corrective action occur, such action will be taken under supervision of the QA Coordinator and Project Manager. Any QA/QC problem or deficiency should be reported to the Agencies overseeing the project.

20. Section 7, Page 2, Sample Custody - A bound field log book must be maintained and contain information pertinent to field surveys, measurements and/or sampling. Entries in the log book should also contain the following data:

- Name and title of author, date and time of entry, and physical/environmental conditions during field activity
- Location of sampling or measurement activity
- Name(s) and title(s) of field crew
- Type of sampled or measured media (e.g., soil, sediment, groundwater, etc.)
- Sample collection or measurement method(s)
- Number and volume of sample(s) taken
- Description of sampling point(s)
- Description of measuring reference points
- Date and time of collection or measurement
- Sample identification number(s)
 - Sample distribution (e.g., laboratory)
 - Field observations/comments
 - Field measurements data (pH, etc.)

21. Section 9, Analytical Procedures - State whether the split-sample analyses will be performed using identical procedures for both samples.

22. Section 10, Data Reduction, Validation, and Reporting - This section should include the data-flow scheme describing the treatment of the data submitted by the analytical laboratories, e. g., review, validation, integration of split-sample data.

23. Section 12, Performance and System Audits and Frequency - Describe these measures with respect to the laboratory which will analyze the split samples, in addition to the primary laboratory.

QUALITY ASSURANCE PROJECT PLAN FORMAT

16 ELEMENTS TO BE INCLUDED IN A QUALITY ASSURANCE PROJECT PLAN

1. Title Page with Provision for Approval Signatures
2. Table of Contents
3. Project Description
4. Project Organization and Responsibility
5. Q.A. Objectives for Measurement of Data in Terms of Precision, Accuracy, Completeness, Representativeness, and Comparability
6. Sampling Procedures
7. Sample Custody
8. Calibration Procedures and Frequency
9. Analytical Procedures
10. Data Reduction, Validation, and Reporting
11. Internal Quality Control Checks
12. Performance and System Audits
13. Preventative Maintenance
14. Specific Routine Procedures Used to Assess Data Precision, Accuracy and Completeness
15. Corrective Action
16. Quality Assurance Reports to Management

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1. Title Page

QUALITY ASSURANCE PROJECT PLAN FOR

Project Title

Document Control Number

Organization's Name

Address

Telephone Number

APPROVALS:

Name and Title of Organization's
Project Manager

Date

Name and Title of Organization's
Quality Assurance Official

Date

California Regional Water Quality
Control Board, San Francisco Bay Region
Quality Assurance Official

Date

2. Table of Contents

1. Introduction (Optional)
- / 2. Title Page with Provisions for Approval Signatures
- / 3. Table of Contents
- / 4. Project Description
- / 5. Project Organization and Responsibility
- / 6. Q.A. Objectives for measurement of Data in Terms of Precision, Accuracy, Completeness, Representativeness, and Comparability
- / 7. Sampling Procedures
- / 8. Sample Custody
- / 9. Calibration Procedures and Frequency
- / 10. Analytical Procedures
- / 11. Data Reduction, Validation, and Reporting
- / 12. Internal Quality Control Checks
13. Performance and System Audits
14. Preventative Maintenance
15. Specific Routine Procedures Used to Assess Data Precision, Accuracy and Completeness
- / 16. Corrective Action
- / 17. Quality Assurance Reports to Management

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Date _____
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3. Project Description

Address the following:

Project objective (i.e. purpose or goal) -

Pertinent background information -

Intended use of data (i.e. monitoring, enforcement, etc.) -

Overview of project activities (i.e. scope of project, the approach taken to achieve goals) -

Schedule of activities and anticipated completion dates. This may include but is not limited to initiation of sample collection, sample analysis, data review and reporting, data validation, and final report preparation. Refer to the Sample Plan for specifics. -

4. Project Organization and Responsibility

Include a statement on each key individual, including the Quality Assurance Officer(s) and the technical consulting firm, who are responsible for ensuring collection of valid measurement data and the routine assessment of measurement systems for precision and accuracy. State their duties which may include the review of calculations and reports, providing training to personnel, and ensuring that established protocols and procedures are followed. Provide a flow diagram which includes the individuals discussed, their interaction with each other, and the line of authority. Also, provide information on the training provided to personnel to accomplish their tasks.

5. Quality Assurance Objectives for Measurement of Data in Terms of Precision, Accuracy, Completeness, Representativeness, and Comparability

For each major parameter, provide the Quality Assurance objectives for precision, accuracy, and completeness for both field and laboratory analysis. Summarize these objectives in a table format. Also, address representativeness and comparability for both field and laboratory analyses (See Appendix A for a definition of terms).

Field Analyses

Representativeness -

Comparability (units data reported in) -

Laboratory Analyses

Representativeness -

Comparability (units data reported in) -

Section # 6
Revision # _____
Date _____
Page _____ of _____

6. Sampling Procedures

Sampling procedures may be discussed in Section VI of the Sample Plan or here. Refer to the Sample Plan format for additional methods and procedures. In addition to those as outlined in the Sample Plan, procedures shall include, but not be limited to the following:

Inclusion of specific sampling procedures to be used (by reference in the case of standard procedures and by actual description of the entire procedure in the case of nonstandard procedures).

Charts, flow diagrams or tables delineating sampling program operations.

A description of containers, procedures, reagents, etc., used for sample collection, preservation, transport, and storage.

Special conditions for the preparation of sampling equipment and containers to avoid sample contamination (e.g., containers for organics should be solvent-rinsed; containers for trace metals should be acid-rinsed).

Sample preservation methods and hold times.

Time considerations for shipping samples promptly to the laboratory.

Sample custody or chain-of-custody procedures (See Section 7).

Forms, notebooks and procedures to be used to record sample history, sampling conditions and analyses to be performed.

7. Sample Custody

State of California certified laboratories and field sampling efforts associated with these laboratories must address the following (Documentation of many of the procedures can be fulfilled by submittal of the laboratory quality assurance manual):

Procedures and forms for recording the exact location and specific considerations associated with sample acquisition.

Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (i.e. filters).

Documentation of laboratory and field sample preservation methods. See Section VI. E. of the Sample Plan for a discussion of field preservation techniques.

Details of labeling techniques.

A copy of the chain of custody form. Provide forms used in the field and laboratory. See Section VI. G. of the Sample Plan for a discussion of field documentation methods.

Identify the responsible laboratory personnel who acts as sample custodian.

Laboratory procedures for sample handling, storage and dispersement for analysis.

Specification of laboratory sample custody procedures for sampling, handling, storage, and dispersement for analysis.

8. Calibration Procedures and Frequency

For each major piece of equipment used for field monitoring activities, provide the information listed below. Quality assurance manuals and methods may be referenced, but appropriate sections must be provided as appendices.

Field Equipment

Equipment to be used -

Calibration procedures (Reference or description of procedures) -

Frequency of recalibration -

Calibration standards used -

Source of standards -

Where calibrations and repairs are logged (Notebooks) -

Laboratory Equipment

Equipment:

Calibration procedures (Reference or description of procedures) -

Frequency of recalibration -

Calibration standards used -

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Source of Standards -

Where calibrations and Repairs are logged -

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9. Analytical Procedures

For each analytical procedure performed in the field or laboratory, reference or cite the method name and number (copies may need to be provided) or provide a description of the analytical procedure. Include the analyte or parameter group, the name of the method, the method number (if applicable), and detection limit. See Appendix B for a listing of common sources of methods used for analyses.

10. Data Reduction, Validation, and Reporting

Procedures used for data reduction, validation and reporting are described below:

Equations used to calculate concentrations or value of measured parameter, and reporting units -

Principal criteria that will be used to validate data during collection and reporting of data. Also, address what percent agreement must occur between field samples in order to be considered valid -

Methods used to identify and treat outliers -

Data flow or reporting scheme from collection of raw data to storage of validated analytical results. Provisions for maintaining copies of chromatographs -

Responsible individuals who will handle data -

Provision for preparation of a technical ^{report} for each phase of the investigation is covered by Section VIII of the Sample Plan.

11. Internal Quality Control Checks

Minimum suggested field quality control measures are as follows:

- 1 duplicate/matrix/day/concentration or 10% of samples
- 1 field blank/matrix/day/concentration/laboratory
- 1 VOA travel blank/day/shipping container
- 1 background sample/day

Minimum laboratory quality control is dependent on the analyte and should be addressed in the laboratory's quality assurance manual. The following are the most commonly used methods for quality control. Indicate the method(s) and frequency of internal quality control checks to be used for laboratory and field activities (Field quality control activities should also be included in the Sample Plan):

Replicates -

Spiked samples (Daily matrix spikes and periodic blind samples) -

Split samples -

Blanks -

Background -

Internal standards -

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Performance quality control samples -

Surrogate samples -

Calibration standards and devices -

Reagent checks -

Zero and span gases -

Control charts -

Other -

12. Performance and System Audits

Laboratory and field personnel participate in performance and system audits and quality control check sample programs as listed below:

Internal Audits

General description of audits to be conducted -

Systems audits are conducted by -

Frequency of audits -

Person to receive audit reports -

External Audits

General description of audits to be conducted -

Systems audits are conducted by -

Frequency of audits -

Person to receive audit reports -

13. Preventative Maintenance

A preventive maintenance program consisting of scheduled routine maintenance of laboratory and field equipment to minimize downtime and out-of-control situations is conducted. Equipment, their maintenance schedules, and critical spare parts are maintained to reduce down time as follows:

<u>Equipment</u>	<u>Maintenance</u>	<u>Interval</u>	<u>Critical Spare Parts</u>
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14. Specific Routine Procedures Used to Assess Data Precision, Accuracy and Completeness (Data Review)

The procedures used to assess data precision, accuracy, and completeness are as follows (Address each measurement parameter and include the equations used to calculate precision, accuracy, and completeness. Examples of statistical procedures are: arithmetic mean, range, standard deviation, t-test, f-test, chi-square test, confidence limits):

Data precision -

Data accuracy -

Data completeness -

15. Corrective Action

Corrective action procedures must be implemented at times due to questionable data. These actions should address the following:

Predetermined limits for data acceptability beyond which corrective action is required (i.e. spike recoveries less than 60% required corrective action) -

Procedures for corrective action (i.e. re-evaluation of analyst's work, instrumentation checks) -

Person(s) responsible for initiating the corrective action and for approving the corrective action -

See Section I of the Sample Plan for a discussion of corrective actions to be taken for field and project activities.

16. Quality Assurance Reports to Management

Quality assurance reports to management should include the following information:

Periodic assessment of measurement data accuracy, precision and completeness -

Results of performance audits -

Results of system audits -

Significant quality assurance problems and recommended solutions -

Other -

A final report will be prepared for each project on the performance of measurement systems and data accuracy -

The individual(s) responsible for preparing the reports is (are) -

Frequency of periodic reports -

Reports submitted to RWQCB Yes No

APPENDIX A

DEFINITIONS

Accuracy: the degree of agreement of a measurement with an accepted reference or true value.

Comparability: expresses the confidence with which one data set can be compared to another.

Completeness: the amount of valid data obtained from a measurement system compared to the amount that was expected and needed to be obtained to meet the project data goals.

Data Reduction: mathematical and or statistical procedures used to convert raw measurement(s) to the final reported form.

Data Validation: a systematic process for reviewing a body of data against a set of criteria to provide assurance that the data are adequate for their intended use. Data validation consists of data editing, screening, checking, auditing, verification, and review.

Duplicate Sample Analyses: Duplicate samples analyzed daily to show precision of the method.

Out-of-Control: generated data that fall outside established acceptance limits.

Performance Audit: procedure used to determine quantitatively the accuracy of measurement data through the use of performance evaluation samples.

Precision: a measure of mutual agreement among individual similar conditions. Usually expressed in terms of the standard deviation.

Quality Assurance: the total integrated program for assuring the reliability of monitoring and measurement data. A system for integrating the quality planning, quality assessment, and quality improvement efforts to meet user requirements.

Quality Control: the routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process.

Replicate Sample Analyses: sampling done in triplicate to allow for one analysis, one for duplication and one for matrix checks or re-analysis.

Representativeness: a sample or group of samples that reflects the characteristic of the media at the sampling point. It also includes how well the sampling point represents the actual parameter variations which are under study.

APPENDIX B

SAMPLE COLLECTION AND ANALYTICAL REFERENCES

Sampling Methods

Water

1. Handbook for Sampling and Sample Preservation of Water and Wastewater, EPA 600/4-82-029, September 1982.
2. Addendum to Handbook for Sampling and Sample Preservation, EPA 600/4-83-039.
3. Manual of Groundwater Sampling Procedures, NWWA/EPA Series.

Hazardous Wastes

1. Samples and Sampling Procedures for Hazardous Waste Streams, EPA 600/2-80-018, January 1980.
2. Test Methods for Evaluating Solid Waste, SW-846.

Pesticides

1. NEIC Pesticide Sampling Guide, EPA-330/9-81-001, March 1981.

Analytical Methods

Water

1. Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, revised March 1983.
2. Standard Methods for the Examination of Water and Wastewater, 15th Edition.
3. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA 600/4-82-057, July 1982.
4. Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA 600/4-80-032, August 1980.
5. Microbiological Methods for Monitoring the Environment, EPA 600/8-78-017, December 1978.

Hazardous Wastes

1. Test Methods for Evaluating Solid Waste, SW-846, July 1982. Addendum of Proposed Sampling and Analytical Methods, 1984, EPA, RCRA.
2. Methods for CERCLA Hazardous Substances, Vols. 1, 2 and 3, EPA 600/x-83-071, November 1983.

Split Sample: a sample collected for the purpose of analysis by two laboratories.

Systems Audit: A review of the total data generation process which includes on-site reviews of the field and laboratory operation systems, physical facilities for sampling, equipment calibrations, and measurement protocols.