U.S. Environmental Protection Agency (EPA)
Region III
1650 Arch Street
Philadelphia, PA 19103-20290755

US EPA - Region III

Guide for preparing a

Generic Quality Assurance Project Plan

for a

State RCRA Subtitle C or

LUST or UST Program

October 2000

This document provides examples of the kind of information that should be included in a generic Quality Assurance Project Plan (QAPP) for a state RCRA Subtitle C or UST or LUST Program. State QAPPs should provide a detailed description of specific activities that are being performed. This generic QAPP must be submitted to EPA Region III for review and approval. When applicable, a site-specific Sampling and Analysis Plan may also be required.

The technical specifications in this QAPP Template do not supercede state, local and/or site-specific Applicable, Relevant and Appropriate Requirements (ARARs).

This document has been derived from the US EPA QA/R-5: EPA Requirements for Quality Assurance Project Plans.

Title and Approval Page

_____

Document Title

_____

Prepared by: (Preparer's Name and Organizational Affiliation)

_____

Address and Telephone Number

_____

Day/Month/Year

State Program Director:_____

Signature

_____

Printed Name/Date

State Program QA Manager:_____

Signature

_____

Printed Name/Date

U.S. EPA Project Manager Approval:_____

Printed Name/Date

_____

Printed Name/Date

TABLE OF CONTENTS

PROJECT MANAGEMENT

A.1 PROGRAM DESCRIPTION

Describe all program activities(i.e., compliance enforcement inspections, groundwater monitoring inspections, compliance monitoring, site assessments, data reviews of information input into the biennial report, emergency response activities, remediation activities, technical evaluations of permits, etc) that are covered by this QAPP. For each activity, identify the information that will be needed to make informed, defensible decisions and how this information will be obtained. Cite applicable technical, regulatory or program-specific quality standards, criteria or objectives.

A2 PROGRAM ORGANIZATION AND RESPONSIBILITY

Include titles, responsibilities and organizational affiliation of persons involved in environmental data collection, analysis and evaluation. Titles, responsibilities and organizational affiliation of persons involved in overall project coordination, overall QA for program activities, systems auditing, data processing activities and data quality reviews ***must*** *be included. If applicable, include information about sampling and analytical operations.*

- Overall program coordination. - *insert name and/or title of person responsible for this activity. Provide a brief description the roles and responsibilities of this person.*
- Overall QA for all program activities - *insert name and/or title of person responsible for this activity. Provide a brief description the roles and responsibilities of this person. On QA matters, this person should report directly to the person responsible for overall program coordination.*
- Systems auditing (on-site evaluations) - *insert name and/or title of person responsible for this activity. Provide a brief description the roles and responsibilities of this person. At a minimum of once per year, this individual(s) should accompany inspectors or field samplers to evaluate whether they are adhering to the program's protocols.*
- Performance auditing. - *If applicable, insert name and/or title of person responsible for this activity. Provide a brief description the roles and responsibilities of this person.*
- Sampling operations - *If applicable, insert name and/or title of person responsible for this activity. Provide a brief description the roles and responsibilities of this person(s).*
- Sampling QC - *If applicable, insert name and/or title of person*

responsible for this activity. Provide a brief description the roles and responsibilities of this person(s).

- Laboratory analyses - *If applicable, insert name and address of laboratory that performs work for this program. If more than one laboratory is used, insert list of names and addresses of all laboratories that perform work for this program.*
- Laboratory QC - *If applicable, insert name and/or title of person responsible for this activity. Provide a brief description the roles and responsibilities of this person(s).*
- Data processing activities - *insert name and/or title of person responsible for this activity. Provide a brief description the roles and responsibilities of this person(s).*
- Data processing QC - *insert name and/or title of person responsible for this activity. Provide a brief description the roles and responsibilities of this person(s).*
- Data quality review - *insert name and/or title of person responsible for this activity. Provide a brief description the roles and responsibilities of this person(s).*

Modify the program's organizational chart to show reporting relationships and lines of authority for all individuals involved in environmental data collection. Individuals who use non-measurement data (i.e., inspection reports, facility databases, etc.) to make decisions should also be included. Include titles, responsibilities and organizational affiliation of all project participants. All names and titles of persons in the bulleted list should be included in the organizational chart. Attach the program's organizational chart. The organizational chart should be labeled Figure 1.1.

The organizational chart provides sufficient evidence that the lines of authority for all referenced organizations (including contractors and subcontractors) is appropriate to accomplish the QA objectives of this program.

A3 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Data collected from this program will be used to:

State the appropriate objective(s). Examples of potential objectives are provided below. This is not meant to be an exhaustive list.

- Ascertain if there is a threat to public health or the environment.
- Locate and identify potential sources of contamination. Sampling data will be used to formulate remediation strategies, and estimate remediation costs.

- Determine treatment and disposal options. Characterize soil for on-site or off-site treatment.
- Verify attainment of clean-up goals. Ascertain if additional remediation is required.
- Identify all persons participating in the management of hazardous waste in the state, including transporters, generators and treatment, storage and disposal facilities.
- Monitor and ensure regulatory compliance with State and federal hazardous waste rules and regulations

When conducting investigations or using environmental data, only measurements and information that is reflective of the medium and conditions will be used. Certain activities have pre-defined project quality objectives and measurement criteria. *Examples of these kinds of activities are provided below. Insert other activities that represent your program. A list of these activities is provided below:*

Activity	Measurement Criteria
Compliance Evaluation Inspections	Parameters and detection limits specified in consent and permit orders.
Comprehensive Ground-water Monitoring Evaluation	
Compliance Sampling Inspection	Parameters and detection limits specified in consent and permit orders.
Operation and Maintenance Inspection	Parameters and detection limits specified in treatment standards in 40 CFR, Part 268
Case Development Inspection	

When applicable, the Data Quality Objectives (DQO) process outlined in EPA QA/G-4: Guidance for the Data Quality Objectives Process will be followed. Data Quality Objectives (DQOs) are qualitative and quantitative statements which specify the quality of environmental

monitoring data required to support decisions. DQOs are predicated in accordance with the anticipated end uses of the data which are to be collected. DQOs are applicable to phases and aspects of the data collection process including site investigation, design, construction, and remedy operations. It is important to note that the level of detail and data quality needed will vary with the intended use of the data. The DQO process consists of the following seven steps:

Step 1 – State the Problem - The problem will be concisely summarized, with prior studies and existing information reviewed.
Step 2 – Identify the Decision – The decision to be made based on the environmental data collected will be identified.
Step 3 – Identify Inputs to the decision – The information needed to make the decision will be identified.
Step 4 – Define the Boundaries of the Study – The time periods and area of study will be identified, including when and where data will be collected.
Step 5 – Develop a Decision Rule – The specific action levels and parameters of interest will be defined and integrated with the previous DQO outputs to describe a logical basis for choosing an appropriate action based on the results.
Step 6 – Specify Limits on Decision Errors – The acceptable decision error rate based on the possible consequences of making an incorrect decision will be established.
Step 7 – Optimize the Design for Obtaining Data – The information from the previous steps will be evaluated to generate alternative data collection designs to meet and satisfy the DQOs in the most efficient manner.

This process will be used for the following activities:

Identify activities that require the use of the DQO process. An example of one type of activity would be to

- Locate and identify potential sources of contamination. .

When the DQO process is used, site-specific Data Quality Objectives and measurement performance criteria will be included in a Sampling and Analysis Plan. Prior to the initiation of these types of data activities, a site-specific Sampling and Analysis Plan (SAP) will be prepared. This SAP shall:

- Logically evaluate available site information.
- Specify site-specific Measurement Quality Objectives for precision, accuracy and completeness for each parameter being measured.
- Select an appropriate sampling design.
- Select and utilize suitable geophysical, analytical screening, and sampling techniques.

- Employ proper sample collection and preservation techniques.
- Collect and analyze appropriate quality assurance/quality control (QA/QC) samples.
- Logically present and interpret analytical and geophysical data.
- Define data usability criteria.

A4 SPECIAL TRAINING REQUIREMENTS/CERTIFICATIONS

Inspectors are required to complete the following training:
Include a list of basic training required for inspectors. Examples of types of training that could be included are provided below:

- Basic Inspector Training
- OSHA 40-hour Hazardous Waste Cleanup Course
- Advanced RCRA Inspector Training

If certified laboratories are used to analyze samples for your program, provide a list of each of the laboratory's certifications. Laboratory certifications should be germane to the types of analyses that are being performed for the program.

If additional training or certifications are required for program staff, please list the training courses or describe the certifications

MEASUREMENT/DATA ACQUISITION

B1 SAMPLING METHODS REQUIREMENTS

This section should only be included if it is applicable to your program activities.

The purpose of sample collection is to determine the presence and identity of contaminants along with the extent to which they have become integrated into the surrounding environment. The objective of this effort is to collect and analyze a sample which is representative of the media under investigation. The methods and equipment used for sampling environmental matrices vary with the associated physical and chemical properties.

For each anticipated sampling media (i.e., sediment, soil, groundwater, surface geophysics, waste samples, etc.), describe the sampling procedures to be used. Describe the sampling equipment, equipment decontamination procedures, sample collection, sample preservation procedures. If samples are to be composited, please include these procedures. Please be advised, samples for volatile organic analyses can not be composited in the field. If samples are to be filtered, please describe field filtration procedures. Also describe any field analytical procedures that may be used during sampling, such as the collection of pH, conductivity, turbidity during the purging of groundwater wells.

Specific requirements for sampling may be found in the following guidance documents:

- *RCRA Ground Water Monitoring: Draft Technical Guidance (US EPA, 1993)*
- *SW846 Test Methods for Evaluating Solid Waste Physical/Chemical Methods (Chapter 10)*
- *RCRA Inspection Manual (OSWER Directive 9938.02b, October 1993)*
- *Soil-Gas and Geophysical Techniques for Detection of Subsurface Organic Contamination (Pitchford et a., 1988)*
- *Permit Guidance Manual on Unsaturated Zone Monitoring for Hazardous Waste Land Treatment Units (US EPA, 1986)*
- *Samplers and Sampling Procedures for Hazardous Waste Streams (deVera, 1980)*
- *Vadose Zone Monitoring for Hazardous Waste Sites (Everett et al., 1983)*

If SOPs for these activities exist, reference them in the text and place a copy of the SOP in an Appendix

To ensure that uniform and acceptable sampling protocols are being used, the sampling requirements found in Table 1.0 will be used for all program activities.

B.2 SAMPLING HANDLING AND CUSTODY REQUIREMENTS

This section should only be included if it is applicable to your program activities.

Sample labels will be securely affixed to each sample container. Sample labels will clearly identify the particular sample, and delineate the following information:

- Site name and designated project number.
- Sample identification number.
- Date and time the sample was collected.
- Sample preservation method.
- Sample pH.
- Analysis requested.
- Sampling location.

All samples will be maintained in accordance with the following chain of custody procedures. A sample is under custody when it is:

- In a person's physical possession
- In view of that person after he/she has taken possession
- Secured by that person so that no one can tamper with the sample
- Secured by that person in an area which is restricted to authorized personnel.

A chain-of-custody record must always be maintained from the time of sample collection until final deposition. An example of a chain of custody form is found in *Figure 1. (Attach a copy of a blank chain of custody form and label as Figure 1)*. Every transfer of custody will be noted and

signed for with a copy of the record being kept for each individual which endorsed it. At a minimum, the chain-of-custody record will include the following information:

- Contractor name and address.
- Sample identification number.
- Sample location.
- Sample collection date and time.
- Sample information, i.e., matrix, number of bottles collected, container type, etc.
- Names and signatures of samplers.
- Signatures of all individuals who have had custody of the samples.

When preparing sample containers for shipment they will be securely sealed. The custody seals will be used to demonstrate that a sample container has not been opened or tampered with. The individual who has sample custody shall always sign, date, and affix the custody seal to the sample container in such a manner that it cannot be opened unless it is broken. When samples are not under direct control of the individual responsible for them, they will be stored in a container which will be affixed with a custody seal.

Samples will then be an appropriate transport container and packed with an appropriate absorbent material such as vermiculite. All sample containers will be packed to maintain a temperature of 4°C. A temperature blank will be added to each transport container. When the transport container is received in the laboratory, the laboratory sample custodian will use this container of water to measure the temperature within the transport container. All sample documentation will then be affixed to the underside of each transport container lid. The transport container lid will then be closed and affixed with a custody seal accordingly. Samplers will transport environmental samples directly to the laboratory within 24 hours of sample collection, or utilize an overnight delivery service within 24 hours of sample collection.

All of the appropriate U.S. Department of Transportation (U.S. DOT) regulations for packaging, marking/labeling, and shipping hazardous materials and wastes will be followed. Air carriers which transport hazardous materials, in particular Federal Express, will comply with the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulations. The IATA regulations detail the procedures to be used to enable the proper shipment and transportation of hazardous materials by a common air carrier. Following all of the current IATA regulations will ensure compliance with U.S. DOT.

B3 ANALYTICAL METHODS REQUIREMENTS

This section should only be included if it is applicable to your program activities.

Analytical methods will be selected that will achieve project objectives. For routine parameters, analytical method numbers, extraction and/or digestion method numbers, method detection limits and quantitation limits are found in Table 2. When non-routine parameters are requested, the site-specific SAP will include information about analytical method requirements. Standard Operating Procedures (SOPs) for field screening methods and for non-EPA approved methods that are used for routine activities have been included in the Appendix. *EPA considers most methods developed by ASTM, NIOSH and the APHA/AWWA/WEF (Standard Methods for the Examination of Water and Wastewater) EPA approved methods. For all non-EPA approved analytical and field methods should be included in Appendix A.*

B4 QUALITY CONTROL REQUIREMENTS

This section should only be included if it is applicable to your program activities.

The field quality control requirements found in Table 3 will be followed during this investigation. *State where laboratory quality control requirements can be found. These requirements may be found in a Laboratory's Quality Manual or in Appendix B.*

B5 INSTRUMENT/EQUIPMENT MAINTENANCE REQUIREMENTS

This section should only be included if it is applicable to your program activities.

All field equipment will be maintained in accordance with each respective instrument manufacturer's operating instructions. All maintenance activities will be recorded in a log book. For field equipment, the preventive maintenance information found in Table 4 will be used. When the acceptance criteria is not met, the corrective action found in Table 4 will be implemented.

State where procedures for maintenance of analytical equipment can be found.. These procedures may be found in a Laboratory's Quality Manual or in Appendix B.

Describe the availability of spare parts identified in the manufacturer's operating instructions. If SOPs exist, include them in an Appendix to this document.

B6 INSTRUMENT CALIBRATION AND FREQUENCY

This section should only be included if it is applicable to your program activities.

All field equipment will be calibrated following the procedures found in Table 5. When the acceptance criteria is not met, the corrective actions found in Table 5 will be implemented.

State where procedures for calibration of analytical equipment can be found. These procedures may be found in a Laboratory's Quality Manual or in Appendix B.

B7 DATA MANAGEMENT

1.0 Sample Documentation

This section should only be included if it is applicable to your program activities.

All sample documents will always be legibly written in ink. Any corrections or revisions to sample documentation shall be made by lining through the original entry and initialing any changes. To reiterate these requirements the following sub-sections are provided to outline sample documentation procedures which will be employed when conducting this

investigation.

1.1 Field Logbook

This section should only be included if it is applicable to your program activities.

The field logbook is a descriptive notebook detailing site activities and observations so that an accurate and factual account of field procedures may be reconstructed. All entries will be signed by the individuals who are making them. All field logbook entries will document the following specifics:

- Facility name and address.
- Names of personnel on site.
- Dates and times of all entries.
- Descriptions of all site activities, including site entry and exit times.
- Noteworthy events and discussions.
- Weather conditions.
- Site observations.
- Identification and description of samples and locations.
- Subcontractor information and names of on-site personnel.
- Dates and times of sample collections and chain of custody information.
- Records of photographs.
- Facility or site sketches.
- All relevant and appropriate information delineated in field data sheets and sample labels.

1.2 Standard Operating Procedures

This paragraph should only be included if it is applicable to your program.

Often many laboratory and field operations are arranged to form Standard Operating procedures (SOPs). Whenever SOPs are applicable and available, they will be incorporated into the data collection activities pursuant to a investigation. To ensure environmental sample collection efforts are comparable, procedures found in sampling SOPs will be followed. The sampling SOPs are found in Appendix A.

State where SOPs for non-sampling activities, such as inspections and compilation of biennial reports can be found. These SOPs may be in the form of guidance, checklists or inspector manuals.

1.3 Field Data Records

This section should only be included if it is applicable to your program.

All real-time measurements and observations must always be recorded in project log books, field data records, or in similar types of record keeping books. Field data records will be organized into standard formats whenever possible, and retained in permanent files.

1.4 Analytical Data Deliverable Requirements

This section should only be included if it is applicable to your program.

At a minimum, analytical data deliverable package for screening and definitive data will include the following:

- Sample documentation (location, date and time of collection and analysis, etc.)
- Chain of custody
- Initial and continuing calibration
- Determination and documentation of detection limits
- Analyte(s) identification
- Analyte(s) quantitation
- QC blanks
- Matrix spike recoveries
- Quality Control sample results
- Duplicate results

Prior to the submission of laboratory data, the laboratory's Quality Assurance Officer will review the data for accuracy, precision and completeness.

1.5 Inspection Reports

Describe the type of information that is included in these reports along with acceptance criteria for their use. In Appendix C include examples of forms and/or checklists that are being used for inspections.

1.6 Data Management

Describe the record keeping procedures and the approach used for data storage and/or retrieval on electronic media. Discuss the control mechanism for detecting and correcting errors and for

preventing loss of data during data reduction, data reporting and data entry. Include standard retention time for each type of record.

ASSESSMENT AND OVERSIGHT

C1 PERFORMANCE AND SYSTEMS AUDITS

During this investigation, internal and external performance and systems audits will be undertaken to evaluate the capability and performance of the total measurement system. Audits will be utilized to ensure that inspections and/or field and laboratory activities will provide data that adequately reflects facility conditions.

A performance audit is performed to evaluate the accuracy of the total measurement system or component thereof. A systems audit focuses on evaluating the principal components of a measurement system to determine proper selection and use. In regard to inspections and/or field sampling operations, this oversight activity is performed to critique the quality control procedures which are to be employed.

Identify the title of the person who will conduct audits for inspections and/or field and laboratory activities. Describe the protocol that will be used for audits. Define the acceptance criteria for these audits. Identify the frequency of audits. It is recommended that at least one systems audit be performed per year.

C2 REPORTS

Identify the frequency and distribution of reports issued to inform management of the following:

- *Status of the program activities*
- *Results of Performance Evaluations and Systems Audits*
- *Results of periodic data quality assessments*
- *Significant quality assurance problems and recommended solutions*
- *Changes in the QAPP or site-specific SAP*

Identify the preparer and the recipients of the reports. If significant quality assurance problems occur, EPA should be notified.

DATA VALIDATION AND USABILITY

D1 REVIEW OF FIELD DATA

Describe the criteria to be used to review field data (i.e., calibration results, site location information, etc.) for accuracy, precision and completeness. Also, include the criteria that will be used to quality or reject field data records.

D2 REVIEW OF INSPECTION REPORTS

Describe the criteria to be used to review reports for accuracy, precision and completeness. Also, include the criteria that will be used to quality or reject inspection reports.

D3 REVIEW OF DATA INPUT INTO RCRIS OR RCRA INFO

Describe the criteria to be used to review data for accuracy, precision and completeness. Also, include the criteria that will be used to quality or reject data.

D2 DATA VALIDATION

This section should only be included if it is applicable to your program.

To ensure that measurement data generated when performing this investigation are of an appropriate quality, all data will be validated. Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of its validity prior to its intended use. It requires that the techniques utilized are applied to the body of the data in a systematic and uniform manner. The process of data validation must be close to the origin of he data, independent of the data production, and objective in its approach.

Data from this project will be validated in accordance with the appropriate level of validation. *Insert names of program activities which* will be validated in accordance with the IM1 and M2 level of data validation found in the Region III Innovative Approaches to Data Review Guidance Document. (June 95) *Insert names of program activities which* will be validated in accordance with the Region III Modifications to the National Functional Guidelines for Organic Analyses (11/94) and the Region III Modifications to the National Functional Guidelines for Inorganic Analyses (4/93). *Please be advised, data being used for risk assessment must be validated in accordance with the Region III Modifications to the National Functional Guidelines for Organic Analyses (11/94) and the Region III Modifications to the National Functional Guidelines for Inorganic Analyses (4/93). A copy of these guidance document can be obtained from OASQA - Quality Assurance Team. Contact May Edwards at* (410) 305-2736.

D3 RECONCILIATION WITH USER REQUIREMENTS

To assess if environmental monitoring measurements are of an appropriate quality, the general PARCC requirements and site-specific Measurement Quality Objectives (MQOs) for precision, accuracy and completeness will be compared to the project's quality objectives and measurement performance criteria. Quality Objectives are typically assessed by evaluating PARCC (Precision, Accuracy, Representativeness, Completeness, and Comparability) of all aspects of the data collection process. PARCC is defined as:

1.0 Accuracy

Accuracy is a measure of the bias that exists in a measurement system.. Accuracy will be assessed through the analysis of quality control samples. The analytical accuracy will expressed as the percent recovery (%R) of an analyte which has been added to the environmental sample at a known concentration before analysis and is calculated according to the following equation.

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

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

The following formula should be used to for measurements where a standard reference material is used:

$$\%R = 100x\frac{C_m}{C_{rm}}$$

Where: %R = percent recovery
C_m = measured concentration of standard reference material
C_{rm} = actual concentration of standard reference material

1.1 Precision

Precision is a measure of the reproducibility of analyses under a given set of conditions. Precision will be determined through the use of field duplicates, matrix spike/matrix spike duplicates and duplicate quality control samples. The Relative Percent Difference (RPD) between the two results will be calculated and used as an indication of the precision of the analyses performed.

The following formula should be used to calculate precision:

$$RPD = \frac{(C_1 - C_2)}{(C_1 + C_2)/2} x100$$

Where: RPD = relative percent difference
C_1 = larger of the two observed values
C_2 = smaller of the two observed values

1.2 Completeness

Completeness is defined as the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Data completeness will be expressed as the percentage of valid data obtained from the measurement system. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria required by the prescribed analytical method.

$$\%C = 100x\frac{V}{n}$$

The following formula should be used to calculate completeness:
Where: %C = percent completeness
V = number of measurements judged valid
n = total number of measurements necessary to achieve a specified statistical level of confidence in decision making.

1.3 Representativeness

Representativeness is the degree sampling data accurately and precisely depict selected characteristics. *Describe how the program will ensure that the data being generated and/or reported accurately depicts facility conditions.*

1.4 Comparability

Comparability is the degree of confidence with which one data set can be compared to another. *Describe how the program will ensure that the data being generated and/or reported will be comparable to data that is being generated by other State, Federal or Local Agencies.*

APPENDIX A

TABLES

TABLE 1
CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES FOR AQUEOUS MATRICES[A]

Name	Container[1]	Preservation	Maximum holding time
Inorganic Tests:			
Chloride	P, G	None required	28 days
Cyanide, total and amenable to chlorination	P, G	Cool to 4° C; If oxidizing agents present, add 5 mL 0.1N $NaAsO_2$ per L or 0.06 g of ascorbic acid per L; adjust pH> 12 with 50% NaOH. See Method 9010 for other interferences	14 days
Hydrogen ion (pH)	P, G	None required	24 hours
Nitrate	P, G	Cool to 4° C	48 hours
Sulfate	P, G	Cool to 4° C	28 days
Sulfide	P, G	Cool to 4° C; add zinc acetate	7 days
Metals:			
Chromium IV	P, G	Cool to 4° C	24 hours
Mercury	P, G	HNO_3 to pH<2	28 days
Metal, except Chromium IV and mercury	P, G	HNO_3 to pH<2	6 months
Organic Tests:			
Acrolein and acrylonitrile	G, PTFE-lined septum	Cool to 4° C 0.008% $Na_2S_2O_3$[3] Adjust pH to 4-5	14 days
Benzidines	G, PTFE-lined cap	Cool to 4° C 0.008% $Na_2S_2O_3$[3]	7 days until extraction 40 days after extraction
Chlorinated hydrocarbons	G, PTFE-lined cap	Cool to 4° C 0.008% $Na_2S_2O_3$[3]	7 days until extraction 40 days after extraction
Dioxins and Furans	G, PTFE-lined cap	Cool to 4° C 0.008% $Na_2S_2O_3$[3]	30 days until extraction 45 days after extraction
Haloethers	G, PTFE-lined cap	Cool to 4° C 0.008% $Na_2S_2O_3$[3]	7 days until extraction 40 days after extraction
Nitroaromatics and cyclic ketones	G, PTFE-lined cap	Cool to 4° C 0.008% $Na_2S_2O_3$[3] store in dark	7 days until extraction 40 days after extraction
Nitrosamines	G, PTFE-lined cap	Cool to 4° C 0.008% $Na_2S_2O_3$[3] store in dark	7 days until extraction 40 days after extraction

(Continued on next page)

TABLE 1 (cont.)

CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES FOR AQUEOUS MATRICES[A]

Name	Container[1]	Preservation	Maximum holding time
Oil and grease	G	Cool to 4° C; add 5 mL diluted HCl	28 days
Organic carbon, total (TOC)	P, G	Cool to 4° C; store in dark[2]	28 days
Organochloride pesticides	G, PTFE-lined cap	Cool to 4° C	7 days until extraction 40 days after extraction
Organophosphorus pesticides	G, PTFE-lined cap	Cool to 4° C	7 days until extraction 40 days after extraction
PCBs	G, PTFE-lined cap	Cool to 4° C	7 days until extraction 40 days after extraction
Phenols	G, PTFE-lined cap	Cool to 4° C 0.008% $Na_2S_2O_3$[3]	7 days until extraction 40 days after extraction
Phthalate esters	G, PTFE-lined cap	Cool to 4° C	7 days until extraction 40 days after extraction
Polynuclear aromatic hydrocarbons	G, PTFE-lined cap	Cool to 4° C 0.008% $Na_2S_2O_3$[3] store in dark	7 days until extraction 40 days after extraction
Purgeable aromatic hydrocarbons	G, PTFE-lined septum	Cool to 4° C 0.008% $Na_2S_2O_3$[3]	14 days
Purgeable Halocarbons	G, PTFE-lined septum	Cool to 4° C 0.008% $Na_2S_2O_3$[3]	14 days
Total organic Halides (TOX)	G, PTFE-lined cap	Cool to 4° C; Adjust to pH<2 with H_2SO_4	28 days
Radiological Tests: Alpha, beta and radium	P, G	HNO_3 to pH<2	6 months

[A] Table originally excerpted, in part, from Table II, 49 **FR** 28, October 26, 1984, and revised as appropriate for SW-846. See Chapter Three, Chapter Four, or Section 6.0 of the individual methods for more information.

[1] Polyethylene (P) or Glass (G).

[2] Adjust to pH<2 with H_2SO_4, HCl or solid $NaHSO_4$. Free chlorine must be removed prior to adjustment.

[3] Adjust samples to pH 5-8 using NaOH or H_2SO_4.

(Continued on next page)

TABLE 1 (Continued)

SAMPLE HOLDING TIMES, RECOMMENDED DIGESTION VOLUMES AND RECOMMENDED COLLECTION VOLUMES FOR INORGANIC DETERMINATIONS IN AQUEOUS AND SOLID SAMPLES

Measurement	**Digestion Volume (mL)[a,c]**	**Collection Volume (mL)[a,c]**	**Treatment / Preservation Holding time[b]**
Inorganic Analytes (except hexavalent chromium and mercury):			
Aqueous			
Total	100	600	HNO_3 to pH <2 6 months
Dissolved	100	600	Filter on site; HNO_3 to pH <2; 6 months
Suspended	100	600	Filter on site; 6 months
Solid			
Total	2 g	200 g	6 months
Hexavalent Chromium:			
Aqueous	100	400	24 hours; Store at $4^o \pm 2^o$ C until analyzed
Solid	2.5 g	100 g	One month to extraction, 4 days after extraction; Store at $4^o \pm 2^o$ C until analyzed
Mercury:			
Aqueous			
Total	100	400	HNO_3 to pH <2 28 days
Dissolved	100	400	Filter; HNO_3 to pH <2 28 days
Solid			
Total	0.2 g	200 g	28 days; Store at $4^o \pm 2^o$ C until analyzed

[a] Unless stated otherwise
[b] Either glass or plastic containers may be used
[c] Any sample volume reduction from the reference method's instruction must be made in the exact proportion as described in the method and representative sampling must be maintained.

(Continued on next page)

TABLE 1 (Continued)
SAMPLE CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

VOLATILE ORGANICS			
Sample Matrix	Container	Preservation	Holding Time
Concentrated Waste Samples	Method 5035: 40-mL vials with stirring bar. Method 5021: See method Methods 5031 & 5032: 125-mL widemouth glass container Use Teflon-lined lids for all procedures	Cool to 4° C.	14 days
Aqueous Samples With No Residual Chlorine Present	Methods 5030, 5031 & 5032: 2 X 40-mL vials with Teflon-lined septum caps	Cool to 4° C and adjust pH to less than 2 with H_2SO_4, HCl, or solid $NaHSO_4$.	14 days
Aqueous Samples WITH Residual Chlorine Present	Methods 5030, 5031 & 5032: 2 X 40-mL vials with Teflon-lined septum caps	Collect sample in a 125-mL container which has been pre-preserved with 4 drops of 10% sodium thiosulfate solution. Gently swirl to mix sample and transfer to a 40-mL VOA vial. Cool to 4° C and adjust pH to less than 2 with H_2SO_4, HCl, or solid $NaHSO_4$.	14 days
Acrolein and Acrylonitrile in Aqueous Sample	Methods 5030, 5031 & 5032: 2 X 40-mL vials with Teflon-lined septum caps	Adjust to pH 4-5. Cool to 4° C.	14 days
Solid Samples (e.g., soils, sediments, sludges, ash)	Method 5035: 40-mL vials with septum and stirring bar. Method 5021: See method. Methods 5031 & 5032: 125-mL widemouth glass container with Teflon-lined lids.	See the individual methods.	14 days

(Continued on next page)

TABLE 1 (CONTINUED)

SAMPLE CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

SEMIVOLATILE ORGANICS / ORGANOCHLORINE PESTICIDES / PCBs AND HERBICIDES			
Sample Matrix	Container	Preservation	Holding Time
Concentrated Waste Samples	125-mL widemouth glass with Teflon-lined lid.	None	Samples extracted within 14 days and extracts analyzed within 40 days following extraction.
Aqueous Samples With No Residual Chlorine Present	1-gal., 2 X 0.5-gal., or 4 X 1-L amber glass container with Teflon-lined lid.	Cool to 4° C	Samples extracted within 7 days and extracts analyzed within 40 days following extraction.
Aqueous Samples WITH Residual Chlorine Present	1-gal., 2 X 0.5-gal., or 4 X 1-L amber glass container with Teflon-lined lid.	Add 3-ml 10% sodium thiosulfate solution per gallon (or 0.008%). Addition of sodium thiosulfate solution to sample container may be performed in the laboratory prior to field use. Cool to 4° C.	Samples extracted within 7 days and extracts analyzed within 40 days following extraction.
Solid Samples (e.g., soils, sediments, sludges, ash)	250-mL widemouth glass container with Teflon-lined lid.	Cool to 4° C	Samples extracted within 14 days and extracts analyzed within 40 days following extraction.

(Continued on next page)

TABLE 2

Analytical Methods Requirements

Parameter	Matrix	Sample Preparation Method	Analytical Method	Detection Limit[1]	Precision (% RPD)	Accuracy (% Recovery)

[1]Include concentration units. If parameter is being measured for a number of activities, record the most stringent detection limit required.

TABLE 3
Field Quality Control Requirements

QC Sample	Frequency	Acceptance Criteria	Corrective Action
Field Duplicate	One per twenty samples per matrix or one per day, whichever is more frequent.		
Split Sample	10% of field screening data will be confirmed with data from a fixed laboratory.[1]		
MS/MSD[2]	One per twenty samples per matrix or one per day, whichever is more frequent.		
Equipment Rinsate Blank	One per twenty samples per matrix per equipment type per decontamination event or one per day, whichever is more frequent.		
Field Blank	One per twenty samples per matrix or one per day, whichever is more frequent.		
VOA Trip Blank	One for each cooler which contains samples for VOA analyses.		
Cooler Temperature Blank	One per cooler.		
Other (*Specify*)			

Legend:
[1] Per Superfund Data Quality Objectives Process for Superfund
[2] Sufficient sample will be collected to allow the laboratory to perform this analysis.

Table 4
Preventive Maintenance - Field Equipment

Identify field equipment and/or systems requiring periodic preventive maintenance. Describe the activity, such as check the battery, etc.

Instrument	Activity	Frequency

Table 5
Calibration and Corrective Action - Field Equipment

Identify all tools, gauges, instruments, and other equipment used for data collection activities that must be calibrated to maintain performance within specified limits.

Instrument	Calibration Standards	Frequency Initial & Continuing Calibration	Acceptance Criteria	Corrective Action

APPENDIX A

Standard Operating Procedures

APPENDIX B

Laboratory Qualifications

APPENDIX C

Examples of Inspection Forms and Checklists