# San Francisco District



# **PUBLIC NOTICE**



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Proposed Guidance for Sampling and Analysis Plans
(Quality Assurance Project Plans)
for Dredging Projects
within the USACE San Francisco District

The national sediment testing manual entitled "Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S.- Testing Manual" was formally adopted by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) and released to the public on February 12, 1998. This document, commonly referred to as the "Inland Testing Manual" (ITM), provides guidance for evaluating whether dredged material may be suitable for discharge into waters of the U.S. (such as at designated disposal sites in San Francisco and Monterey Bays). The ITM includes national guidance for conducting physical, chemical, and biological testing on sediments proposed for dredging and disposal into waters of the U.S. Proposals for ocean disposal under the Marine Protection. Research, and Sanctuaries Act will continue to be evaluated by EPA and USACE in accordance with the testing guidelines in "Evaluation Of Dredged Material Proposed For Ocean Disposal - Testing Manual." This document, commonly referred to as the "Green Book," will be referenced in this notice as the OTM (Ocean Testing Manual).

In Chapter 8 both the ITM and the OTM provide general guidance on preparation of sampling and analysis plans when testing is necessary to make suitability determinations on dredged material. The references in these publications are not current. EPA's current guidance, "Guidance for Quality Assurance Project Plans" (available at EPA Quality Assurance Division's website: http://es.epa.gov/ncerqa/qa/qa\_docs.html) and referred to as

EPA QA/G-5, provides extensive guidance on sampling and analysis plans. However, EPA QA/G-5 is still general in nature and not specifically directed at dredging operations. The attached guidance has tailored this guidance to dredging operations as performed within the San Francisco District, Corps of Engineers.

The proposed guidance must be used in conjunction with EPA QA/G-5. The attached local guidelines *supplement* the much more detailed information in EPA QA/G-5. Questions about these local guidelines should be directed to the USACE San Francisco District, EPA Region 9, or (for projects in San Francisco Bay) to the Dredged Material Management Office (DMMO).

Comments concerning the proposed guidance will be accepted until August 30, 1999 and should be addressed to the DMMO contact listed on the header of this Public Notice.



# SAMPLING AND ANALYSIS PLAN (Quality Assurance Project Plan) GUIDANCE FOR DREDGING PROJECTS WITHIN THE SAN FRANCISCO DISTRICT

July 1, 1999

#### Dredged Material Management Office:

U.S. Army Corps of Engineers, San Francisco District
U.S. Environmental Protection Agency, Region 9
San Francisco Bay Conservation and Development Commission
Regional Water Quality Control Board, San Francisco Bay, Region 2
State Lands Commission

#### **Interested Parties:**

California Department of Fish and Game National Marine Fisheries Service U.S. Fish and Wildlife Service

# **About the LTMS**

The Long Term Management Strategy (LTMS) is a joint effort between the State Water Resources Control Board; San Francisco Bay Regional Water Quality Control Board; the San Francisco Bay Conservation and Development Commission; the U.S. Army Corps of Engineers, South Pacific Division and San Francisco District; and the U.S. Environmental Protection Agency, Region 9. The purpose of the LTMS is to develop a long-term strategy for acceptable disposal alternatives for dredged material. The LTMS has four goals:

- 1) Maintain in an economically and environmentally sound manner those channels necessary for navigation in San Francisco Bay and Estuary, and eliminate unnecessary dredging activities in the Bay and Estuary;
- 2) Conduct dredged material disposal in the most environmentally sound manner;
- 3) Maximize the use of dredged materials as a resource; and
- 4) Establish a cooperative permitting framework for dredging and dredged material disposal applications.

Initiated in 1989, the LTMS gathered information and conducted studies of aquatic and upland disposal in the years 1990 through 1995. Since then, the LTMS has shifted to a planning and implementation mode with publication of a comprehensive Policy - Environmental Impact Study and Report in October 1998. The LTMS agencies are now preparing a Comprehensive LTMS Management Plan and are working on funding mechanisms and policies to promote beneficial reuse of dredged material.

## About the Dredged Material Management Office

In an effort to fulfill the fourth goal of LTMS (cooperative permitting framework), the participating agencies created the Dredged Material Management Office. Currently the DMMO is in a pilot phase with the US Army Corps of Engineers serving as the host agency. The LTMS agencies use the DMMO as a coordinating body for all phases of dredging projects, but the DMMO is specifically tasked with reviewing Sampling and Analysis Plans (SAPs), results, and consolidated dredging permit applications. Through the DMMO, the participating agencies will, as staff resources allow, develop guidelines, procedures and protocols which address the unique San Francisco Bay environment and the needs of the Bay Area dredging community. The LTMS agencies with the addition of the State Lands Commission and California Department of Fish and Game staff meet on a twice-monthly basis to review dredging projects. The goals of the DMMO are to exchange technical information about dredging projects, coordinate interagency review of Sampling and Analysis Plans, test results, and permit applications, and foster consensus permit recommendations for Bay area dredging projects.

Introduction

I.

- 1. This document is intended to provide guidance and clarification on required testing and reporting requirements for dredged material investigations within the United States Army Corps of Engineers (USACE) San Francisco District. This guidance provides an outline of topics to include in a Sampling and Analysis Plan (SAP) or Quality Assurance Project Plan (QAPP)<sup>1</sup> and should be used in conjunction with other guidance for conducting sediment evaluations (e.g., the proposed local guidelines contained in Public Notice 99-3 for implementing the EPA/USACE Inland Testing Manual) including USEPA 1998a and USEPA 1998b. Guidance on preparation of permit applications and proposals for Tier I exemptions to sediment testing are outside the scope of this document.
- 2. Use of these guidelines for preparing SAPs or QAPPs and reporting test results will help avoid unnecessary project delays, streamline the review of applications, and provide a consistent data base for agency decisions regarding dredged material suitability. It should be noted that the SAP or QAPP components described in this document may not constitute an exhaustive list for all dredging projects; rather they represent the usual information that should be included for typical dredging projects. Complex dredging projects, or projects which involve potentially contaminated sediment, may require more information than described here.
- 3. It is Environmental Protection Agency (EPA) policy that all environmental data used in decision making be supported by an approved SAP or QAPP (USEPA 1998a). The USACE also recommends preparation of a QAPP for its own dredging projects (Plumb 1997). To quote from the USACE guidance:

"There are three important considerations that mandate the use of quality assurance plans in environmental data-collection programs conducted by the Corps or their contractors. First, good science and management of good science require effort in the area of quality assurance to control the performance of the data generation process in order to produce valid data that can be used in the decision-making process. ... Second, the Administrator of the U.S. Environmental Protection Agency (EPA) has established a regulatory requirement that all environmental data mandated or supported by EPA through regulations, grants, or contracts be collected pursuant to an approved quality assurance project plan. ... Third, the Corps has established a minimum of 11 Engineering Regulations (ERs) and Engineering Technical Letters (ETLs) that require quality assurance to be adequately considered in individual programs..."

4. The SAP or QAPP is the principal product of a systematic planning process. It integrates all technical and quality aspects for the life cycle of sediment testing, including planning, implementation, and assessment. The purpose of the SAP or QAPP is to document planning for environmental data operations and to provide a specific "blueprint" for obtaining the type and quality of environmental data needed for a specific decision or use. While time spent on such planning may seem unproductive and costly, the penalty for ineffective planning includes greater

A Sampling and Analysis Plan is also known in current terminology as a Quality Assurance Project Plan .

cost and lost time. Users of this document should assume that all of the elements described herein are required in the SAPs or QAPPs unless otherwise directed by the Dredged Material Management Office (DMMO). If applicants feel that an element is not applicable, they should so state in the SAP or QAPP.

- 5. The DMMO recognizes that a "one size fits all" concept of SAPs or QAPPs is not appropriate. This means that the content and level of detail in each SAP or QAPP will vary according to the nature of the work being proposed and the intended use of the data. The SAP or QAPP shall address all required elements. Pertinent documentation, such as laboratory Standard Operating Procedures, may be referenced in response to a particular required SAP or QAPP element. This is encouraged to reduce the size of the SAP or QAPP and the time required to prepare it. For entities that perform routine maintenance dredging it may be beneficial to prepare a QAPP, which will remain relatively static for all routine maintenance dredging, and SAPs for each dredging episode. The SAP could then reference, where appropriate, the QAPP. The SAP or QAPP shall also address related Quality Assurance (QA) planning documentation (e.g., Quality Management Plans) from subcontractors or suppliers of services critical to the technical and quality objectives of the sampling and testing program. In any case, all referenced documents must be attached to the SAP or QAPP, or be placed on file with the DMMO and available for routine referencing when needed. Such references must be kept current by the applicant.
- 6. The DMMO will have ultimate discretion over the required content and adequacy of the SAP or QAPP. As such, all SAPs or QAPPs should be submitted to the DMMO for review and approval prior to the start of sediment sampling and testing. In limited circumstances the DMMO may grant conditional approval of a SAP or QAPP to permit some work to begin while non-critical deficiencies in the SAP or QAPP are being resolved. Subject to these exceptions, it is the responsibility of the project proponent to assure that no environmental data are acquired before the SAP or QAPP is approved and received by dredging project personnel.
- 7. All SAPs or QAPPs shall be implemented as approved for the intended work. The group performing the work is responsible for implementing the approved SAP or QAPP and ensuring that all personnel involved in the work have copies of the approved SAP or QAPP and all other necessary planning documents. Because of the complex and diverse nature of environmental data acquisition, changes to original plans are often needed. When a substantive change is warranted the originator of the SAP or QAPP shall document the change in the Test Report, and if an approved QAPP is involved, subsequently modify it to reflect any necessary permanent changes...
- 8. The SAP or QAPP must be composed of standardized, recognizable elements covering the entire dredging project testing scheme from planning, through implementation, to assessment. The SAP or QAPP elements that follow are presented in that order and have been arranged for convenience into four general groups. These groups and their intents are summarized as follows:
  - Project Management This group of SAP or QAPP elements covers the basic area of dredging project management, including the project history and objectives, and roles and responsibilities of the participants. These elements ensure that the dredging project sediment testing program has a defined goal, that the participants understand

the goal and the approach to be used, and that the planning outputs have been documented.

- Measurement/Data Acquisition This group of SAP or QAPP elements covers all
  aspects of measurement system design and implementation, ensuring that appropriate
  methods for sampling, analysis, data handling, and Quality Control (QC) are employed
  and are properly documented.
- Assessment/Oversight This group of SAP or QAPP elements addresses the activities
  for assessing the effectiveness of the implementation of the dredging project and
  associated Quality Assurance (QA) and QC. The purpose of assessment is to ensure
  that the SAP or QAPP is implemented as prescribed.
- Data Validation and Usability This group of SAP or QAPP elements covers the QA activities that occur after the data collection phase of the dredging projects completed. Implementation of these elements ensures that the data conform to the specified criteria, thus ensuring that the resulting data are adequate for agency decision makers.

Ι

# II. SAP or QAPP — Format and Contents

Table I contains the elements that should appear in the SAP or QAPP. These elements are derived from USEPA 1998a and USEPA 1998b. Content of those elements not contained in USEPA 1998a and USEPA 1998b are explained below. For minor projects, some of the following elements may be superfluous or unnecessary. If applicants are uncertain regarding the required contents of their QAPP or SAP, they should contact the DMMO in the early planning stages of the project.

## 1. Element A1 — Title and Approval Sheet.

See USEPA 1998a and USEPA 1998b.

#### 2. Element A2 — Table of Contents.

See USEPA 1998a and USEPA 1998b. A document control format or component is not required.

#### 3. Element A3 — Distribution List.

See USEPA 1998a and USEPA 1998b.

4. Element A4 — Project /Task Organization. In addition to the information described in USEPA 1998a and USEPA 1998b the following information should be included:

#### 4.1 List of Acronyms

A list and definitions of all acronyms used in the SAP or QAPP should be provided in the document.

## 4.2 Dredging project Proponent

Be sure to identify the applicant(s) including name, address, phone, fax, and e-mail address if available.

# 4.3 Dredging project Team and Responsibilities

This section should give the names, affiliations, address, phone, fax, and e-mail address, if available, and a list of responsibilities of the principle contact(s) responsible for the following elements of the proposed testing program:

- Dredging project planning and coordination.
- Field sample collection and transport, including chain-of-custody.
- Sample holding and archiving.
- Laboratory preparation and analysis for physical, chemical, and bioassay testing. Contacts should be given for all laboratories involved in sediment testing.
- Quality Assurance (QA) management.
- Final data reporting.

# 5. Element A5 — Problem Definition/Background

This section should provide sufficient background information as described in USEPA 1998a and USEPA 1998b including the information below.

#### 5.1 Site History

This section should summarize all available site use, dredging and testing information that could have a bearing on sampling or testing decisions for the proposed dredging project. It is suggested that the following information from at least the last three dredging episodes be provided (if available):

- Date and location of dredging, volume removed, and disposal site used.
- Summary of past testing results (physical, chemical, and biological) and associated suitability determinations. It would be helpful to include figures of the area dredged, sampling locations and summary data tables from earlier reports.
- Summary of testing results from adjacent or nearby areas, if available. These data, obtained from other dredging projects or monitoring programs, are particularly useful for dredging projects with little or no previous dredged material testing information.
- Identification and description of site-specific and nearby land- and water-based activities that may affect sediment quality in the proposed dredging area (e.g., fuel docks, outfalls, industrial uses).

# 5.2 Identification of Principal Data Users and Decision Makers.

This section should identify the regulating agencies (e.g., USACE, RWQCB, and BCDC).

# 6. Element A6 — Dredging project/Task Description

# 6.1 Purpose/Background.

# 6.1.1 General Background

This section should provide a comprehensive description of the proposed dredging project including the following information:

- Location (city and county) of the dredging project (include vicinity and dredging site maps with scale and north arrow clearly shown).
- Type of facility involved (e.g., oil refinery, recreational harbor, dry dock, etc.).
- Type of activity supported by dredging project (e.g., navigation channel, recreational harbor, outfall maintenance, etc.).
- Purpose of the proposed dredging (e.g., maintenance dredging of berths, navigation channel deepening, etc.).
- The area(s), depth(s), overdredge depth(s), and estimated in-place volume of dredged material
  associated with the proposed dredging project. Indicate whether side slopes and overdredge
  are included in volume calculations and the acreage of the dredging project based on the top
  of the side slope.
- Existing/pre-dredging conditions and depth(s). This may be accomplished by cross referencing the bathemetric data required by 10.4.
- The proposed dredging method (e.g., clam shell, hydraulic, hopper).

- Proposed dredged material disposal site(s). Include a map of the site(s) if the site(s) is not a multi use site.
- Rehandling sites and treatment systems, if proposed. Provide diagrams and maps, as discussed in Section 10.4.

## 6.1.2 Permitting

This section should indicate whether the proposed dredging is for a new permit or an episode under an existing permit. For episodes under existing permits, the permit status of the proposed dredging project should be summarized relative to each of the DMMO permitting agencies (e.g., USACE Section 10, 404 and 103 permits, RWQCB Waste Discharge Requirement (WDR) or Section 401 Certifications, BCDC permits, and SLC leases). Include a discussion of any special permit conditions or related actions (e.g., previous DMMO directions or enforcement of a permit violation) that may have bearing on SAP or QAPP approval. This section should also briefly summarize the status of any applications for the proposed dredging project. This information should include, but is not limited to, the following items. A table may be useful in presenting this information:

- Date of consolidated application submission to DMMO (if prior to SAP or QAPP submission),
- Existing and previous permit numbers associated with dredging projects in the area. For each permit, indicate agency, issuance and expiration dates, permitted volume(s), and any limitations.

#### 6.2 Description of the Work to be Performed.

# 6.2.1 Measurements that are expected during the course of the sediment sampling and testing.

This section should cite the list of physical properties, chemicals of concern, and bioassay tests to be undertaken. These are identified in appropriate testing guidelines (e.g. ITM, Green Book). Also, identify the methods and reporting limits that will be used in making these measurements. The use of tables is strongly recommended. Cross reference to section 13.3 is also strongly encouraged.

# 6.2.2 Applicable technical quality standards or criteria.

This section should address any relevant Water Quality Standards (WQS), or Sediment Quality Guidelines (SQG). Currently, no SQG exist, but regulatory agencies either separately or jointly may issue such guidelines in the future.

# 6.2.3 Any special personnel or equipment requirements that may indicate the complexity of the dredging project.

Indicate "Not Applicable" if there are no personnel or equipment beyond normal sampling and testing for a dredging project.

#### 6.2.4 The assessment techniques needed for the dredging project.

See the guidance in USEPA 1998b, A6.2 (4). Use of cross reference to Section 20 would be appropriate.

#### 6.2.5 A schedule for the work performed.

This section should give an estimated schedule for the testing program including:

- Commencement of field sampling
- Completion of field sampling
- Completion of chemical and physical testing
- Completion of biological testing
- Delivery of final testing report to DMMO
- Expected or proposed dredging and disposal timeframe (e.g., include consideration of any relevant dredging or disposal timing restrictions.

# 6.2.6 Dredging project and quality records required, including the types of reports needed.

See the guidance in USEPA 1998b, A6.2 (6). Cross referencing section 9 would be appropriate.

#### 7. Element A7 — Quality Objectives and Criteria for Measurement Data.

See guidance in USEPA 1998a and USEPA 1998b, A7. Appendix D of USEPA 1998b has a good discussion of the difference between Data Quality Objectives (DQO) and Data Quality Indicators (DQI).

# 8. Element A8 — Special Training requirements/Certification.

Indicate "Not Applicable" if there are no personnel training or certification requirements beyond those required for normal sampling and testing for a dredging project. Applicants and consultants may use this section to document any state, local government, or project specific training or certification requirements such as laboratory certification.

#### 9. Element A9 — Documentation and Records

#### 9.1 Reporting of Results

#### 9.2 Report Format

This section should indicate the format for the final reporting of the data (e.g., hard copy, electronic) and the software that will be used for data files and text documents. For electronic transmittal of data, procedures for cross-checking and validating data transmission should be discussed. (Contact DMMO Coordinator for current data format for electronic transmittal of reports)

# 9.3 Data Reporting Package Archiving and Retrieval.

See guidance in USEPA 1998a and USEPA 1998b, A9.4.

#### 10. Element B1 — Sampling Process Design (Experimental Design)

#### 10.1 Scheduled Dredging project Activities, Including Measurement Activities.

Indicate "Not Applicable"

#### 10.2 Rationale for the Design.

See USEPA 1998b, B1.3 for guidance. This section should give a brief overview description of the type (e.g., USACE/USEPA 1991, USEPA/USACE 1998, PN 99-3, or other published agency guidelines) and extent (i.e., number of samples and composites) of testing being proposed. Justification for the proposed testing program should be made by explicit reference to the dredging project description and site history information presented in earlier sections as well as to any existing guidance on sampling design (e.g., ITM testing guidelines in PN 99-3). It is particularly important to clearly explain the rationale for any proposed sampling and compositing approach that differs from existing agency guidance (e.g., PN 99-3 minimum sampling guidelines).

#### 10.3 Design Assumptions.

See USEPA 1998b, B1.4, for guidance. Be sure to address contingency plans to account for changes or modifications to the proposed sampling plan.

#### 10.4 Procedures for Locating and Selecting Environmental Samples.

See USEPA 1998b, B1.5, for guidance. This section should provide all information describing and justifying the proposed location, depth, and compositing plan for each sediment sample. The text of this section should provide a brief explanation of and justification for the proposed sampling locations representative of the material to be dredged (e.g., based on grid, shoaling patterns, pollution sources, or ship interference or movement) and compositing (e.g., based on location, geological, or chemical considerations, or dredging parameters).

A pre-sampling hydrographic survey should be taken no more than 120 days before submission of the SAP or QAPP to get the best possible bathymetric data for volume estimates and sample positioning.

#### - A Word About Hydrographic Surveys -

An appropriate pre-sampling hydrographic survey is one performed by a qualified marine surveyor within four months prior to submission of the SAP or QAPP. A qualified marine surveyor is a person who has a minimum of three years of documented experience in hydrographic surveying of navigable channels and has either a current land surveyor's or professional engineer's license in the state of California or an American Congress on Surveying and Mapping (ACSM) certification as an "Inshore Certified Hydrographic Surveyor." However, older bathymetric information may be acceptable for areas with demonstrated slow rates of deposition. Proposed use of bathymetry taken more than four months prior to testing should be clearly substantiated within the SAP or QAPP. In a typical survey, soundings should be taken every 5-10 feet along a survey line and the interval between survey lines should be no more than 50 feet. Lower resolution surveys may be acceptable in some circumstances, but any such proposal should be discussed in the draft SAP or QAPP and approved by DMMO in advance. Sounding precision should not be less than 0.5 feet, and should be referenced to local MLLW.

More information on hydrographic surveys can be found in the USACE manual Hydrographic Surveys,

# Sampling and Analysis Plan (Quality Assurance Project Plan)

July 1, 1999

#### **Guidance for Dredging Projects Within the USACE San Francisco District**

EM1110-2-1003 (31 October 1994), available at http://www.usace.army.mil/inet/usace-docs/eng-manuals/em.htmf. This document is supplemented by Engineering circular EC 1130-2-210, *Hydrographic Surveying* (1 October 1998), available at http://www.usace.army.mil/iet/usace-docs/ng-circulars/ec-cw.html.

The following information should be superimposed on or included with the survey map(s):

- Date when the hydrographic survey was conducted (as opposed to the date the map was generated).
- Name of hydrographic surveyor.
- Scale of figure and north arrow.
- Proposed sampling locations and composite boundaries.
- Large scale features (e.g., piers, boat ramps).
- Dredging project boundaries as defined by the top of the side slope.
- Contour lines depicting areas that will actually be dredged (i.e., showing areas that are less than project depth, and that are less than the proposed overdepth).
- Potential sources of sediment contamination (e.g., fuel docks, culverts/outfalls, and dry docks).

It is suggested that the following information be presented in tabular format:

- Nomenclature planned to identify field and laboratory samples/composites: To facilitate DMMO review of analytical and QA documentation, cross reference all proposed sample identification numbers to a unified identification system. Field sampling identification should correspond to sites indicated on the survey map and core logs.
- Compositing Plan: Rationale for the proposed compositing. Address why sediment throughout the area or layer to be composited is expected to be relatively homogeneous physically and chemically (refer to past test results for the area, if available).
- Dredging Volume: Estimate of the in-place volume of material to be dredged (including the full overdepth, even if this differs from the "pay depth" in a dredging contract) that is represented by each station, sample and composite.
- Sampling Depths. Include the proposed depth of each core sample. Depths should be equal to the proposed dredging depth plus the full overdredge depth.
- Sample Analysis: Identify which tests will be run on core samples or composites of samples (e.g., physical tests, chemical tests, water column toxicity tests, benthic toxicity tests, or bioaccumulation tests)
- Field Parameters: Describe how samples will be evaluated in the field. Field staff typically make observations of visible layers in the core samples, odor, color, consistency, and texture of the sediment.

This section should also provide information on the reference and control site(s) that will be used for comparison with sediments from the proposed dredging location(s). Control sediments are those in which test organisms have been raised or obtained. They are subjected to the same laboratory conditions and tests as the reference and test sediments. Reference sediment must be collected from the approved reference location associated with the proposed disposal site(s). If reference site sampling is not planned, indicate source of the approved and applicable database

reference values (e.g., PN 93-2 or other subsequent guidelines). The following information should be provided for both reference and control samples:

- Map identifying reference and control site locations with coordinates for both sites.
- Number of samples making up reference composite and control composite.

#### 10.5 Classification of Measurements as Critical or Noncritical.

See guidance in USEPA 1998b, B1.6.

#### 10.6 Validation of Any Nonstandard Methods.

See guidance in USEPA 1998b, B1.7. Any method modifications must be fully documented. Validation data will be provided as described in USEPA 1996

# 11. Element B2 — Sampling Methods Requirements

# 11.1 Describe the Sample Collection, Preparation, and Decontamination Procedures.

See guidance in USEPA 1998b, B2.2. This section of the SAP or QAPP should provide a full and detailed description of the procedures for water, sediment, and tissue sample collection; equipment decontamination; sample logging; sample packaging; and storage. This section should include discussion of the following elements:

- Proposed field sampling schedule (i.e., proposed starting date and expected duration of sampling activities, cross referencing of previous tables is encouraged)
- Proposed field sampling (e.g., coring device), sample containers (e.g., type of buckets, glass jars), and storage equipment (e.g., cooler).
- Proposed navigation and positioning methods.
- Proposed sample preservation, transport and chain-of-custody procedures.
- Proposed sample storage and archiving procedures (e.g., temperatures and holding times, cross referencing is encouraged).

# 11.2 Identify Support Facilities for Sampling Methods.

See guidance in USEPA 1998b, B2.3 This would include a brief description of the equipment and vessel used in the sampling operation.

# 11.3 Describe Sampling/Measurement System Failure Response and Corrective Action Process.

See guidance in USEPA 1998b, B2.4.

# 11.4 Describe Sampling Equipment, Preservation, and Holding Time Requirements.

See guidance in USEPA 1998b, B2.5. See Table 2.

# 12. Element B3 — Sample Handling and Custody Requirements.

See guidance in USEPA 1998b, B3.. Chain of custody procedures shall conform to ASTM D 4840 (ASTM 1995).

## 13. Element B4 — Analytical Methods Requirements.

#### 13.1 Subsampling.

See guidance in USEPA 1998b, B4.2.

# 13.2 Preparation of the Samples.

See guidance in USEPA 1998b, B4.3. This information may be combined in a table with the requirements of 13.3.

#### 13.3 Analytical Methods.

See guidance in USEPA 1998b, B4.4. This information may be combined in a table with the requirements of 13.2. Laboratories are allowed to use professional judgement in modifying and developing alternatives to approved test methods to take advantage of emerging technologies that reduce costs, overcome analytical difficulties, and enhance data quality. A necessary condition of method flexibility is the requirement that modified method produce results equivalent or superior to results produced by the approved reference method. The flexibility to select more appropriate methods provides an opportunity to use new technologies to overcome matrix interference problems, lower detection limits, improve laboratory productivity, or reduce the amount of hazardous wastes in the laboratory.

#### 13.3.1 Physical and Chemical Analysis

This section should either reference DMMO guidance (Table 2) or present the following information in a tabular format:

- Characteristic to be measured (e.g., conventional physical measurements, metals, PAHs, polychlorinated biphenyls, organotins, and pesticides).
- Proposed preparation/extraction and cleanup methods (sediment and tissue),
- Proposed analytical methods (sediment and tissue),
- Minimum levels (ML) for sediment (dry weight basis) and tissue (wet weight basis). Minimum levels should meet those specified in Table 2 of this guidance.

Discussion of the proposed methods should be included to clarify any study-specific or labspecific modifications or additions, or to justify substantive deviations from the methods in Table 2.

# 13.3.2 Biological Analysis

This section should present an overview of the bioassay testing that is proposed, including the following information:

• Approach to be used (e.g., USACE/USEPA 1991, USEAP/USACE 1998, or other published agency guidelines), or

• Any project-specific parameters that have been pre-arranged with DMMO that may influence future decision-making for this dredging project (e.g., additional testing)<sup>2</sup>.

#### **Bioassay Protocols**

Generally, the SAP or QAPP should reference recommended protocols for conducting bioassays (e.g., ASTM or EPA standard methods as described in Appendix E of the ITM). The following project-specific information should be included, as well as discussion of any proposed deviations from or clarifications of the recommended protocols:

- Species proposed for use and rationale for their selection (e.g., seasonal availability, substrate preferences/tolerances), if necessary,
- Source of test organisms, and collection and handling procedures (including acclimation procedures),
- Control sediment source,
- Reference sediment source,
- Number of laboratory replicates proposed.
- Reference toxicant(s),
- Performance standards for control and reference samples,
- Performance standards for reference toxicant testing (e.g., laboratory mean and standard deviation on LC<sub>50</sub>/EC<sub>50</sub> data for each species proposed for testing).
- Water quality parameters (e.g., salinity, temperature, pH, ammonia, and dissolved oxygen) to be measured in overlying water/elutriate, including measurement procedures and frequency,
- Proposed bioassay sediment interstitial water monitoring parameters (e.g., salinity, pH, ammonia, and sulfides), including measurement procedures and frequency.

# 14. Element B5 — Quality Control Requirements

Field and laboratory QC procedures should follow the DMMO recommended minimum laboratory QC outlined in Table 3, as well as standard industry practices for environmental samples. All QC in a cited method must be performed. This section should reference the guidance used or discuss the following QC components as they relate to the proposed sampling and analysis:

- Field cross contamination and filter blanks,
- Method blanks.
- Duplicates (reported as relative standard deviation),
- Ongoing Precision and Recovery (OPR) [sometimes referred to as a laboratory control samples, quality control check sample, laboratory-fortified blank, or blank spike],
- Matrix spikes.
- Surrogate spikes,
- QC batch size.

<sup>&</sup>lt;sup>2</sup> In unusual circumstances, DMMO may agree to review draft data in order to expedite tiered testing (e.g., to decide on an appropriate compositing scheme or whether bioaccumulation testing is necessary). Any SAP proposing review of draft data should provide a full justification for the request being made.

A detailed discussion should be included to clarify any study-specific or lab-specific modifications or to justify substantive deviations from recommended QC components (Table 3).

#### 14.1 QC Batch Size.

The basic unit for laboratory quality control is the batch. Samples shall be prepared, analyzed, and reported in batches and be traceable to these respective batches. Batch sizes are normally limited to twenty field samples of a similar matrix but can exceed this by incorporating additional QC samples. Each batch shall be uniquely identified within the laboratory. Samples prepared together would normally be analyzed together on a single instrument. Samples taken from the same site would normally be grouped together for batching purposes within the constraints imposed by the method holding times. Laboratories may find it necessary to group multiple clients samples into a single batch. Under these circumstances, additional batch QC samples may be needed that evaluate the effect of the matrix from each site on method performance. Field QC samples, i.e., trip blanks, rinsates, etc., shall not knowingly be used for batch QC purposes.

#### 14.1.1 Preparation Batch.

The preparation batch shall be defined as samples of the same or similar matrix that are prepared together by the same person, or group of people, using the same equipment/glassware 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 limited continuous sequential time periods, usually not to exceed one analytical shift. Samples in each preparation batch should be of a similar matrix (e.g., ground water, soil, sludge, liquid waste, etc.) and, ideally, from the same site. Each preparation batch shall contain all of the appropriate number and type of calibration solutions, blanks, quality control samples, and regular analytical samples as defined by the analytical method. The laboratory shall have sufficient quantities of extraction/digestion glassware/equipment to meet these requirements. These requirements shall be completely defined in the laboratories SOPs and are summarized in part in the following sections. The use of various clean-up methods would be included as part of the preparation batch. It would be expected that all field and batch specific QC samples would be cleaned up using the same procedures.

#### 14.1.2 Analysis Sequence.

The analysis sequence or instrument run sequence shall be defined as samples that are analyzed together within the same time period or in sequential continuous time periods on one instrument under the control of one continuing calibration verification. Analysis sequences would be bracketed by the appropriate continuing calibration verification standards and other QC samples as defined by the analytical method. In general, if an instrument is not used for periods of time or shut down (e.g., overnight, etc.), then a new analysis sequence shall be initiated. Each analysis sequence shall contain the requisite number and type of calibration solutions, quality control samples, and regular analytical samples as defined by the analytical method. These requirements shall be completely defined in the laboratories Standard Operating Procedures (SOP) and are summarized in part in the following sections.