

CHAPTER 4

4.0 DREDGED MATERIAL SUITABILITY DETERMINATIONS

4.1 INTRODUCTION

As part of the process for authorizing dredging and disposal projects, the agencies involved must determine whether the material proposed for dredging is suitable for the proposed disposal environment. This chapter discusses how suitability determinations are made and describes the LTMS agencies' plans for continued improvement of the process.

4.2 IMPLEMENTATION MEASURES

The LTMS agencies will implement several measures to achieve the goals of the LTMS as they relate to dredged material suitability determinations. These implementation measures are shown as bulleted, italicized text.

4.3 OCEAN DISPOSAL AND THE GREEN BOOK

Disposal of dredged material outside of the baseline¹ is regulated under Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA).² Suitability of dredged material for ocean disposal is determined through compliance with USEPA's Ocean Dumping Regulations.³ National guidance for the MPRSA Section 103 program was published by USEPA and USACE in a document titled *Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual* (USEPA and USACE 1991), known as the "Green Book."

The USACE, in consultation with USEPA, determines the suitability of dredged material proposed for ocean disposal under criteria defined in the regulations. Material is determined to be suitable for ocean disposal if it meets the limiting permissible concentration (LPC).⁴ USEPA has independent authority to determine suitability. No material may be disposed at San Francisco Deep Ocean Disposal Site (SF-DODS) until USEPA provides written concurrence.

1 The baseline is generally where the shore directly contacts the open sea (33 CFR 329.12(a)(1)).

2 Use of dredged material as fill within the geographic limit of the territorial sea (within three nautical miles of the baseline) is regulated under Section 404 of the Clean Water Act rather than Section 103 of MPRSA.

3 40 CFR 220-228

4 40 CFR 227.27

4.3.1 Tiered Testing Approach

The Green Book implements a tiered testing approach. It is necessary to proceed through the tiers only until sufficient information exists to determine if the proposed dredged material is suitable or unsuitable for disposal. One of three decisions can be made:

- Information is sufficient to determine that the material is suitable for disposal.
- Information is sufficient to determine that the material is not suitable for disposal.
- Information is insufficient to make a determination.

Ocean Testing – “Green Book”
<ul style="list-style-type: none">• Tier I – Review of existing data; determine exclusion from testing• Tier II – Bulk sediment chemistry; evaluation of compliance with Water Quality Criteria; Theoretical Bioaccumulation Potential• Tier III – Liquid/Suspended Phase bioassays; benthic bioassays; bioaccumulation tests and tissue analyses• Tier IV – If necessary, and in consultation with USACE (and USEPA)

4.3.1.1 Tier I Evaluation

Tier I evaluations include examination of existing data and determination of whether the proposed dredged material meets at least one of the exclusion criteria, which are listed in Part 227.13(b) of the regulations. If the proposed dredged material does not meet any of the exclusion criteria, the USACE and USEPA may use prior decisions regarding suitability and recent data obtained from the project area to evaluate suitability of the material for disposal. In some cases, it may be appropriate to supplement available information with confirmatory physical and chemical analyses of the proposed dredged material.

4.3.1.2 Tier II Evaluation

Tier II consists of a determination of compliance with applicable marine water quality criteria (WQC) and an evaluation of the theoretical bioaccumulation potential (TBP) for certain contaminants of concern. Because WQC generally do not exist for all contaminants of concern, project proponents usually proceed to Tier III to determine compliance with the LPC.⁵

⁵ Details regarding evaluation of Tier II data may be found in the Green Book, Chapter 10.

Tier II analyses cannot be used to make a definitive determination of suitability. Therefore, the only decisions that can be made at Tier II are either to continue to Tier III or to find the material unsuitable for disposal. The results of TBP calculations, however, may be used to eliminate the need for certain analyses in Tier III. For example, if TBP results indicate that a particular contaminant of concern does not have the potential to bioaccumulate, the regulatory agencies may determine that analysis of test organisms' tissue is not necessary.

4.3.1.3 Tier III Evaluation

The Green Book, Chapter 11 provides general guidance on how to assess the effects of dredged material on "appropriately sensitive" marine organisms. In addition, regional testing protocols and other information contained in the Inland Testing Manual (ITM) (Section 4.4) may be used, as appropriate.

Water column/suspended phase acute toxicity bioassays (Green Book, Section 11.1) are used to assess the effects of disposal of the proposed dredged material on pelagic organisms. Suspended phase testing must include the use of three different appropriately sensitive marine organisms.

Whole sediment acute toxicity bioassays are used to evaluate the effects of disposal of the proposed dredged material on benthic organisms. Dredged material is considered unsuitable for ocean disposal if mortality of test organisms exceeds mortality in the reference sediment by 10 percent (20 percent for amphipods) or more and is statistically significantly greater in the dredged material than in the reference sediment. Testing must include two benthic organisms, generally an amphipod (always required) and a polychaete. Reference sediment is from an area similar to the SF-DODS which experiences substantially the same influences as the disposal site, with the exception of disposal of dredged material.⁶

Bioaccumulation analyses also evaluate the capacity of contaminants in dredged material to bioaccumulate or biomagnify, and thus the potential for adverse impacts on higher trophic levels. Guidance regarding the USACE's and USEPA's evaluation of bioaccumulation analyses results is found in the Green Book, Chapter 12. Contaminant concentrations in the tissues of the test species are evaluated relative to the Food and Drug Administration's (FDA's) published list of action limits (current values may be found in Table 6-1 of the ITM).⁷ If any of the contaminants of concern measured in test organism tissues statistically exceed FDA action limits, the dredged material is considered unsuitable for ocean disposal.

Contaminant tissue concentrations from organisms exposed to the proposed dredged material that do not exceed the FDA action limits, or for which action limits do not exist, are compared to tissue

⁶ The reference site for the SF-DODS is located at 37°39.0' N 129°29.0' W, approximately 10 to 15 nautical miles from the disposal site. The reference site is subject to essentially the same oceanographic influences and consists of sediments of similar grain size, composition, and geology.

⁷ ITM located at: <http://vm.cfsan.fda.gov/~Ird/fdaact.html>.

concentrations of species exposed to reference sediment. If concentrations of the contaminants of concern exceed those in the reference sediment by a statistically significant amount, USEPA and USACE use a number of factors to evaluate whether the material is suitable for ocean disposal (Green Book, Chapter 10 and ITM, Chapter 12).

Results from Tier III tests are usually sufficient to evaluate the suitability of the proposed dredged material for ocean disposal. Situations arise, however, where data from composite sample(s) indicate that the material is unsuitable for ocean disposal. In these cases, the USACE and USEPA generally recommend additional Tier III testing of subareas within the region characterized by the composite sample. The intent is to identify localized “hot spots,” thus allowing the remainder of the material represented by the composite to be found suitable for disposal.

4.3.1.4 Tier IV Evaluation

In rare cases, Tier III results may indicate that Tier IV testing is necessary (Green Book, page 6-1). For example, evaluation of long-term effects on marine organisms (such as reduced fecundity or mutations) may be necessary. In this case, the USACE, in consultation with USEPA, determines the required tests to evaluate chronic or other sublethal effects. Project proponents, however, may choose to suspend testing at Tier III. In these cases, the regulatory agencies must determine that the material is not suitable for ocean disposal.

4.4 IN-BAY DISPOSAL AND THE INLAND TESTING MANUAL

Dredged material disposal inside the baseline⁸ is regulated under Section 404 of the Clean Water Act (CWA). In addition, return flow from upland dredged material disposal sites into waters of the U.S. is regulated administratively as disposal under Section 404. Disposal is subject to compliance with the CWA Section 404(b)(1) Guidelines (Guidelines).⁹

National guidance for evaluation of material to be disposed in waters of the U.S. was published in 1998 by the USACE and USEPA. This document, *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual* (USEPA and USACE, 1998), is also referred to as the “Inland Testing Manual”. The ITM was developed to be consistent with the Green Book. Like the earlier guidance, the ITM uses a testing approach that is tiered and effects-based. This approach is designed to ensure that adequate information is generated to satisfy the requirements of the Guidelines, without making applicants test unnecessarily. The LTMS agencies have published draft guidance on testing under the ITM (PN 99-3).¹⁰ PN 99-3 is consistent with the ITM and should be used in conjunction with the national guidance.

8 For the purposes of this Management Plan, this includes disposal in San Francisco Bay and in adjacent waters of the U.S., including wetlands.

9 40 CFR 230.

10 PN 99-3 can be found on the DMMO Web site.

4.4.1 Tier I Evaluation

As with the Green Book, Tier I of the ITM focuses on existing information regarding the proposed dredged material. Review of this information may result in the decision that further analyses are not needed, or that confirmatory chemical measurements may be adequate for determination of the material's suitability for unconfined aquatic disposal. In general, the regulatory agencies have greater flexibility under Section 404 than under MPRSA, in terms of testing requirements to determine suitability.

4.4.2 Tier II Evaluation

In Tier II, bulk sediment chemical concentrations are used to evaluate the likelihood that disposal of the proposed dredged material would violate water quality standards. TBP may also be calculated (Section 4.3). Results from Tier II are useful for informing testing choices in Tier III and may be used to determine that material is *not* suitable for unconfined aquatic disposal. However, as with ocean disposal, Tier II results generally are not adequate for determining that material may be disposed in waters of the U.S.

4.4.3 Tier III and Tier IV Evaluations

Tier III tests focus on direct evaluation of water column and benthic toxicity expected to result from disposal of the proposed dredged material. Testing requirements and criteria to determine suitability for disposal are essentially identical for both ocean and in-Bay disposal. The increased flexibility of the CWA, however, allows for the testing of a single water column organism (described in PN 99-3), as opposed to the three species required under MPRSA. Two benthic organisms, including an amphipod, must be subject to acute toxicity tests. If there is reason to believe that disposal may result in bioaccumulation, the agencies may also require bioaccumulation testing and tissue analyses. Generally, evaluation at Tier III should be sufficient for determining the material's suitability for unconfined aquatic disposal, although Tier IV analyses may be needed in infrequent cases.

Clean Water Act Flexibility

- More discretion than MPRSA regarding testing requirements (particularly water column bioassays and bioaccumulation testing)
- Allows disposal if controls ensure minimal exposure of the material to the aquatic environment, such as
 - Isolation using bulkheads or other structures
 - Capping dredged material with clean sediment

4.4.4 Sediment Quality Guidelines

Sediment Quality Criteria (SQC) have not been developed for the Bay Area that represent a single sediment chemical concentration below which disposal poses minimal risk to the aquatic environment. However, the LTMS agencies initiated a work group composed of agency staff, consultants,

environmentalists and scientists to consider developing sediment quality guidelines (SQGs) that could be used in the region. The LTMS agencies propose to use these guidelines, as appropriate, to require additional testing, primarily bioaccumulation and related tissue chemistry. The SQG Work Group was established to address concerns expressed by interested parties.

The SQG Work Group has focused on the development of bioaccumulation trigger levels to help standardize when bioaccumulation testing is needed. The Work Group also has identified a preliminary list of “contaminants of concern” using an unbiased, scientific method to identify those compounds with known presence in the Bay Area. This list currently includes polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dichlorodiphenyl-trichloroethane (DDT), and mercury. To facilitate the development of SQGs, the LTMS agencies implement the following measure:

- *The LTMS agencies will continue to coordinate the efforts of the SQG Work Group and provide the work group’s results for public review, including the technical basis for any proposed SQGs. The LTMS agencies also will hold at least one public meeting describing any such guidelines, their development, and their proposed use.*

4.4.5 Reference Sites

The reference sediment serves as the point of comparison to identify potential effects of contaminants in the proposed dredged material. The Guidelines, however, currently require a comparison of “excavation” and “disposal” sites, the latter serving as “reference sediment.” However, ongoing disposal at a designated site may degrade the area over time, resulting in increasing levels of contaminants. Moreover, use of the disposal site as a reference is inconsistent with the practice employed in the ocean disposal program. As a result, USEPA (headquarters) published a draft “reference rule” on January 4, 1995 to rectify this inconsistency.

Several potential reference sites were investigated by the SWRCB (1998). The report, *Evaluation and Use of Sediment Reference Sites and Toxicity Tests in San Francisco Bay* (1998), concluded that three specific sites are probably representative of the least-impacted areas of the Bay.¹¹ LTMS agencies will propose these areas, identified in Table 4.1, for reference sites upon finalization of USEPA’s reference rule, and implement the following measure:

- *Upon finalization of USEPA’s proposed rule on reference sites, the LTMS agencies will recommend that testing for dredging projects be carried out using new reference sites from the SFBRWQCB’s Evaluation and Use of Sediment Reference Sites and Toxicity Tests in San Francisco Bay.*

¹¹ State Water Resources Control Board, San Francisco Bay Regional Water Quality Control Board, California Department of Fish and Game, Marine Pollution Studies Laboratory, and Institute of Marine Sciences UCSC. April 1998. *Evaluation and Use of Sediment Reference Sites and Toxicity Tests in SF Bay, Final Report*. 132pp plus appendices.

Table 4.1
Proposed In-Bay Reference Sites

<i>Site Name</i>	<i>Latitude</i>	<i>Longitude</i>
Paradise Cove	37° 53.95' N	122° 27.86' W
Tubbs Island	38° 06.87' N	122° 27.86' W
Island # 1	38° 06.72' N	122° 19.71' W

4.5 BENEFICIAL REUSE AND SEDIMENT SCREENING CRITERIA AND TESTING REQUIREMENTS FOR WETLANDS CREATION AND UPLAND BENEFICIAL REUSE

To facilitate and promote the reuse of dredged material, the SFBRWQCB prepared *Sediment Screening Criteria and Testing Requirements for Wetlands Creation and Upland Beneficial Reuse* (SFBRWQCB, 1992). The screening criteria were based on statistical estimates of sediment toxicity and ambient concentrations of chemicals found in the sediments of San Francisco Bay. The SFBRWQCB issued a revised draft of the screening criteria document in May 2000. This revision is in response to updated data on sediment toxicity and additional information on Bay sediment quality.

The screening criteria document identifies two general classes of dredged material suitable for reuse. Wetland surface material exhibits bulk sediment concentrations that fall within the range of ambient conditions in the central portions of San Francisco Bay (the Bay). Wetland surface material is not expected to pose a threat to water quality or the aquatic environment, even where it is in direct contact with surface waters or aquatic organisms, or is likely to erode into surface waters.

The second class of dredged material (wetland foundation) generally falls within the range of ambient conditions typically found around the margins of the Bay. This material is not of a quality that constitutes a hazardous or listed waste (SFBRWQCB, 1992), but has been found to be generally unsuitable for unconfined open water disposal. Wetland foundation material is not expected to be a threat to water quality when it is used such that there is minimal risk for it to come in direct contact with the aquatic environment or erode into surface waters. Wetland foundation material must be tested using the California Waste Extraction Test¹² to ensure that any water that leaches through the material will not adversely impact the aquatic environment. Final determination of sediment suitability for any specific permit action, however, considers site location, design and proposed construction methodology(-ies). Projects proposing to use wetland foundation material are expected to require Waste Discharge Permits from the SFBRWQCB to ensure that there will be minimal risk of adverse impacts. Permit requirements will typically include design constraints, monitoring requirements, discharge prohibitions, effluent limits and receiving water limits.

12 As described in CCR Title 22.

4.5.1 Sediment Quality Guidelines

As described in Section 4.5, the SFBRWQCB is in the process of revising its 1992 document providing testing guidance and sediment quality guidelines for beneficial reuse of dredged material. These have not been adopted by the Board and are undergoing external review. In addition, the long-term goal of the SQG work group is to establish guidelines for beneficial reuse of dredged material and to encourage and facilitate beneficial uses. Although the group hopes to develop beneficial reuse SQG, the highly variable nature of beneficial reuse projects and sites may place a severe constraint on this goal. To facilitate and promote beneficial reuse of dredged material, the LTMS agencies implement the following measure:

- *The SFBRWQCB will revise Sediment Screening Criteria and Testing Requirements for Wetland Creation and Upland Beneficial Reuse, which will provide guidelines on testing (including recommendations for reference sites) and sediment quality screening for various beneficial uses. A draft version of the revised document has been issued for public comment and, following the close of the comment period, will be revised and finalized through the formal administrative process.*

4.5.2 Standardized Beneficial Reuse Testing Requirements

The LTMS agencies recognize that certain biogeochemical changes that occur when dredged material is placed outside of the aquatic environment may affect the bioavailability of contaminants. As a result, the SQG work group plans to examine existing “upland” bioassays to evaluate their appropriateness for beneficial reuse projects. The LTMS agencies expect that a number of regional and perhaps site specific modifications may be required and that verification and scientific peer review may be needed. Therefore, extensive laboratory and field testing will likely be required prior to their use as a regulatory tool. Although this effort is likely to be a long-term goal, the LTMS agencies implement the following measure:

- *A long-term goal of the LTMS agencies is to develop testing protocols to further improve the evaluation of the suitability of Bay Area dredged sediments for various beneficial reuse options. The LTMS agencies plan to re-evaluate the appropriateness of existing sediment testing protocols, particularly bioassays, to ensure that they address the environments and potential biological receptors likely to be of concern for beneficial reuse projects.*

4.6 REGIONAL IMPLEMENTATION MANUAL (RIM)

The LTMS agencies plan to develop a RIM describing testing and analysis requirements for disposal of dredged material in the Bay Area. The RIM will include regional test protocols, contaminants of concern, appropriate species for bioassays, and quality assurance guidance. Sediment quality guidelines, new or modified testing procedures, reference sites, and other testing and suitability-related information will be included as they become available.

The RIM will complement the *LTMS Management Plan* and be used in conjunction with it. Substantive changes or additions will be subject to public review and comment. To facilitate

development of the RIM, which will serve as a testing manual for the three disposal and reuse environments, the LTMS agencies implement the following measure:

- *The LTMS agencies will work to develop a comprehensive regional implementation manual (RIM), which will incorporate existing local guidance for testing requirements for all disposal environments in the LTMS planning area. A draft version will be issued, revisions made per public comments, and a final version prepared. The document will be revised or updated as needed.*

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