CHAPTER 5

TIERED EVALUATION PROCESS AND TIER I

5.1 OVERVIEW

Over 99 percent of the volume of sediment dredged annually in the Lower Columbia River Management Area (LCRMA) and adjacent channel reaches has been found to be suitable for placement at ocean and flow-lane disposal sites or used for beach nourishment. However, the potential exists for various degrees of sediment contamination at some dredging sites, particularly those located near urban and industrial areas. Projects in such locations may have to undergo a more extensive sediment evaluation. Such an evaluation, as called for in this manual, is essential so that dredged material will be disposed of in a manner that is consistent with environmental and regulatory mandates.

The chemical and biological testing required under this guidance manual can be expensive. One of the objectives of the manual is to develop and refine procedures that reduce the cost of dredged material testing while providing an appropriate evaluation of the potential environmental impact of dredged material disposal. The basic framework for evaluating dredging and disposal proposals consists of a tiered evaluation process.

5.2 TIERED EVALUATION PROCESS

The tiers or categories of information/data needs described below are used in a sequential manner for evaluating the suitability of dredged material for unconfined aquatic disposal. This sequential approach is called a tiered evaluation process. At each tier a decision is made regarding the adequacy of the existing data to make a suitability determination. If the existing data are adequate for decision purposes, then there is no need to proceed to the next tier. If not, data at the next tier are required before dredged material may be approved for unconfined aquatic disposal. The tiered arrangement is summarized in Table 5-1 and illustrated in Figure 5-1.

TABLE 5-1
Summary of Tiered Evaluation Approach for Aquatic Disposal

Tier I	Applicant and agencies compile and evaluate existing information on specific dredging site; determine if exclusion-from-testing or recency/frequency guidelines apply; and determine if there exists a reason-to-believe that significant contamination is present. Agencies prepare a suitability determination if sufficient information is available to approve unconfined aquatic disposal. (Chapter 5) If sediment information is not adequate, applicant must prepare and submit a sampling and analysis plan or SAP. (Chapter 6 and 7)
Tier IIA	Sediments are sampled and analyzed for grain size and total volatile solids (TVS), and any other conventional chemical parameter determined applicable to the proposed dredging location (Chapter 8). If the results of grain size analysis are at least 80% sand and TVS is less than 5.0%, the proposed dredged material qualifies for unconfined aquatic disposal based on exclusionary status.
Tier IIB	If the sediment fails either the grain size or TVS test, **or if active sources of contamination are determined to be present,** the sediment must be tested for chemicals-of-concern (Chapter 8). If the results of sediment testing do not exceed screening level guidelines, the proposed dredged material qualifies for unconfined aquatic disposal.
Tier III	If the results of the chemistry test exceed screening guidelines, the sediment must undergo appropriate biological tests (Chapter 9). If the sediment passes the biological testing guidelines, the proposed dredged material qualifies for unconfined aquatic disposal. Sediment that fails the biological tests of Tier III is determined to be unsuitable for unconfined aquatic disposal.
Tier IV	Two circumstances can trigger Tier IV evaluation (Chapter 10): a) the results of Tier III bioaccumulation tests are indeterminate, or b) the sediments contain chemicals which do not have threshold sediment quality values or for which the routine biological tests are inappropriate. If Tier IV testing is considered necessary by the RMT, then specific tests or evaluations and interpretive criteria will be designed by the RMT in coordination with the project proponent.

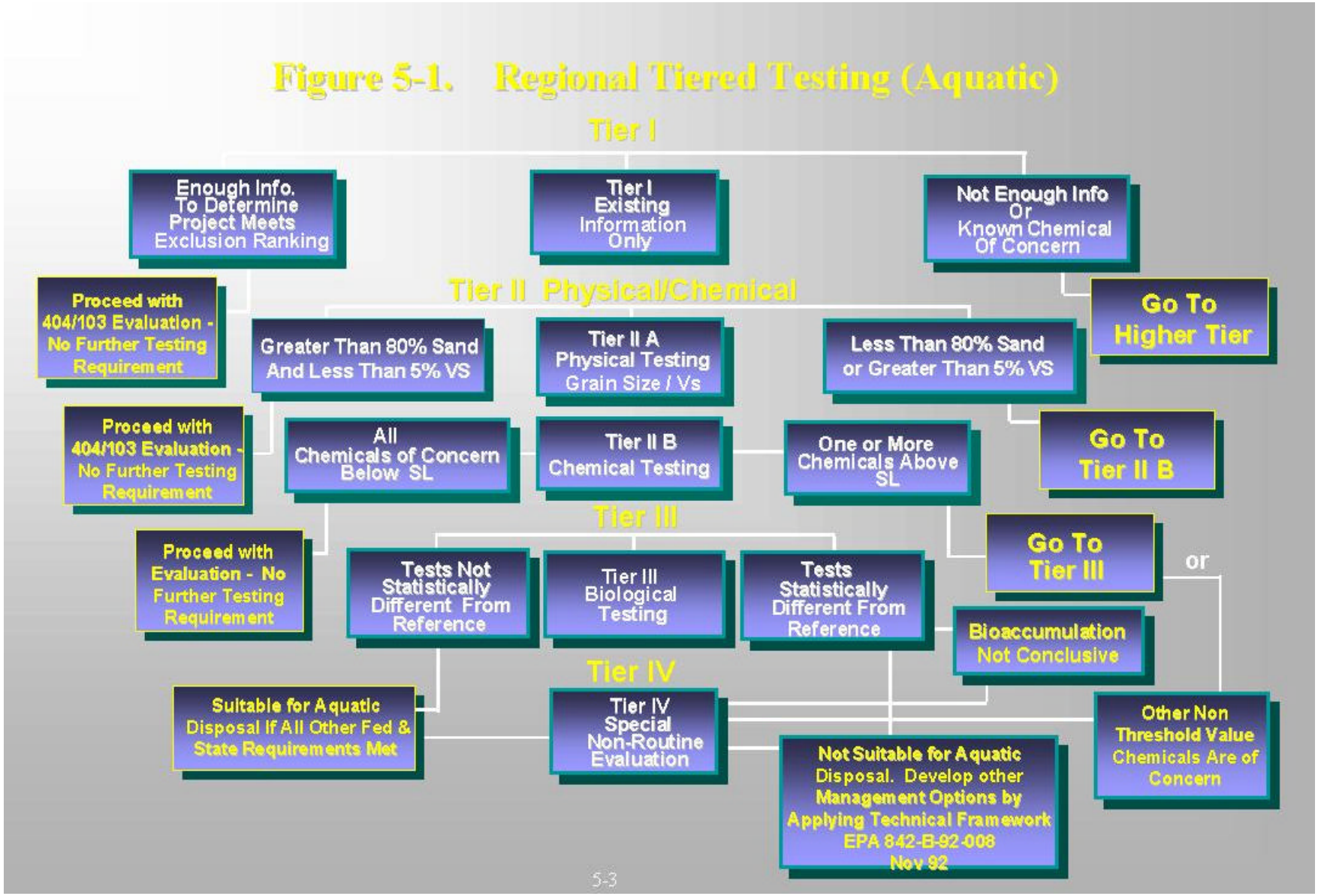
Figure 5-1. Regional Tiered Testing (Aquatic)
Tier I
Enough Info. To Determine Project Meets Exclusion Ranking
Tier I Existing Information Only
Not Enough Info Or Known Chemical Of Concern
Proceed with 404/103 Evaluation - No Further Testing Requirement
Tier II Physical/Chemical
Go To Higher Tier
Greater Than 80% Sand And Less Than 5% VS
Tier II A Physical Testing Grain Size / Vs
Less Than 80% Sand or Greater Than 5% VS
Proceed with 404/103 Evaluation - No Further Testing Requirement
All Chemicals of Concern Below SL
Tier II B Chemical Testing
One or More Chemicals Above SL
Go To Tier II B
Tier III
Proceed with Evaluation - No Further Testing Requirement
Tests Not Statistically Different From Reference
Tier III Biological Testing
Tests Statistically Different From Reference
Go To Tier III
or
Bioaccumulation Not Conclusive
Tier IV
Suitable for Aquatic Disposal If All Other Fed & State Requirements Met
Tier IV Special Non-Routine Evaluation
Other Non Threshold Value Chemicals Are of Concern
Not Suitable for Aquatic Disposal. Develop other Management Options by Applying Technical Framework EPA 842-B-92-008 Nov 92
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5.3 TIER I

This section contains both an ***initial management area ranking*** (Section 5.3.1) and an ***individual project evaluation*** (Section 5.3.2). The management area ranking refers to the initial rankings assigned to specific sites or reaches of the Lower Columbia River where dredging is occurring or has occurred historically. These initial rankings serve as one of the project variables factored into the development of sediment sampling and analysis plans.

The individual project component refers to the Tier I evaluation process for a specific dredging proposal. Included in the Tier I evaluation for specific dredging proposals are guidelines pertaining to:

Exclusion from further testing based upon grain size and TVS (Section 5.3.3)

Proximity to known sources of contamination

Frequency of dredging (Section 5.3.4), and

Recency of data (Section 5.3.5).

5.3.1 Initial Management Area Rankings. In order to assign initial rankings in the LCRMA, the Regional Management Team (RMT) evaluated all known and available sediment quality data of the LCRMA and adjacent side channels. Reaches or sites where dredging may be expected or has occurred in the past were assigned one of five possible ranks: **exclusionary, low, low-moderate, moderate** or **high**. In that order, these ranks represent a scale of increasing potential for concentrations of chemicals-of-concern and/or adverse biological effects. Table 5-2 identifies the parameters that better define these rankings. The ranking system is based on two major factors:

< The availability of historic information on the physical, chemical, and/or biological-response characteristics of the sediments from a reach or site

< The number, kinds, and proximity of chemical sources (existing and historical) known to occur in or near a particular reach or site

The initial management area rankings are contained in Table 5-3. These rankings represent existing information at the time of initial ranking. Revisions to the rankings can and will occur as the result of additional information brought to the attention of the RMT. In addition, a specific project site or reach can be re-ranked based upon the results of new sediment testing or by means of a partial characterization. (see Section 6.7)

TABLE 5-2
MANAGEMENT AREA RANKING DEFINITIONS

RANKING	PARAMETERS
Exclusionary	Available data indicate coarse-grained sediment with at least 80% sand retained in a No. 230 sieve and a Total Volatile Solids content of less than 5.0%. Locations sufficiently removed from potential sources of sediment contamination based on historical information and/or best professional judgement. Typical locations include the mouth and mainstem channel of the Lower Columbia River.
Low	Available data indicate low concentrations of chemicals-of-concern (CoCs) and/or no significant response in biological tests. Locations with higher percentage of finer-grained sediments and organic material but few sources of potential contamination. Typical locations include adjacent entrance channels, rural marinas, navigable side sloughs, and small community berthing facilities.
Low-Moderate	Available data indicate a "low" rank may be warranted but data are not sufficient to validate the ranking.
Moderate	Available data indicate moderate concentrations of CoCs in sediments in a range known to cause adverse response in biological tests. Locations where sediments are subject to several sources of contamination, or where existing or historical use of the site has the potential to cause sediment contamination. Typical locations include urban marinas, fueling and ship berthing facilities; areas downstream of major sewer or stormwater outfalls; and medium-sized urban areas with limited shoreline industrial development.
High	Available data indicates high concentrations of CoCs in sediments and/or significant adverse responses in at least one of the last two cycles of biological tests. Locations where sediments are subject to numerous sources of sediment contamination, including industrial runoff and outfalls, or where existing or historical use of the site has the potential to cause sediment contamination. Typical locations include large urban areas and shoreline areas with major industrial development.

5.3.2 Project Specific Evaluations. Tier I involves the review of all available historical information to determine if there is a reason-to-believe that significant contamination may be present at a site proposed to be dredged. Included in the Tier I evaluation is the determination of whether the sediments to be dredged fall under an "exclusionary" category (Section 5.3.3). Projects requiring frequent dredging may also be excluded from further testing following two rounds of successive evaluation (Section 5.3.4). For projects with newly obtained sediment characterization data, Recency Guidelines have a bearing on the longevity of the information for decision purposes (Section 5.3.5).

a) Review of Historical Information. The agencies involved in the review and approval of dredging projects in the LCRMA can and do serve as a significant source of historical information about sediments and proposed dredging locations. The agencies share a common responsibility to make available any and all such information. However, the compilation of all available historical information about sediment quality or potential sources of contamination for a specific dredging project is the responsibility of the project proponent. An accurate compilation of historical data can result in substantial cost savings. For example, qualified data may eliminate or reduce the need for testing; may help limit the number of contaminants tested for; and may reduce the amount of dredged material needed to be tested.

b) Quality Assurance of Existing Data. The value of historical data is controlled by its reliability, which in turn depends upon the quality, timeliness, and completeness of the data. For example, twenty year old data may provide valuable input on a historical contaminant source which no longer exists, even though it can not be used for determinations of suitability. In contrast, recent data from a well designed sampling effort may be sufficient to make a final suitability determination on a project or to substantially reduce additional testing requirements. The following types of information are required in order to use existing data for suitability determinations:

- < Sampling and analytical methods for both chemistry and biological tests
- < Chemical detection limits
- < Biological test control sediment
- < Quality control measures for both chemistry and biological tests

TABLE 5-3. COLUMBIA RIVER FEDERAL PROJECT RANKING

PROJECT AREA	PROJECT	EXCLUSIONARY	LOW	LOW - MODERATE	MODERATE	HIGH
Mouth of the Columbia	RM -2 to 5	X				
Main Stem Columbia	RM 5 to 20	X				
	RM 20 to 29	X				
	RM 29 to 47	X				
	RM 47 to74	X				
	RM 74 to 88	X				
	RM 88 to 99	X				
	RM 99 to 106	X				
Columbia Side Channels						
	Hammond Boat Basin		X			
	Skipanon Channel			X		
	Baker Bay West Channel to mi.1+30	X				
	Baker Bay West Channel mi.1+30 to end		X			
	Illwaco Boat Basin		X			
	Chinook Channel	X				
	Chinook Marina		X			
	Toungue Point Access Ch & Turning Basin		X			
	Toungue Point Finger Piers				X	
	Skamokawa Creek		X			
	Elochoman Slough				X	
	Wahkiakum Ferry	X				
	Westport Slough		X			
	Old Mouth of the Cowlitz	X	X			
	St. Helens X-Over Ch.		X			
	Oregon Slough		X			
Willamette River						
	Main Federal Channel		X	X	X	
	US Moorings					X

5.3.3 Exclusion from Further Testing. The determination of a possible exclusionary status for a particular dredging project is done during Tier I or at Tier IIA. Exclusions from testing for coarse-grained dredged material is provided for in national guidelines (40 CFR 230.6(a) and 40 CFR 227.13(b)). In those guidelines, dredged material which meets the criteria set forth in the following three paragraphs is considered environmentally acceptable for unconfined aquatic disposal without further testing:

> (1) Dredged material that is composed predominantly of sand, gravel, rock, or any other naturally occurring bottom material with particle sizes larger than silt, and the material is found in areas of high current or wave energy such as streams with large bed loads or coastal areas with shifting bars and channels; or
>
> (2) Dredged material that is identified for beach nourishment or restoration and is composed predominantly of sand, gravel or shell with particle sizes compatible with material on the receiving beaches; or
>
> (3) When: (a) the dredged material proposed for disposal is substantially the same as the substrate at the proposed disposal site; and (b) the site from which the material proposed for disposal is to be taken is far removed from known existing and historical sources of pollution so as to provide reasonable assurance that such material has not been contaminated by such pollution.

This regional manual endorses the concepts embodied in categories (1) and (2) above by adopting the following exclusionary language:

Sediments which meet the criteria set forth in the following two paragraphs are considered environmentally acceptable for unconfined aquatic disposal in the Lower Columbia River Management Area without further testing; ***provided however, the sediments are not located within the likely impact zone of an active and significant contaminant source:***

(1) Sediments that are composed of greater than 80% sand, gravel or other naturally occurring bottom material (retained on a 230 sieve) and that have a total volatile solids content of less than 5.0 %.

(2) Sediments targeted for beach nourishment or restoration that are composed of greater than 80% sand, gravel or shell (retained on 230 sieve), that have a total volatile solids content of less than 5.0 %, and that are compatible with material on the receiving beaches.

The adoption of exclusion category is based upon numerous studies and sampling efforts done on the Lower Columbia River verifying that coarser-grained sediments are characterized by

very low to negligible levels of chemical contamination. This exclusion category was used as one of the guidelines in determining the initial rankings in the LCRMA.

5.3.4 "Frequency of Dredging" Guideline. The frequency of dredging guideline provides a second method by which dredged material may be excluded from further testing for specific periods of time. The frequency guideline pertains to dredging projects that occur on a frequent basis, such as every year or, at most, every two or three years. Such dredging commonly reflects a situation of routine and rapid buildup of shoals with relatively homogeneous sediments. The quality of the sediment at the dredging site tends to stay the same for successive years, barring any significant changed condition at or upstream of the site.

To qualify for consideration under the frequency guideline, a project requires full characterization of sediments for two successive dredging events. Provided the sediments are found suitable for unconfined aquatic disposal for each dredging event, the "frequency" of additional characterization after that will depend upon the rank of the project site determined by the results of the first two rounds of testing.

In effect, the frequency guideline specifies a period of time in which a qualified dredging project is "excluded" from having to do any further testing. The time durations provided for by the frequency guidelines are the same as for the "recency of data" guidelines described below: that is, two years for high-ranked areas; and 5, 6, and 7 years for moderate, low-moderate, and low-ranked areas, respectively. Areas or projects ranked Exclusionary under Section 5.3.3 do not need to be considered under the frequency guideline since they have already qualified for exclusion from further testing on the basis of grain size and total volatile solids.

5.3.5 "Recency of Data" Guideline. The recency of data guideline refers to the duration of time for which newly obtained and qualified physical, chemical or biological information is considered adequate for decision making without further testing. Recency guidelines are based on the area or project site rankings which, in turn, reflect a consideration of the presence and operating status of contaminant sources located at or near the area to be dredged. The recency guideline for exclusionary, low, low-moderate, and moderate ranked areas is 10, 7, 6, and 5 years, respectively. In high-ranked areas, the recency guidelines allow characterization data to be valid for a period of 2 years.

The recency guidelines do not apply when a known "changed" condition has occurred since the most recent sampling effort, such as an accidental spill or the siting of a new discharge outfall. For subsurface sediments, the potential for contamination from groundwater sources must also be considered.

5.4 TRANSITION TO SUBSEQUENT TIER(S)

The compilation and review of existing information and other locational factors comprise the first tier of the tiered approach to sediment evaluation. If existing information adequately support a decision for unconfined aquatic disposal, no additional data are needed. If existing information does not exist or is not adequate for purposes of the initial site/sediment characterization, the project proponent will be required to prepare and submit a sampling and analysis plan (SAP). Chapter 6 describes the details of a sampling plan applicable to the complexities of a dredging project and the guidelines for preparing and submitting the plan. Chapter 7 provides further details on the proper implementation of sediment sampling and laboratory analyses.