

2002

Management/Monitoring Plan

Mouth of the Columbia River (MCR)

Ocean Dredge Material Disposal Site (ODMDS)

May 2002

This 2002 Management/Monitoring Plan has been prepared jointly by USEPA, Region 10, and USACE, Portland District. The plan addresses management and monitoring of existing EPA designated sites and selected Section 103 sites until EPA completes final site designation. The plan will be updated for the designated sites as part of the designation process.

MCR ODMDS
2002 Management/Monitoring Plan
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Purpose and Authorization

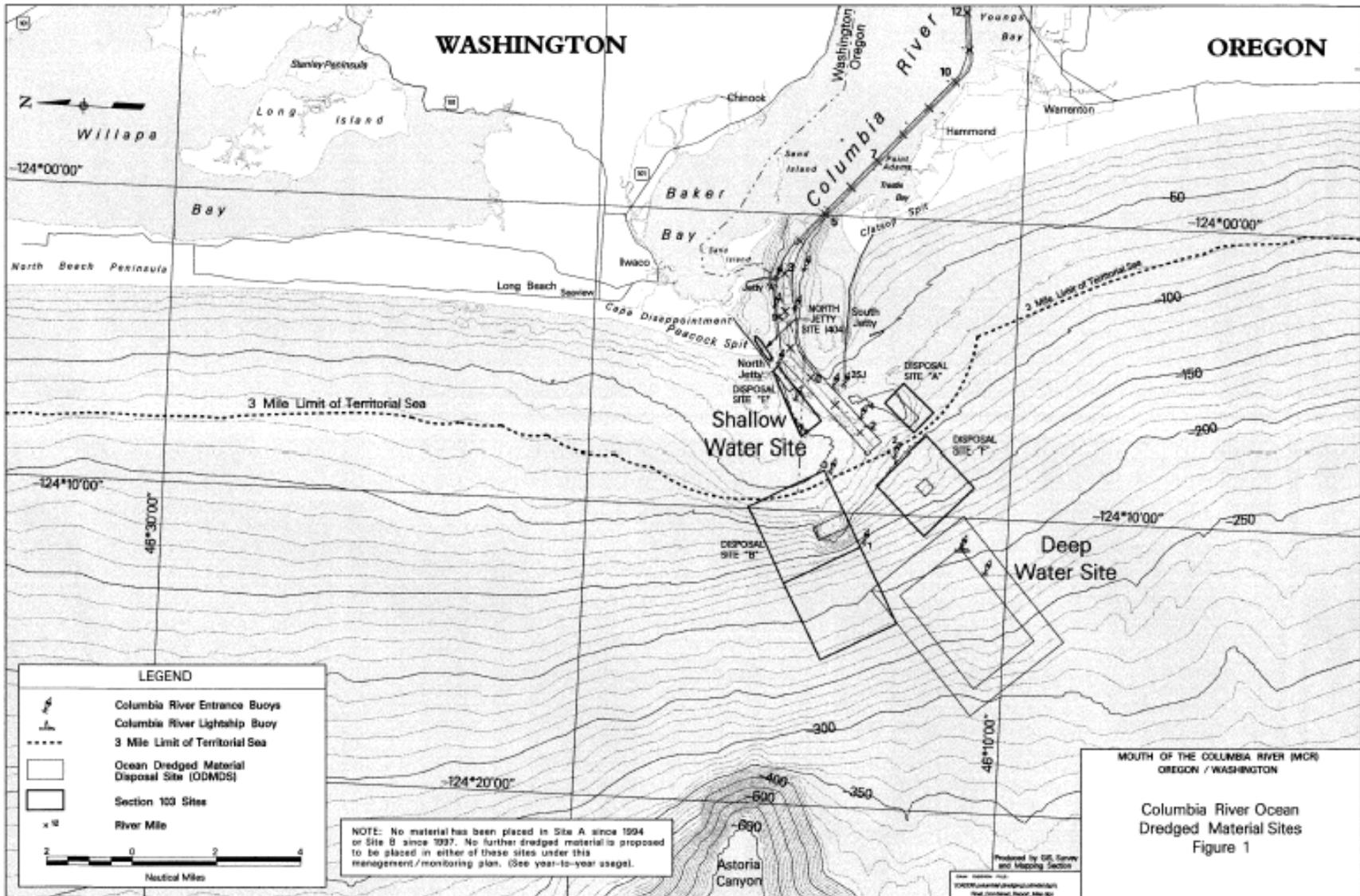
This Management and Monitoring Plan has been prepared jointly by the U. S. Environmental Protection Agency (USEPA), Region 10, and the U.S. Army Corps of Engineers (USACE), Portland District. This is an interim plan to address management and monitoring of existing EPA designated sites and selected Section 103 sites until EPA completes final site designation. The plan will be updated for the designated sites as part of the designation process.

The purpose of this plan is to establish a coordinated program between USEPA, Region 10 and USACE, Portland District for the management and monitoring of the Columbia River Ocean Dredged Material Disposal Sites (ODMDSs) (Figure 1) that is environmentally sound and feasible from an engineering standpoint. This management and monitoring plan meets all criteria and factors set forth in Part 228, *Criteria for the Management of Disposal Sites for Ocean Dumping* (Title 40 CFR), and has been reviewed by the public. These regulations were promulgated in accordance with criteria set forth in Sections 102 and 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 (33 U.S.C. §1412 and §1413). Further, Section 506, *Site Designation*, of the Water Resources Development Act of 1992 (WRDA 1992), further defined the roles, authorities, and responsibilities of the USACE and the USEPA by amending Section 102(c) of the MPRSA (33 U.S.C. §1412(c)).

MPRSA Section 102(c)(3), as amended by WRDA 1992, sets forth a number of requirements regarding the content and development of site management plans, as follows:

In the case of ODMDSs the USEPA, in conjunction with the USACE, shall develop a site management plan for each site designated pursuant to MPRSA Section 102(c)(3). Plans shall include, but not be limited to-

- (A) a baseline assessment of conditions at the site;
- (B) a program for monitoring the site;
- (C) special management conditions or practices to be implemented at each site that are necessary for protection of the environment;
- (D) consideration of the quantity of the material to be disposed of at the site, and the presence, nature, and bioavailability of the contaminants in the material;
- (E) consideration of the anticipated use of the site over the long term, including the anticipated closure date for the site, if applicable, and any need for management of the site after the closure of the site; and
- (F) a schedule for review and revision of the plan (which shall not be reviewed and revised less frequently than 10 years after adoption of the plan, and every 10 years thereafter).



Management of ODMDSs involves regulating the times, the quantity, and the physical/chemical characteristics of dredged material that is dumped at the site; establishing disposal controls, conditions, and requirements to avoid and minimize potential impacts to the marine environment; and monitoring the site environs to verify that unanticipated or significant adverse effects are not occurring from past or continued use of the disposal site and that permit terms are met.

Appropriate management of ODMDSs is aimed at assuring that disposal activities will not unreasonably degrade or endanger human health, welfare, the marine environment or economic potentialities (see MPRSA Section 103(a)). ODMDS management is a continuum that begins with site designation. At the site designation stage, the emphasis is on selecting a site where disposal will not have a significant adverse impact on various amenities such as fisheries, coral reefs, historic sites (e.g., shipwrecks), or endangered species, or on other uses of the marine environment.

ODMDSs are selected so as to minimize the risk of potentially adverse effects to human health and the marine environment.

Objectives

The fundamental objectives of this management and monitoring plan are to provide for the safe and efficient disposal of dredged material while at the same time, minimizing the impacts to coastal resources. Specific objectives necessary for accomplishing this are to:

1. Control mounding, to avoid potentially hazardous increases in wave heights,
2. Minimize impacts to marine resources,
3. Beneficially use dredged material when practical.
4. Safely and efficiently use hopper dredges,
5. Minimize interference with other uses of the ocean, and

Site Management Roles and Responsibilities

The management and monitoring of ocean dredged material disposal sites are a federal responsibility shared between the EPA and the Corps of Engineers. Other federal and state agencies which have federal regulatory responsibilities include: the National Marine Fisheries Service, US Fish and Wildlife, Oregon Department of Land Conservation and Development, Oregon Department of Environmental Quality and, Washington Department of Ecology.

Disposal Site Characterization

ODMDSs A, B, E, and F at MCR received EPA interim designation in 1977. EPA issued final site designation for the four ODMDSs (A, B, E, and F) in 1986 under its Section 102 authority. Their use was primarily for the disposal of MCR maintenance dredged material (Figure 1). The selection and eventual designation of these ODMDSs, documented in USEPA's Final 1983 ODMDS Designation Environmental Impact Statement (EIS), was based on studies of the

physical, chemical, and biological conditions offshore from the MCR. Corner coordinates and descriptions are given in Table 1.

Since 1977 material dredged from the MCR project has been placed at ODMDS A, B, E, and F. Due to mounding at the 1986 EPA designated ODMDS A and B, areas around ODMDS A, B, and F were selected by the Corps through its Section 103 authority to receive dredged material. EPA concurred with the Section 103 action and also issued proposed rules to expanded these sites under its Section 102 authority in 1992. To provide further site capacity and management options, areas around sites B and E were further selected by the Corps under its Section 103 authority in 1997. EPA concurred with this action in 1998. **Upon EPA's final designation of the Deep Water Site and Shallow Water Site the original 1986 EPA designated Sites A, B, E, and F will be ddesignated. The Corps Section 103 sites will also no longer be available for the placement of dredged material.**

The two new proposed ODMDSs, the Shallow Water Site and the Deep Water Site, located offshore of the mouth of the Columbia River, are also discussed in this management and monitoring plan. These sites are to handle dredged material from the Corps' Columbia River and Mouth of the Columbia River (MCR) Federal navigation channels. Material from permitted projects may also be placed in the disposal sites. The two ODMDSs would be designated under EPA Section 102 authority or selected and used under the Corps' 103 authority.

The Shallow Water Site incorporates the existing EPA Section 102 designated Site E and the Corps' 1998 Section 103 selected "Expanded Site E." As shown on Figure 1, the site is located off the end of the North Jetty and would be about two miles long and from 1,000 feet to over 3,000 feet wide, covering an area of approximately 530 acres. Water depths in the site range from 40 to 70 feet. The site has an estimated capacity of 2.1 million cubic yards (mcy) to 2.3 mcy per year. Most of the sand that would be transported away from the Shallow Water Site is expected to move north toward and across Peacock Spit.

The Deep Water Site is located in 190 to 300 feet of water and covers approximately 5,500 acres. It was sized to accommodate 50 years of maintenance from MCR and future material from the Columbia River, estimated at 225 mcy total, with a mound height of approximately 40 feet. One dredged material placement site, the North Jetty Site, is located in the entrance channel and is included in this discussion because it is an integral part of the dredged material management plan, even though it is not an ODMDS. The North Jetty Site is being used and managed under Clean Water Act Section 404 (CWA) authority. The North Jetty Site is located on the south side of the North Jetty, near the head of the jetty. The site covers approximately 115 acres, in water 40 to 70 feet deep. The site has been eroding and sand placed here will help protect the foundation of the North Jetty. Material is expected to move slowly away from this site towards both Peacock Spit and Jetty A. The site is estimated to have a static capacity of one million cubic yards. The dynamic capacity of this site has not yet been determined.

Benson Beach another potential CWA 404 dredged material placement site is located between the MCR north jetty and North Head, a rock promontory approximately 7,500 feet north of the north jetty. Benson beach accreted as a result of construction of the north jetty. After accreting

the beach has been eroding since the late 1940's. No dredged material has ever been placed on Benson Beach but it has been suggested that direct placement of dredged material onto Benson Beach could offset erosion and reduce the need for ocean disposal. Appendix A, Chapter 7 (Benson Beach Disposal Site Evaluation) of the Integrated Feasibility Report for Channel Improvements and Environmental Impact Statement (USACE, 1999) provided additional information regarding placement of dredged material on Benson Beach.

Other potential beneficial use sites will be considered and material utilized when authorized and feasible. Utilization of alternative sites would help to reduce the need for disposal at the ODMDSs.

Disposal Site History

See Appendix H, Exhibit B of the Integrated Feasibility Report for Channel Improvements and Environmental Impact Statement for disposal site histories.

Baseline Studies

MPRSA 102(c)(3)(A) requires that the management plan include a baseline of conditions at the site.

Extensive studies were conducted off the mouth of the Columbia River in the 1970's under the Dredged Material Research Program (USACE, 1977) providing detailed baseline information on the offshore environment for the original ODMDS (A, B, E, and F) designation. The proposed Shallow Water Site is a high-energy erosive area and experiences high fluctuations in biological use. It has been previously used for dredged material placement. Therefore, no pre-disposal biological baseline is possible. The May 1997 bathymetric survey of the Shallow Water Site and the surrounding area is used as the baseline for predicting potential wave impacts.

Physical baseline studies have been completed at the Deep Water Site. These include a sidescan survey, an acoustic bottom characterization survey, and physical/chemical analyses survey. Biological baseline studies will be conducted in 2002 to characterize the Deep Water Site.

Table 1. Coordinates (NAD 1983) and Dimensions of the Sites.

Shallow Water Site

Corner Coordinates:

46° 15' 35.36" N, 124° 05' 15.55" W
46° 14' 31.07" N, 124° 07' 03.25" W
46° 14' 58.83" N, 124° 07' 36.89" W
46° 15' 42.38" N, 124° 05' 26.65" W

Dimensions:

1,054' to 3,600' width
by 10,000' long
Azimuth (long axis): 229° T
Depth: 45'-75'

Deep Water Site Placement Area

Corner Coordinates:

46° 11' 06.00" N, 124° 11' 05.99" W
46° 12' 28.01" N, 124° 12' 48.48" W
46° 10' 37.96" N, 124° 15' 50.91" W
46° 09' 15.99" N, 124° 14' 08.40" W

Dimensions:

11,000' wide
by 17,000' long
Depth 190'-300'

Deep Water Site

Corner Coordinates:

46° 11' 03.03" N, 124° 10' 01.30" W
46° 13' 09.78" N, 124° 12' 39.67" W
46° 10' 40.88" N, 124° 16' 46.48" W
46° 08' 34.22" N, 124° 14' 08.07" W

Dimensions:

17,000' wide
by 23,000' long
Depth 190'-300'
Buffer 3,000 feet

North Jetty Site

Corner Coordinates:

46° 15' 45.67" N, 124° 05' 11.99" W
46° 16' 17.18" N, 124° 04' 17.99" W
46° 16' 10.31" N, 124° 04' 08.72" W
46° 15' 38.18" N, 124° 05' 02.73" W

Dimensions:

1,000' wide
by 5,000' long
Depth 40'-70'

Coordinates: Mouth of the Columbia River (MCR) Ocean Dredged Material Disposal Sites (EPA 1986 designated sites) (NAD 1927)

Area A

Corner Coordinates:

46° 13' 03" N, 124° 06' 17" W
46° 12' 50" N, 124° 05' 55" W
46° 12' 13" N, 124° 06' 43" W
46° 12' 26" N, 124° 07' 05" W

Dimensions: 5,000' x 2,000'
Azimuth (long axis): 225° T
Average Depth: 65'

Area E

Corner Coordinates:

Area B

Corner Coordinates:

46° 14' 37" N, 124° 10' 34" W
46° 13' 53" N, 124° 10' 01" W
46° 13' 43" N, 124° 10' 26" W
46° 14' 28" N, 124° 10' 59" W

Dimensions: 5,000' x 2,000'
Azimuth (long axis): 332° T
Average Depth: 110'

Area F

Corner Coordinates:

46° 15' 43" N, 124° 05' 21" W
46° 15' 36" N, 124° 05' 11" W
46° 15' 11" N, 124° 05' 53" W
46° 15' 18" N, 124° 06' 03" W

Dimensions: 4,000' x 1,000'
Azimuth (long axis): 229° T
Average Depth: 60'

46° 12' 00" N, 124° 09' 00" W
46° 12' 00" N, 124° 08' 42" W
46° 11' 48" N, 124° 09' 00" W
46° 12' 00" N, 124° 09' 18" W

Dimensions: 1,800' x 1,800'
Azimuth (long axis): 225° T
Average Depth: 125'

Coordinates: Mouth of the Columbia River (MCR) Ocean Dredged Material Disposal Sites
(Corps selected Section 103 sites) (NAD 1983)

Area A

Corner Coordinates:

46° 13' 02" N, 124° 06' 21" W
46° 12' 36" N, 124° 05' 39" W
46° 11' 52" N, 124° 06' 36" W
46° 12' 18" N, 124° 07' 18" W

Dimensions: 6,000' x 4,000'
Azimuth (long axis): 225° T
Average Depth: 70'

Area E

Corner Coordinates:

46° 15' 35" N, 124° 05' 15" W
46° 14' 31" N, 124° 07' 03" W
46° 14' 58" N, 124° 07' 37" W
46° 15' 42" N, 124° 05' 26" W

Dimensions: 1,000'-3,000' x 12,000'
Azimuth (long axis): 332° T
Average Depth: 55'

Area B

Corner Coordinates:

46° 14' 23" N, 124° 08' 40" W
46° 15' 31" N, 124° 13' 46" W
46° 14' 18" N, 124° 15' 07" W
46° 16' 10" N, 124° 10' 01" W

Dimensions: 2 nmi. x 4 nmi.
Azimuth (long axis): 242° T
Average Depth: 150'

Area F

Corner Coordinates:

46° 13' 09" N, 124° 09' 07" W
46° 12' 00" N, 124° 07' 24" W
46° 10' 49" N, 124° 09' 03" W
46° 11' 58" N, 124° 10' 45" W

Dimensions: 10,000' x 10,000'
Azimuth (long axis): 225° T
Average Depth: 125'

Monitoring Program

MPRSA 102(c)(3)(B) requires that management plans include a program for monitoring the site.

Site Monitoring

It is important to understand that disposal site monitoring is not a stand-alone activity; it is based on the site designation process, the characteristics of the dredged material, and compliance with permit or Section 103(e) authorization terms. Disposal site monitoring is a key component of site management. The main purpose of a disposal site monitoring program is to determine whether dredged material site management practices, including disposal operations, at the site need to be changed to avoid unreasonable degradation or endangerment of human health or welfare or the marine environment.

The 1996 Guidance Documentation (USACE/USEPA 1996) for developing management plans states that continuous monitoring of all physical, chemical, and biological parameters and resources in and around a typical disposal site is not necessary. Effective monitoring programs should be designed by the Corps of Engineers and EPA as a tiered series of investigations. The most effective monitoring programs for ocean disposal sites should:

- be integral components of site management;
- evaluate the fate and effect of dredged material disposal;
- use a tiered monitoring approach;
- link specific measured effects (action levels) with predetermined management actions; and
- support decision making

Monitoring plans are developed using a tiered approach: simple techniques for monitoring of physical characteristics occupies the lowest tier while more complex chemical monitoring techniques occupy higher tiers (Zeller and Wastler 1986). Biological effects testing of oceanic processes occupy the highest tier. Work at the higher tiers is undertaken only when the need is demonstrated by the results of monitoring techniques at the lower tiers. Therefore, only the level of monitoring needed to address specific management decisions is undertaken. Each monitoring plan addresses the specific or unique aspects of a particular site and contains triggers, unacceptable impacts and indications for management action or additional testing depending on the management needs (Zeller and Wastler 1986).

According to Segar and Stamman (1986), the broad objectives of most monitoring plans are much the same:

- to ensure that there is no threat to human health or safety;
- to ensure that no unacceptable harm to the ecosystem or resources occurs;
- to ensure conditions that will lead to an unacceptable impact are not developing; and
- to make informed management decisions.

In the tiered approach, the decision rules indicating the need for further testing or remedial action are to be defined in advance (Fredette et al. 1986, Fredette et al. 1990, Segar and Stamman 1986). Specifying the decision rule alone is not enough. One should also specify potential actions to be taken for the specific outcomes of applying the decision rule to the monitoring results. In establishing tiers and triggers, concern for a resource is not sufficient.

Quantitative changes in the resource or other variable that indicate an unacceptable impact are to be predefined and must be testable.

For the purpose of developing this plan, it is assumed that most of the benthic organisms living in the areas used for placement will be destroyed. The areas being used each year are therefore being limited to reduce the extent of the potential impact. In fact, based on past studies at ODMDSs and especially the type of organisms living in the high energy, nearshore areas, many organisms are likely to survive disposal, and affected areas are expected to recolonize following use. Unfortunately, given the large natural fluctuations in population composition and density, it would be very difficult to conclusively demonstrate this through studies. Therefore, no routine biological monitoring sites are proposed. Special studies to try and answer specific questions will be considered. These special studies could help in establishing future management objectives and practices.

Figure 2 shows a generalized, tiered monitoring plan for a disposal site.

Tier 1. Focus is on determining the physical behavior of the disposed material; generally by bathymetric survey and sometimes by periodic sediment characterization to determine whether the deposited material is behaving as expected

Tier 2. Can include more intensive physical or sediment monitoring (limited chemistry and/or minimal biological monitoring) with the extent of each component determined by the outcome of the Tier 1 activities.

Tiers 3 and 4. Include intensive studies directed at specific problems.

An evaluation of the monitoring data takes place between each tier to determine whether there is any need for change, or whether more data, the next tier, will be required before determining a need for change.

Potential options concerning the disposal operations include the following:

No Change

No Change Required: monitoring reveals no cause for concern; disposal and monitoring continue as planned

No Change Possible: (e.g. one-time use, thereby eliminating the possibility for subsequent change in disposal operations)

Operational Change Required

Scheduling: adjust the schedule (time periods or rates) of the disposal to avoid a temporary situation

Placement of Material Within The Site: place the material in a different portion of the site than originally planned or in a different manner than originally planned (e.g. point dump vs. non-repetitive dump)

Restrict Type or Quantity of Material Placed

Change In Site Location

Where the impacts are found to be unavoidable and unacceptable over a large area or long time, a change in site location, including other areas within the same site, may be considered.

Discontinue Disposal At Site

Cessation of disposal if unavoidable and unacceptable conditions occur or persist at a site. This would require identification of a replacement site.

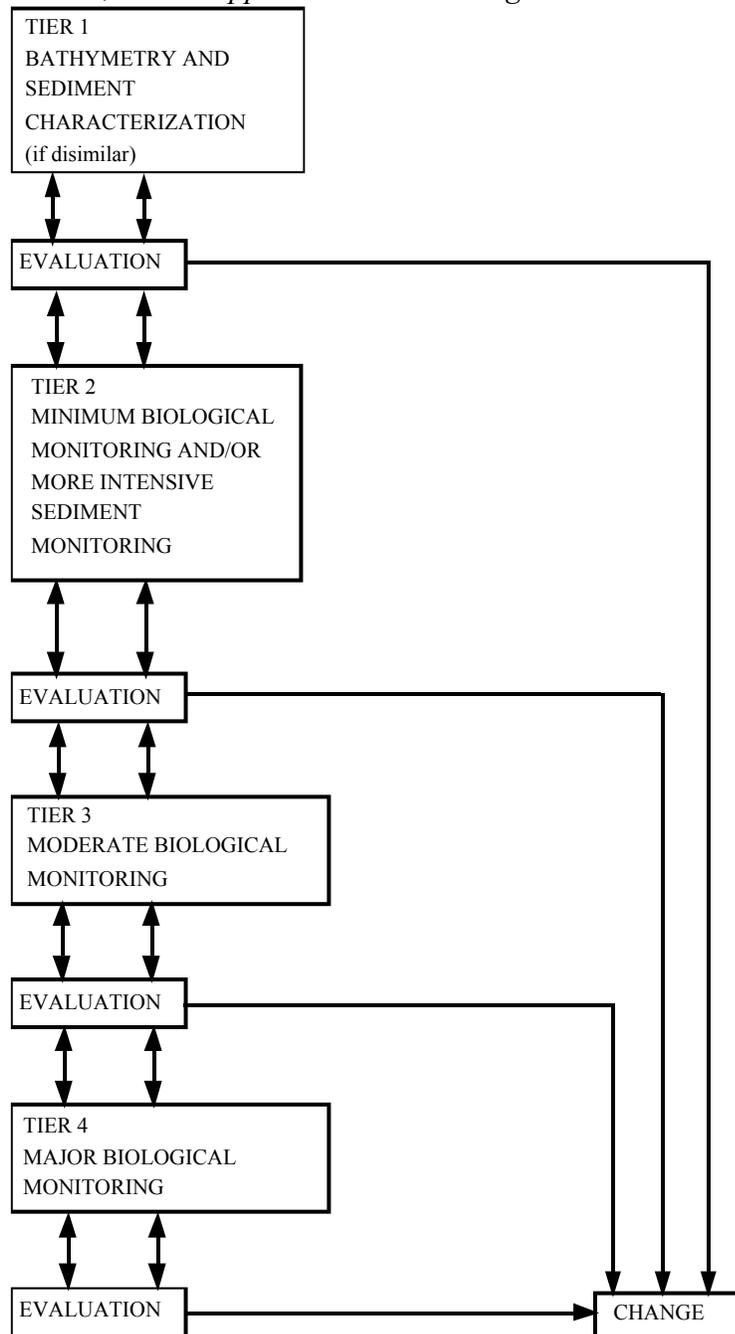
Specific Monitoring Objectives

- Ensure that the dredged material is behaving as predicted and that dredged material does not create unacceptable mounds.
- Assess the significance of potential impacts of disposal operations on the public safety and resources or resource use.
- Verify that material is moving out of the dispersive sites (Shallow Water Site and the North Jetty Site and beneficial use sites such as Benson Beach or other nearshore site) over time, as predicted, providing long-term capacity without adverse effects.
- Verify that material is staying in Site F or the Deep Water Site.

Predictions

- The Shallow Water Site, the North Jetty, and other shallow water sites are anticipated to be dispersive. Dredged material placed in these sites will naturally disperse with wave action and currents such that long-term unacceptable mounding will not occur.
- Unacceptable mounding can be avoided through proper dredged material disposal management.
- Dredged material is similar to existing substrate (shallow water). No significant impact to the habitat is anticipated.
- The Deep Water Site will not be dispersive. Material placed there will remain in the site. The material placed is coarser than the natural substrate.
- Areas outside the designated disposal areas will not be adversely affected by the disposal events.
- Areas of Site A and B in water depths less than 60 feet are anticipated to be dispersive.
- Areas of Site A and B deeper than 60 feet and Site F are anticipated to be non-dispersive.

Figure-2. Generalized, Tiered Approach to Monitoring ODMSs



Evaluation Questions

- What is the distribution pattern of the dredged material? Is the material behaving as anticipated?
- Can the dredged material be identified as different from the existing substrate?
- Is mounding occurring? To what extent?
- How have the depth contours been affected?
- Do the depth contours change over time?
- Is erosion occurring? At what rate?
- Has the character of the site been significantly altered so as to cause alteration of adjoining habitat?
- Has the material moved and affected conditions (sediment type or depths) outside the site?

Coordinated Management of Site

The Corps and EPA will coordinate decisions for site management. Decisions to increase the spacing between the dumping positions, to shift disposal operations to other portions of the site, to redistribute material at a site or to an alternate site, or to make other significant changes in site management will be part of the coordinated management strategy. Every effort will be made to coordinate before an action is initiated.

If Tier 1 monitoring indicates a potential problem, which cannot be readily corrected by management practices, Tier 2 monitoring will be employed or an alternate site or location within the site will be selected. If Tier 2 indicates a problem, or a previously unidentified concern is established, a coordinated Tier 3 plan for specific studies will be developed which focuses on the identified concerns, or an alternate site or location within the site will be used.

Monitoring Data

Bathymetric surveys (Tier 1) are scheduled annually for Site F and those portions of the Deep Water Site used each year. Future bathymetric surveys will show cumulative changes based upon using the oldest most complete surveys available at the site as a baseline. Because of the concern for small boat navigation safety in transiting the Shallow Water Site and the North Jetty Site, bathymetric surveys (Tier 1) there will be conducted during the dredging season to ensure unacceptable accumulation does not occur. Initially, bathymetric surveys will be conducted at the Shallow Water Site and the North Jetty Site at least monthly during the dredging season. The frequency will be increased if necessary to ensure the accumulation threshold is not exceeded or based on the rate and quantity of dredged material to be placed during the dredging season. The area adjacent to the Shallow Water Site and the North Jetty Sites will be surveyed each spring and fall to see if depths outside of the sites are being affected. The extent of coverage will be determined by EPA and the Corps of Engineers, but will be limited to those areas likely to or potentially affected by disposal at the sites. The frequency of surveys may be reduced in the future as the EPA and Corps learns more about the behavior and dispersive capacity of the site.

Data from the monitoring program will be compiled yearly and submitted to the EPA, Region 10

Ocean Dumping Coordinator. These findings will be evaluated and coordinated decisions will be made by EPA and the Corps of Engineers concerning the need for management changes. The disposal plan for a given dredging year will be based on the results of the previous year's monitoring and the spring, pre-dredging/disposal hydrographic surveys. The plan will be provided to the federal and state agencies as well as the public.

Record-Keeping And Reporting Requirements

Currently, daily records are required of dredges indicating where material was dredged and where material was placed. Also required to be recorded are start and endpoint coordinates for each load placed. An annual summary report of quantity dredged and placed at each site is prepared by the Corps and provided to EPA and the states of Oregon and Washington.

Inspection And Surveillance Provisions

Contract dredges have 24-hour inspection by Corps of Engineer personnel to ensure dredging and disposal in the correct locations. Corps of Engineers' dredges are responsible for ensuring their proper positioning. United States Coast Guard has surveillance role under MPRSA.

Special Management Conditions or Practices (Disposal Methods)

MPRSA 102(c)(3)(C) requires that management plans include special management conditions or practices to be implemented at the site that are necessary for the protection of the environment.

Alternative Placement Strategies

The placement strategy has a large influence on the overall impact of disposal in any site. Placement strategies vary on several scales, ranging from individual dumps to the long-term distribution of material. Each time a hopper dredge releases a load of sand it creates a low "mound" on the ocean floor. Individual mounds are broad and flat with the specific dimensions of those mounds depending on the volume and type of material, type of dredge, and depth of water at the ODMDS. Over the course of an average maintenance dredging season there would be approximately 1,200 to 1,400 hopper dredge dumps. Those individual dumps could be spread over a large area (non-repetitive dumping) or they could be concentrated by repetitively dumping in a small area. The disposal area could be more concentrated in deep water than in shallow water because of the lower potential effects on wave heights. From year to year there would also be the option of rotating the disposal areas or reusing the same areas within a site.

Individual Dump Alternatives

Dredge Type. The type of hopper dredge used influences the dimensions of the individual dump mounds. At the same vessel speed, current and water depth, a multiple bottom-door hopper dredge produces a longer and thinner disposal mound than a split-hull hopper dredge. This difference occurs because it takes longer to discharge the material from the bottom-

door dredge than from the split-hull dredge.

For the hopper dredges that commonly work in the Columbia River or MCR, the Corps' multiple bottom-door hopper dredge ESSAYONS for each load would produce a thinner deposit than the split-hull contract hopper dredges at any given water depth. As an example, in 50 feet of water with a one-foot per second (fps) current, a single load for the ESSAYONS would produce a disposal mound that would have a maximum height of less than 8 inches and an area of about 20 acres. A single load placed by the contract dredge NEWPORT would produce a mound with a maximum height of over 10 inches and an area of around 10 acres.

Water Depth. The depth of water at the disposal area has more influence on the disposal mound dimensions than the type of hopper dredge. In shallow (50 feet), nearshore areas the accumulation from a single dump of dredged material would be around 10 inches at the thickest point and would taper to zero over the remainder of the 10 acre disposal mound footprint. Less than five percent of the mound (half an acre) would be 10 inches thick and half the mound (five acres) would have a thickness of less than 3 inches. In deep (200 feet) offshore areas the entire mound would be less than three inches thick but would cover about 30 acres.

Repetitive or Non-repetitive Disposal Placement

On an annual basis, the disposal alternatives include the options of concentrating or dispersing the dredged material. With the existing ODMDS configuration disposal has been concentrated by repetitively dumping because there were no placement alternatives available.

By repetitively dumping in the same locations, dredged material could be concentrated in limited areas. Non-repetitive placement could spread the dredged material over a larger area, but would limit the depth of accumulation. At the extreme, the disposal dumps could be spread so thinly that no two individual dredged material footprints would overlap. The area required for non-repetitive disposal would depend on the selected depth of accumulation and could be conducted in shallow or deep water.

Year-to-Year Site Usage

How a disposal site could be used from year-to-year depends on the movement of material away from the site, on the depth of water, and the potential impacts to navigation and marine resources. Waves and currents can move material away from shallow, nearshore areas such as the Shallow Water Site, but disposal thickness is limited because of potential adverse impacts to wave heights. In Site F or the Deep Water Site there is little material movement and disposal can be much thicker before affecting wave heights. In some locations it may be better to provide an extended period of time between disposals in order to allow marine resources to recover.

No material has been placed at Site A since 1994 because of mounding and concern that material may migrate back into the federal channel. No material has been placed at Site B since 1997 because of a 1998 Settlement Agreement. Site F has received material from the MCR project since 1993. Since 1997 Site F receives material not placed in the Shallow Water Site or North Jetty Site. Upon EPA final site designation of the Shallow Water Site and Deep Water Site no

material will be placed in EPA designated Sites A, B, and F or the areas selected adjacent to these sites by the Corps under its Section 103 authority.

Disposal capacity at the Shallow Water Site would be limited during the dredging season by the predicted impacts to the wave climate. However, as waves and currents transport material away between dredging seasons the site could be used each year. At the Shallow Water Site it has been estimated that 2.3 mcv could be transported away from the site each year, allowing continued use of the site from year to year. Long-term disposal could result in the gradual accumulation of material in and around the Shallow Water Site and it could reduce the areas future disposal capacity. The same consideration would apply at the North Jetty Site or other nearshore site.

In Site F or the Deep Water Site no significant volume of material would be transported away from the disposal area. Therefore, once a deep-water area has reached its disposal height limit, another area would have to be used. The site could be divided into cells and as one cell reaches capacity, the next area could be used adjacent to the first, a process that would eventually lead to the creation of one large mound. Alternatively the next area could be located some distance away, leading to the creation of multiple mounds spread throughout a large ODMDS. Modeling could be used if warranted to evaluate whether there would be any compounding effects on wave heights from adjacent mounds. Dredged material could be point dumped or a non-repetitive disposal option could be employed. A non-repetitive disposal would raise a larger area slower than point dumping. Material placed in Site F will be evenly distributed over a large area to minimize accumulation. Initially, the plan is to limit placement in the Deep Water Site to as small an area within the site as possible and fill it to its maximum height before moving to another area within the site.

Quantity Restrictions and Weather Restrictions

The quantity placed at the Shallow Water Site, the North Jetty Site, or other nearshore sites will be limited by the accumulation threshold estimate for navigation safety. It will likely vary year-to-year based on dispersal and will be monitored by bathymetric surveys. All remaining material will be placed in Site F in 2002 and the Deep Water Site there after, with no quantity restriction.

Adverse sea and weather conditions limit dredging and disposal at MCR to a period typically from May to October. It may be possible to cross the bar for ocean disposal at other times of the year, but time delays will likely occur. Even during the dredging season storm events may restrict disposal, especially at the North Jetty Site, Shallow Water Site, or other nearshore sites.

Seasonal Restrictions

At this time the EPA and the Corps have agreed to not allow use of the outer 5,000 feet of the Shallow Water Site after August 15 because of the potential impact to soft-shell crab. There is no seasonal restriction for use of the any other site.

Equipment Requirements and Discharge Point

Dredges used at the MCR include Corps and contract dredges, and are required to meet all US Coast Guard requirements for safety. They are also required to use modern electronic positioning equipment capable of fixing their location within plus or minus 3 feet to ensure they place material within the designated disposal sites.

Debris Removal Provisions

Debris is defined as material that could cause interference with particular uses of the ocean. Floatable debris comprises material such as logs, that could cause navigation hazards or solids, such as plastic or wood chunks that could foul beaches. Non-floatable debris comprises material that could reasonably be expected to cause conflicts with bottom-net or trawl fishing. As a general rule, non-sediment material that would pass through a 24-inch x 24-inch mesh is not considered debris if it is dredged as part of the sediment matrix.

Discharge of debris at ODMDSs is prohibited unless specifically allowed. Typically the planning or permitting process assesses the potential risks of any debris that could be encountered during dredging. Dredging contractors are required to maintain a record of the handling of debris encountered during dredging and disposal. Compliance inspectors may review these records.

The Corps or EPA may make dredging or disposal area inspections to ensure that the contractor is in compliance with the approved operating plans, and that debris is removed prior to discharge at ODMDSs. The need for such a requirement will be assessed during the planning or permitting process. Floatable debris must be either removed at the dredging area or picked out of the water at the disposal area. Sediments, which contain debris that is not easily removed, may require screening through a 24-inch x 24-inch mesh. The mesh must be periodically cleaned and the debris disposed of according to the approved dredging and disposal plan. Hopper and pipeline dredges are incapable of picking up large debris.

Quantity of Material and Presence of Contamination

MPRSA 102(c)(3)(D) requires that management plans include consideration of the quantity of the material to be disposed of at the site, and the presence, nature, and bioavailability of the contaminants in the material.

The quantity of material allowable for disposal at a particular ODMDS is a function of the capacity of the site and the type of material. For non-dispersive sites, the site will eventually become "full". The concern, in such a case, usually will be that the material not impact amenities outside the ODMDS boundaries or cause a navigation hazard. There may also be vertical limitations so as to avoid navigation hazards. The Deep Water Site was sized to accommodate maximum potential quantity (225 mcy) over the next 50 years, although it is expected that less will be placed there.

For dispersive sites, the material is not expected to remain within the boundaries of the ODMDS after disposal. The rate and direction of movement across the ODMDS boundaries is determined

by physical transport mechanisms. Depending on these transport mechanisms and the nature of the material, transport may be rapid and continuous, or may occur only during episodic events, such as storms or seasonal changes in transport mechanisms. The management of dispersive sites is usually focused on the vertical axis with the goal being to avoid formation of navigational hazards from shoaling. Management of the Shallow Water Site and the North Jetty Site will be as described previously, other nearshore sites would be managed similarly.

Sediment to be placed at the MCR ocean disposal sites will be evaluated according to the Dredging Material Evaluation Framework for the Lower Columbia River Management Area (USACE et al., 1998) or its successor. The information is used by the Portland District, Corps of Engineers and EPA Region 10 and the States of Oregon and Washington to evaluate the suitability of the dredged material for disposal at a given site. The evaluation procedures are intended to ensure that all dredged material disposals are consistent with the MPRSA and the CWA.

Disposal Material

MCR Navigation Project

The bulk of the material to be placed in the ODMDSSs will come from the authorized MCR project, which provides for a 2,640-foot wide channel across the Columbia River bar ranging in depth from 55 feet to 48 feet. The project has two main shoaling areas. The outer shoal extends from approximately river mile (RM) -1.6 to RM 1.0. The inner shoal, Clatsop Shoal, extends from approximately RM 0.0 to RM 2.6, beginning on the south side and crossing the channel near RM 1.0. Maintenance dredging is forecast to average 4.5 mcy per year.

The MCR project sediments have been sampled and tested at various times including 1990 and 2000. Sediment testing in 1990 consisted of the evaluation of physical parameters while 2000 included chemical analyses as well as physical analyses. The analyses indicated that the material is clean sandy material (consistent with previous analyses) and meets the exclusionary criteria of the MPRSA. Therefore, the material has been determined to be suitable for unconfined aquatic disposal. Future evaluation of material would be in accordance with the guidance and timing set forth in the Dredged Material Evaluation Framework - Lower Columbia River Management Area (USACE et al., 1998) or its successor.

Columbia River Navigation Project

The Columbia River channel is authorized to a depth of 40 feet and width of 600 feet from RM 3.0 to 106.5. As estuarine disposal sites reach capacity material from this project will most likely be transported and placed in the ocean. Long-term plans have identified material as far upstream as RM 29.0 as potentially being placed in the ocean. Annual quantities that would go to the ocean are estimated to average 400,000 cubic yards per year for the next 20 to 50 years.

There is also the potential for ocean disposal of material from the proposed deepening of the Columbia River channel to 43 feet. This would involve the disposal of approximately 7 mcy of

sand over a two-year period early in the twenty-first century. An additional 30 mc y over 50 years would be disposed in the ocean from future maintenance (as compared to the 20 mc y from the 40-foot channel).

Material from the Columbia River channel was sampled and subjected to physical and chemical analyses in 1997. The material consists primarily of sand and all material tested was found to be suitable for unconfined aquatic disposal.

Anticipated Site Use

MPRSA 102(c)(3)(E) requires that the management plan include consideration of the anticipated use of the site.

The management plan must describe the anticipated use of the site over the long term, including the anticipated closure date for the site, if applicable, and any need for management of the site after the closure of the site. As indicated above, the anticipated use should be considered in developing site conditions and monitoring plan.

The ODMDs are expected to be used in the following manner. The actual use of the sites will be coordinated annually and could be adjusted based on changing conditions, understanding, and priorities.

Placement priorities will include controlling mounding to avoid potentially hazardous increases in wave heights; minimize impacts to marine resources; safe use of hopper dredges; efficient use of available funds; minimize interference with other uses such as crab fishing, recreational fishing, and commercial navigation; and the beneficial use of dredged material. Beneficial uses being currently considered include protecting the north jetty from undermining, and keeping dredged material within the littoral system through the maximum use of the Shallow Water Site, the North Jetty Site, or other nearshore site where it can potentially contribute to beach nourishment. Quantities beyond what is needed for these beneficial uses or that cannot be placed into the Shallow Water Site because of sea conditions or the potential for mounding will be placed in Site F in 2002 and there after in the Deep Water Site.

The Shallow Water Site and the North Jetty Site (or other beneficial use site) will be used first and to the maximum extent possible without creating adverse wave effects due to bathymetric changes. Placement at the Shallow Water Site will utilize multiple cells or disposal lanes to ensure dispersal over the site. Hydrographic surveys will be conducted during the dredging season to monitor accumulation to ensure the threshold is not exceeded and appropriate management action is taken. Until further notice the western 5,000 feet of the Shallow Water Site will not be used after August 15th in any dredging year due to concerns about potential migration of soft-shell crabs into the site.

The placement volume per year for the North Jetty Site will be determined by monitoring with hydrographic surveys as well. The site was first used during the 1999-dredging season. Up to one million cubic yards could be placed in the site during one dredging season. However, this

site is not expected to have a long-term capacity of one million cubic yard annually, but may require placement at a lower level or frequency to protect the jetty. Some material eroding out of this site is expected to migrate around the north jetty and to the north in the littoral system, and some is expected to move toward Jetty A and remain in the area between it and the North Jetty. A small portion likely migrates back into the navigation channel.

Estimated long-term dispersive capacity of the Shallow Water Site and the North Jetty Site, combined, is around two million cubic yards per year, but it will depend on current conditions and the results of monitoring. With placement at the Shallow Water Site and the North Jetty Site at this level, about 2.5 mcy will have to be placed at Site F in 2002 or the Deep Water Site in a typical year. In years after 2002 with very heavy shoaling at MCR, or if it is determined through monitoring that the Shallow Water Site and the North Jetty Site cannot accommodate this much material safely, more material will have to be placed at the Deep Water Site.

The 7 mcy dredged during construction of the deepening project, if authorized, could be placed into the Deep Water Site. To minimize conflicts, and to limit the area impacted, the plan is to point dump it in the southwest corner of the site. This quantity would cover an area approximately 0.54 square miles.

Until further notice, point dumping, or limiting placement to the smallest area possible, will be used when material is placed in Deep Water Site. The height of accumulation would be restricted to a depth that would not significantly affect wave height. This is estimated conservatively to be an accumulation of 40 feet in depth at the Deep Water Site.

In summary, placement of dredged material at the MCR ocean dredged material disposal sites and North Jetty Site (or other beneficial use site) would occur in the following order, with a shift to successive sites if monitoring indicates the first choices have reached capacity for the year (e.g. further placement could adversely affect the wave climate). The North Jetty Site and the Shallow Water Site would be used first. Once those sites have reached capacity, material would be placed in the northern half of Site F in 2002 then into limited areas by point dumping in the Deep Water Site. The order of preference, and actual portions used will be reevaluated and determined each year based on monitoring of previous placement (rate of dispersal), anticipated dredging quantities, and the current objectives for use of the dredged material. It is anticipated that the resource concerns and demands (needs) for the dredged material could change with time and other beneficial use opportunities could develop.

The Corps proposes to use the ODMDs to dispose of sediments dredged from the federally authorized navigation project at the Mouth of the Columbia River and in the future to dispose of sediments from the other Columbia River projects. The North Jetty Site could also be used for those same dredged materials. These could include the Columbia and Lower Willamette River Federal Navigation Channel and future channel deepening projects if authorized. The ODMDs could also be used in the future for placement of material dredged during other actions authorized in accordance with Section 103 of the MPRSA. These actions would require a Section 103 permit from the Corps, and coordinated through the public notice process. For the North jetty Site a CWA 404 permit would be required.

Site Management Plan Review and Revision

MPRSA 102(c)(3)(F) requires that the management plan include a schedule for review and revision of the plan which shall not be reviewed and revised less frequently than 10 years after adoption of the plan, and every 10 years thereafter.

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