Beneficial Reuse of Dredged Material—The Regulatory Approach

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Beneficial reuse of dredged material requires proper engineering design, protection of human health and the environment, and regulatory acceptance. Beneficial use of dredged material is an integral part of the dredge material management process. Clean dredged material can be used for construction fill, topsoil, wetland mitigation projects. Slightly to moderately contaminated material may be acceptable for upland fill beneath a parking lot, for creation of a soil berm around a dredge material dewatering facility, or daily cover at a landfill.

The purpose of this paper is to identify the regulatory programs and requirements for dredged material beneficial reuse in an upland environment. This paper will describe the transition of the material from an in-water regulatory program to an upland regulatory program; to properly and beneficially manage the dredged material.

Dredged material is typically regulated under the Clean Water Act (CWA). The EPA Office of Water regulates dredged material that is managed under the CWA. However, the CWA gives no guidance for protection of human health and the environment after dredged material is placed in an upland environment. Protection of human health and the environment in an upland environment requires evaluation of groundwater; surface water; ingestion, inhalation and dermal contact for humans; and ingestion and absorption in terrestrial wildlife and vegetation. Consequently, federal, state, and local regulators are faced with management decisions without regulatory guidance.

This paper provides a proposed approach for the regulation of dredged material that is beneficially used in an upland environment. With the participation of state regulatory agencies, risk-based testing protocols can be used to evaluate the dredged material for each of its physical phases (sediment and as dry soil). As the dredged material is moved upland and changes to the physical characteristics occur (sediment to soil), there needs to be a clear division between regulatory programs evaluating aquatic and terrestrial end-points. The paper concludes that coordination of several regulatory programs is required to beneficially use dredged material in an upland environment.

INTRODUCTION

Beneficial use of dredged material is an integral and necessary part of the dredge material management process. Dredged material can be beneficially used in upland, wetland, and aquatic environments (DOER, 1999).

Upland uses include construction fill, such as highway/road/airport, earthen slopes, mine shaft fill, daily landfill cover, or earthen slopes; soil products, such as landscaping soil, agricultural soil, or bagged soil; and manufactured products such as additives in brick or asphalt manufacturing. Wetland uses include construction of wetland, native seed source, geotextile tube fill for berm construction, or biofilters for

leachate. Aquatic uses of dredged material include capping of open-water placement sites; filling in-water mining sites; berm construction; or creation of islands, sea grass meadows, and oyster beds.

There are many opportunities to beneficially use dredged material, or amended dredged material; however the regulatory programs that are associated with re-use, especially in an upland environment, is complicated. As sediments are dredged and placed upland for future beneficial use, several regulatory regimes should be considered.

The purpose of this paper is to identify the current regulatory programs and requirements applicable for beneficial reuse of dredged material in an upland environment, and the overlap that currently exists with those programs. Finally, a regulatory approach will be proposed that clearly reconciles the regulatory authorities for use of dredged material in an upland environment. This proposed approach will describe the transition of the material from regulation under an in-water program to regulation under an upland-focused program; in order to properly and beneficially manage the dredged material in an acceptable manner.

REGULATORY BACKGROUND

Beneficial use of dredge material has occurred for many years. The Rivers and Harbors Act of 1899 required all work in navigable waters be permitted. The National Environmental Policy Act of 1969 (NEPA) regulated actions such as dredging to assure balance between human activities and the environment. The Federal Water Pollution Control Act of 1972, also known as the Clean Water Act (CWA), further regulated in-water work activities to be protective of United States waters. And the Endangered Species Act of 1973 requires assurances that threatened and endangered species will not be harmed by the contemplated dredging activity. In addition, individual states have adopted removal/fill regulations either in their assumption of CWA or CZMA authorities, or related to their proprietary interest in submerged lands. In the past, local jurisdictions have, for the most part, stayed away from in-water management of dredged material, but may increasingly be concerned with in-water disposal of dredged sediments within their boundaries.

The regulatory programs designed to protect human health and the environment during dredging and in-water placement are well established and comprehensive. The regulatory programs associated with a project that consists of dredging and upland placement for final disposition involving dewatering into waters of the state are equally well established. However, programmatic regulation of a project that consists of dredging with the intent to place material in an upland environment without future restrictions on the placement of the material is not well defined.

When material that is generally associated with in-water exposure pathways is moved to an upland environment, the potential exposure pathways are different, sometimes overlapping, and often inconsistent. The protection of human health and the environment associated with in-water sediments consist of: maintaining an acceptable water quality criteria; protecting receptors such as fish and other biota; and eliminating pathways up the food chain into fish, birds, and humans. Protection of human health and the environment associated with upland placement consists of: maintaining groundwater

protection; protecting receptors such as plants, humans and other animals; and eliminating pathways such as direct contact, inhalation, and consumption of soil by humans.

The various agencies, and even different programs and offices within the agencies, are each focused on particular concerns. Some of these concerns are contradicting, while others are overlapping. For instance, the Clean Water Act is of primary concern while managing dredged material in-water, but because of media-specific regulatory regimes, the CWA becomes irrelevant to situations involving the placement of dredged material in an upland environment without return flow to waters of the state. Another example is the attempt in the Hazardous Remediation Waste Management Requirements (HWIR-Media) Final Rule of 1998 to reconcile RCRA and CWA jurisdiction over dredged material constituting hazardous waste by exempting dredged material from RCRA Subtitle C when it is regulated under the CWA (Childs 2002). Since dredged material is rarely classified as hazardous waste, the reconciliation fails to address the vast majority of situations where non-hazardous dredged materials are exposed to potentially conflicting requirements under RCRA and the CWA (or equivalent state solid waste and water quality laws).

PROPOSED REGULATORY APPROACH FOR UPLAND PLACEMENT OF DREDGED MATERIAL

Given that evaluation and regulation of in-water placement of dredged material is well defined, the following proposed regulatory approach is specific for placing dredge material in an upland environment. While the proposed regulatory approach is intended for clean sediments with beneficial reuse, the framework applies to contaminated sediments as well. This approach describes the regulatory transition of the material from an in-water regulatory program to an upland regulatory program.

For this proposed regulatory approach, a typically dredging project will be separated into two phases: (Phase I) dredging and dewatering; and (Phase II) beneficial use in an upland environment. Phase I includes the dredge material characterization, dredging, and dewatering. Phase II begins after the dredged material is dewatered and continues for the life of the material while in an upland environment. The dredged material undergoes a physical transformation from “sediment” during dredging and dewatering to a “soil” after dewatering is complete. With this physical transformation, a conversion of the regulatory programs also occurs. The EPA Office of Water and the equivalent state authority is associated with the sediment during Phase I. While the EPA OSWER and equivalent state authority is associated with the soil during Phase II. This management, physical, and regulatory transformation is illustrated in Figure 1.

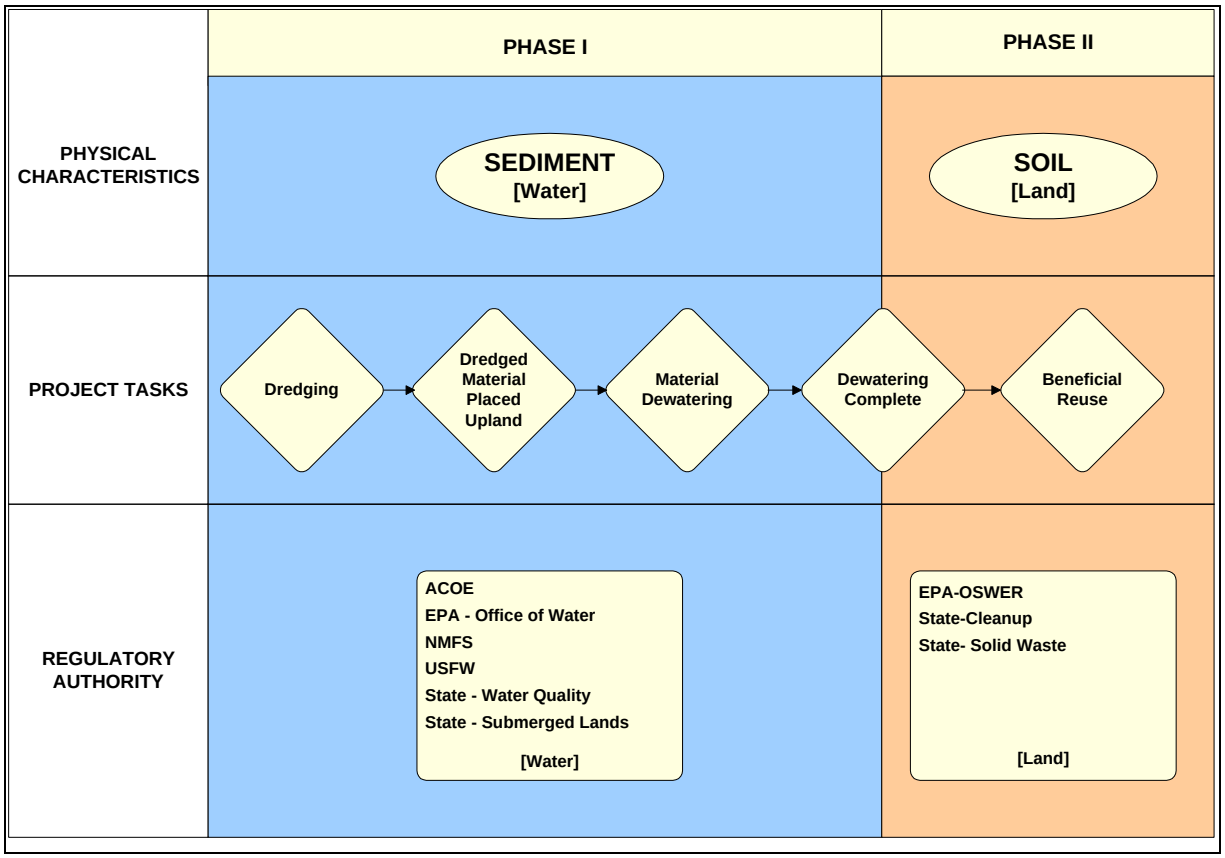

FIGURE 1. Regulatory approach for management of soil and sediment

For each of the proposed regulatory phases, the underlying requirement is the protection of human health and the environment. However, the potential receptors, pathways, and expertise of the regulatory programs associated with each phase differ. In addition, the sampling and analytical requirements, as well as evaluation criteria, can be significantly different for each of the two phases. Therefore, based on the transformation of physical characteristics of the dredged material and the differing regulatory programs, these two phases should be addressed separately.

The first phase (Phase I) would typically consist of working with the ACOE, the EPA Office of Water, USFWS, NMFS, and the equivalent state agencies to determine the acceptable dredge prism, water quality requirements during dredging, and best management practices (BMPs) that may be necessary. If the dredged material is to be placed upland for dewatering and the water will be returned to waters of the state, the Clean Water Act will have jurisdiction for this portion of the project. Based on a dredged material dewatering facility with return water discharged into waters of the state, the three pathways are identified in Figure 2. With each pathway, an acceptable exposure level is identified.

The second phase (Phase II) consists of working with the OSWER and the state equivalent that regulates the programs for RCRA and CERCLA to determine the potential risk pathways, receptors, and acceptable exposure levels for final disposition of

the dredged material (which has now become soil). Note that if the material is determined to be a solid or hazardous waste, the time of generation is after the material becomes a waste. As the dredged material is dewatered, the sediment is regulated by the CWA and is not a waste. Only after the material is dewatered and is excavated to be moved can the material become a waste. This is an important detail so that dredged material processing facilities (with return water) are regulated under the Office of Water and do not require a RCRA Subtitle D permit for the facility. Instead, the soil that is in a rehandle facility will be evaluated as any other mass of soil. If the soil is to be moved, an evaluation will be required to verify that the new location will be protective of human health and the environment. During this evaluation, the lead regulatory programs will be those associated with any other evaluation of this sort.

In the event that there is no return water, the transition from regulatory programs occurs as the dredge material is placed in an upland environment. If dredged material processing does not include return water, the dredged material processing facility may need RCRA permitting, depending on the characteristics of the dredged material.

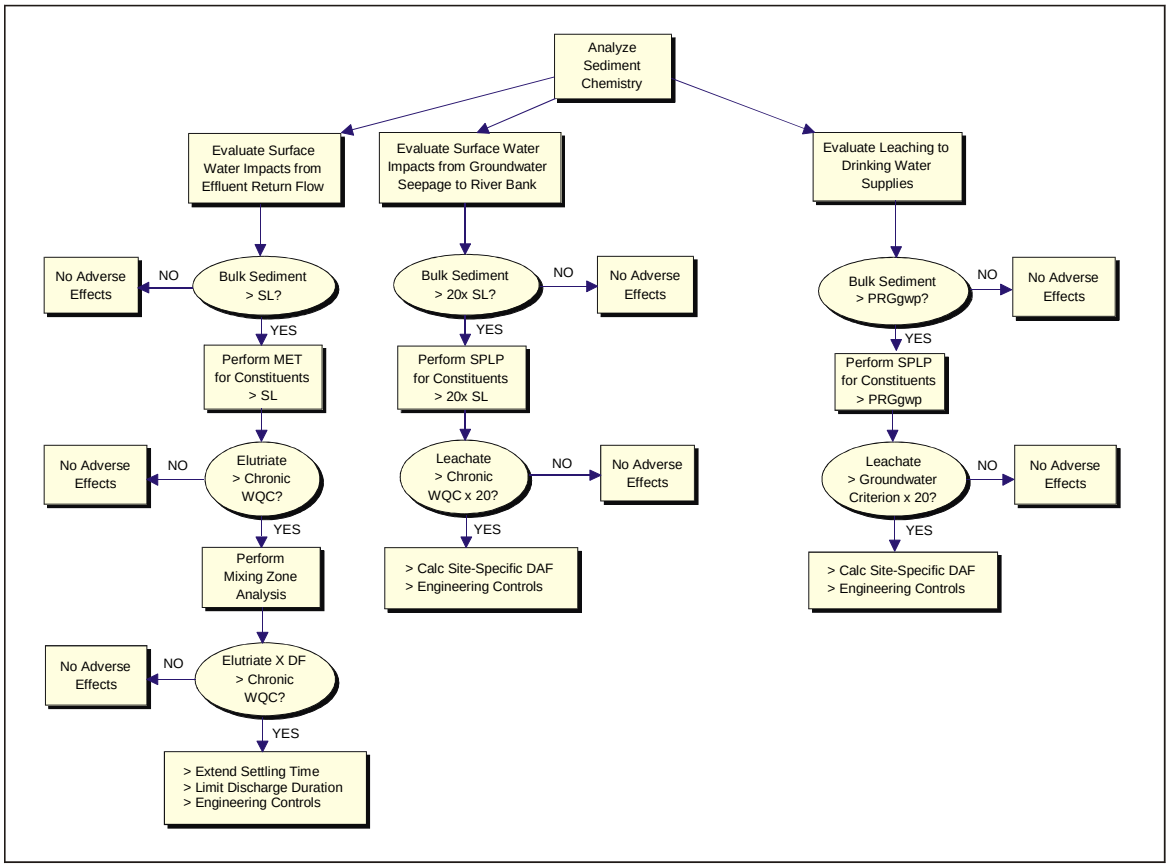

FIGURE 2. Potential exposure pathways at rehandle facility.

SUMMARY AND CONCLUSIONS

With the reduction in accepted in-water disposal options for many ports, dredging project proponents are turning to upland disposal options out of necessity. Beneficial use

of dredged material is an essential part of management of a dredging program, both for economical reasons and for long-term sustainability of maintenance practices.

There are many potential uses of dredged material, including construction fill, topsoil, and wetland creation. Historically dredged material has been regulated under the CWA, which is sufficient if the material continues a relationship with the water. That is, while the dredged material remains as sediment, the CWA has sufficient regulatory authority over the dredged material. However, the CWA does not provide adequate guidance for dredged material that has gone through a physical transformation from sediment to soil. Sediment that is dewatered, or placed upland becomes a soil and different exposure pathways and receptors apply. Conversely, regulators responsible for upland programs should not be applying soil cleanup values, solid waste regulations, and other upland exposure pathways and receptors to sediment. Therefore, an acceptable regulatory approach needs to be defined using existing regulations for dredged material to be used in an upland environment. The regulatory approach should clearly define the regulating authority to prevent program overlap and ambiguity during the sediment to soil transformation.

The proposed regulatory approach is consistent with the physical characteristics of the dredged material. Those regulatory programs associated with water regulate the dredged material while sediment and the programs associated with land regulate the dredged material while it is a soil. Clarity in the regulatory approach helps remove the stigma for dredged material, increases the level of appropriate expertise applied to the review at each phase of the regulatory review, and assures the public that appropriate management review is taking place.

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