APPENDIX R USACE SEATTLE DISTRICT, DREDGED MATERIAL EVALUATION AND DISPOSAL PROCEDURES – USER MANUAL

Dredged Material Evaluation and Disposal Procedures

USER MANUAL

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Dredged Material Management Program

U.S. Army Corps of Engineers, Seattle District
Environmental Protection Agency, Region 10
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Washington State Department of Ecology

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DEFINITIONS

Acute toxicity: Short-term toxicity to organism(s) that have been affected by the properties of a substance, such as contaminated sediment. The acute toxicity of a sediment is generally determined by quantifying the mortality of appropriately sensitive organisms that are exposed to the sediment, under either field or laboratory conditions, for a specified period.

Advanced Dredging/Advanced Maintenance. Advanced maintenance is dredging to a specified depth and/or width beyond the authorized channel dimensions in critical and fast shoaling areas to avoid frequent re-dredging, and to ensure the reliability and least overall cost of operating and maintaining the project authorized dimensions.

Antidegradation: Policy that seeks to manage "sediment quality so as to protect existing beneficial uses and move towards attainment of designated beneficial uses" of the new surface sediment that would be exposed following dredging (Ecology, 2013). The exposed sediment must meet the SMS antidegradation policy (WAC 173-204-120).

Apparent Effects Threshold (AET): The sediment concentration of various chemicals of concern above which statistically significant adverse biological effects (relative to an appropriate reference condition) are always expected. Theoretically, an AET can be calculated for any chemical and biological indicator.

Aquatic disposal: Placement of dredged material in rivers, lakes, estuaries, or oceans via pipeline or surface release from hopper dredges or barges.

Aquatic ecosystem: Bodies of water, including wetlands, which serve as the habitat for interrelated and interacting communities and populations of plants and animals.

Beneficial use: Placement or use of dredged material for some productive purpose.

Bioaccumulation: The accumulation of contaminants in the tissues of organisms through any route, including respiration, ingestion, or direct contact with contaminated water, sediment, or dredged material.

Bioaccumulation Trigger (BT): For bioaccumulative chemicals of concern, the sediment concentration that constitutes a "reason to believe" level that the chemical would accumulate in the tissues of target organisms. Sediments with chemical concentrations above the calculated BT require bioaccumulation testing before suitability for open-water disposal can be determined.

Bioassay: A bioassay is a test using a biological system. It involves exposing an organism to a test material and determining a response. There are two major types of bioassays differentiated by response: toxicity tests which measure an effect (e.g., acute toxicity, sublethal/chronic toxicity) and bioaccumulation tests which measure a phenomenon (e.g., the uptake of contaminants into tissues).

Biomagnification: Bioaccumulation up the food chain. Organisms at higher trophic levels will have higher body burdens than those at lower trophic levels.

Bulking factor: The ratio of the volume occupied by a given mass of dredged material in either a hopper or bin immediately after deposition by a dredging process, to the volume occupied by the same mass of sediment in situ.

Capping: The engineered placement of a covering or cap of clean material over contaminated material to isolate the contamination from the aquatic environment. A cap is typically designed to remain in place and may require periodic monitoring to ensure continued effectiveness.

Chemical of concern (COC): A chemical present in a given sediment thought to have the potential for unacceptable adverse environmental impact due to a proposed discharge.

Chronic: Involving a stimulus that is lingering or which continues for a long time.

Clay: Soil particle having a grain size of less than 3.9 micrometers.

Coastal zone: Includes coastal waters and the adjacent shorelands designated by a State as being included within its approved coastal zone management program. The coastal zone may include open waters, estuaries, bays, inlets, lagoons, marshes, swamps, mangroves, beaches, dunes, bluffs, and coastal uplands. Coastal-zone uses can include housing, recreation, wildlife habitat, resource extraction, fishing, aquaculture, transportation, energy generation, commercial development, and waste disposal.

Comparability: The confidence with which one data set can be compared to others and the expression of results consistent with other organizations reporting similar data. Comparability of procedures also implies using methodologies that produce results comparable in terms of precision and bias.

Confined disposal: A disposal method that isolates the dredged material from the environment.

Confined disposal facility (CDF): An engineered structure for containment of dredged material consisting of dikes or other structures that enclose a disposal area above any adjacent water surface, isolating the dredged material from water during placement. Other terms used for CDFs that appear in the literature include confined disposal area, confined disposal site, and dredged material containment area.

Constituents: Chemical substances, solids, liquids, organic matter, and organisms associated with or contained in or on dredged material.

Confined aquatic disposal: Form of capping which includes the added provision of some form of lateral containment (for example, placement of the contaminated and capping materials in bottom depressions or behind subaqueous berms) to minimize spread of the materials on the bottom.

Contaminant: Chemical or biological substance in a form that can be incorporated into, onto, or be ingested by and is harmful to aquatic organisms, consumers of aquatic organisms, or users of the aquatic environment.

Contaminated sediment: Sediment that has been demonstrated to cause an unacceptable adverse effect on human health or the environment.

Control sediment: A sediment essentially free of contaminants and which is used routinely to assess the acceptability of a test. Control sediment is typically the sediment from which the test organisms are collected. Test procedures are conducted with the control sediment in the same way as the reference sediment and dredged material. The purpose of the control sediment is to confirm the biological acceptability of the test conditions and to help verify the health of the organisms during the test. Excessive mortality in the control sediment indicates a problem with the test conditions or organisms, and can invalidate the results of the corresponding dredged material test.

Data quality indicators: Quantitative statistics and qualitative descriptors which are used to interpret the degree of acceptability or utility of data to the user; include bias (systematic error), precision, accuracy, comparability, completeness, representativeness and statistical confidence.

Disposal site: That portion of the waters of the United States where specific disposal activities are permitted and consist of a bottom surface area and any overlying volume of water.

Dredged material: Material excavated from freshwater, estuarine or marine waters.

Dredged Material Management Unit (DMMU): A manageable, dredgeable unit of sediment which can be differentiated by sampling and which can be separately dredged within a larger dredging area.

EC_{50}: The median effective concentration. The concentration of a substance that causes a specified effect (generally sublethal rather than acutely lethal) in 50% of the organisms tested in a laboratory toxicity test of specified duration.

Ecosystem: A system made up of a community of animals, plants, and bacteria and its interrelated physical and chemical environment.

Effluent: Water that is discharged from a confined disposal facility or water treatment facility during and as a result of the filling or placement of dredged material.

Elutriate: Material prepared from the sediment dilution water and used for chemical analyses and toxicity testing.

Emergency: In the context of dredging operations, emergency is defined in 33 CFR Part 335.7 as a "situation which would result in an unacceptable hazard to life or navigation, a significant loss of property, or an immediate and unforeseen significant economic hardship if corrective action is not taken within a time period of less than the normal time needed under standard procedures."

Evaluation: The process of judging data in order to reach a decision.

Freshwater sediment: sediments in which the sediment pore water contains less than or equal to 0.5 parts per thousand salinity.

Grain-size effects: Mortality or other effects in laboratory toxicity tests due to sediment granulometry, not chemical toxicity.

Gravel: A loose mixture of pebbles and rock fragments coarser than sand. Specifically, a soil particle having a grain size of greater than 2,000 micrometers.

Habitat: The specific area or environment in which a particular type of plant or animal lives. An organism's habitat provides all of the basic requirements for the maintenance of life. Typical coastal habitats include beaches, marshes, rocky shores, bottom sediments, mudflats, and the water itself.

Heterogeneous Sediment: Sediment layers that have potentially different characteristics or levels of chemicals of concern. Heterogeneous sediments are typically sampled with a coring device that allows for separate sampling and analysis for surface and subsurface sediment layers.

Homogeneous Sediment: Sediment that is well-mixed and deposited over a short time-frame. Homogenous sediments are often found in settling basins or some navigation channels where river flow slows down abruptly. A dredge prism made up of homogenous sediment can be represented with grab samples.

K_{OW}: The octanol-water partition coefficient (K_{ow}) is a measure of the equilibrium concentration of a compound between octanol and water that indicates the potential for partitioning into soil organic matter (i.e., a high K_{ow} indicates a compound which will preferentially partition into soil organic matter rather than water). K_{ow} is inversely related to the solubility of a compound in water.

LC_{50}: The median lethal concentration. The concentration of a substance that kills 50% of the organisms tested in a laboratory toxicity test of specified duration.

Leachate: Water or any other liquid that may contain dissolved (leached) soluble materials, such as organic salts and mineral salts, derived from a solid material. For example, rainwater that percolates through a confined disposal facility and picks up dissolved contaminants is considered leachate.

Loading density: The ratio of organism biomass or numbers to the volume of test solution in an exposure chamber.

Management actions: Those actions considered necessary to rapidly render harmless the material proposed for discharge (e.g., non-toxic, non-bioaccumulative) and which may include containment in or out of the waters of the US (see 40 CFR Subpart H). Management actions are employed to reduce adverse impacts of proposed discharges of dredged material.

Maximum Level (ML): A guideline value derived for each chemical of concern which represents the highest Apparent Effects Threshold (AET) – a chemical concentration at which biological indicators show significant effects.

Method detection limit (MDL): The minimum concentration of a substance which can be identified, measured, and reported with 99% confidence that the analyte concentration is greater than zero.

Open-water disposal: The purposeful placement of approved dredged material at a designated dispersive, non-dispersive, or flow-lane location.

Overdepth: Paid allowable overdepth dredging (depth and/or width) is a construction design method for dredging that occurs outside the required authorized dredge prism. Paid overdepth is designed to compensate for physical conditions and inaccuracies in the dredging process and to allow for efficient dredging practices.

Pathway: In the case of bioavailable contaminants, the route of exposure (e.g., water, food).

Porewater: The water that fills the area between grains of sediment.

Practicable: Available and capable of being done after taking into consideration cost, existing-technology, and logistics in light of overall project purposes.

QA: Quality assurance; the total integrated program for assuring the reliability of data. A system for integrating the quality planning, quality control, quality assessment, and quality improvement efforts to meet user requirements and defined standards of quality with a stated level of confidence.

QC: Quality control, the overall system of technical activities for obtaining prescribed standards of performance in the monitoring and measurement process to meet user requirements.