Update on Great Lakes dredging studies: Evaluating environmental risks and benefits of open water placement

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GREAT LAKES DREDGING TEAM

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US Army Corps of Engineers

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Dredging Operations Environmental Research

- **The Goal:** *Find the least costly dredged material management alternative, consistent with sound engineering environmentally acceptable management practices*

*** The Federal Standard (33 CFR 336.1) ***

What is Environmentally Acceptable Open Water Placement?

- ✓ **Compliance with Clean Water Act Section 404(b)(1) Guidelines**
  - ► ***"Inland Testing Manual" (USEPA/USACE 1998)***
  - ► ***"Great Lakes Testing Manual" (USEPA/USACE 1998)***
- ✓ **Reasonable Section 401 water quality certification**
- ✓ **Coastal Management Program Consistency**

USEPA/USACE Are Updating The Guidance

The big ideas behind the revision

- ***Develop one guidance document for both Inland and Ocean Testing manuals***
- ***Incorporate Risk Management concepts into engineering approaches for dredged material management***

Risk Management is What We've Been Doing All Along

Just not very well…

Relative Risk is a key concept

- ✓ **Every dredged material management approach has environmental risk including no action.**
- ✓ **The utility of a risk management strategy must be evaluated by comparing the newly created risk to background risk**

Need to define the technical approaches for comparing risk management strategies and defining the existing background risk for Great Lakes Dredging Operations.

Risk Management is What We've Been Doing All Along

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Engineering Approaches for Managing Risk

- ✓ **Dredging Windows – Scheduling open water placement to reduce exposure and minimize known effects**

Other approaches

- ✓ **Work Sequencing – Manage placement operations to bury contaminants and cap with clean dredged material**
- ✓ **Engineering Controls – Use tremie pipe or other techniques to minimize mixing in water column**
- ✓ **Modify Bioavailability –Use amendments such as activated carbon, alum, etc. that reduce exposure**

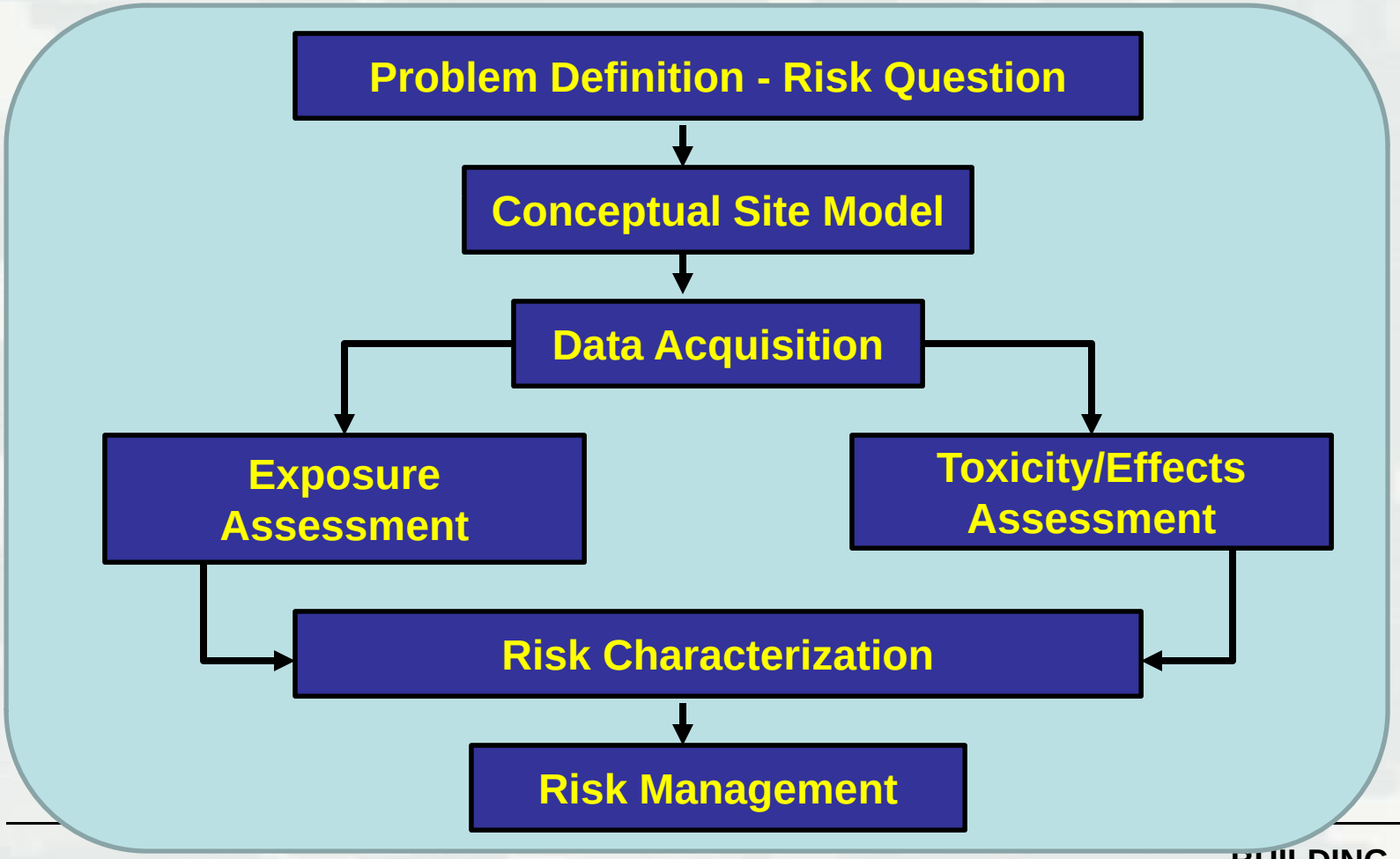
Risk Assessment is the Key Concept behind the 2011 Federal Water Quality Guidance for the Great Lakes System

(40 CFR 132.1 October 17, 2011)

"EPA understands that the science of risk assessment is rapidly improving. Therefore, to ensure that the scientific basis for the methodologies …. are always current and peer reviewed, EPA will review the methodologies and revise them, as appropriate, every 3 years."

Engineering Risk Management Solutions Requires Risk Analysis as the Design Basis

The Risk Analysis Process



The Inland/ Great Lakes Tiered Assessment Evaluates Relative Risk *to a limited extent….*

- ✓ **TIER 1: Compile existing data and review exclusionary criteria**
- ✓ **TIER 2: Use dredged material physical/chemical data to model evaluate potential impacts to water column and bioaccumulation**
- ✓ **TIER 3: Directly environments using biological effects-based tests.**
- ✓ **TIER 4: Case Specific Testing …….is only entered if the information provided by Tiers 3 is not sufficient ????**

TIER 4 testing has typically not been used to assess environmental acceptability because little or no regional guidance has been developed.

Many Assumptions Are Embedded within the ITM & GLTM Tier 2 and 3 Assessments

- ***Standardized procedures used to identify potential risk***
- ***Designed to support conservative decisions with limited data.***
- ***Simply do not take into account many site specific conditions***

Regional problems require regional solutions

Examples of Embedded Tier 2 Risk Assumptions

- **Analysis of Theoretical Bioaccumulation Potential (TBP) assumes bioavailability (BSAF) is the same for DM and reference site sediment.**
- **WQS developed for continuous point discharges are appropriate for estimating the bioaccumulation in fish from discontinuous dredge material placement.**

Regional problems require regional solutions

Examples of Embedded Tier 3 Risk Assumptions

- **The toxicity measured in whole sediment laboratory toxicity tests is a good representation of the toxicity expected to occur in the field following placement.**
- **A statistically significant increase in PCB or other PBT tissue concentrations during bioaccumulation tests is biologically significant.**

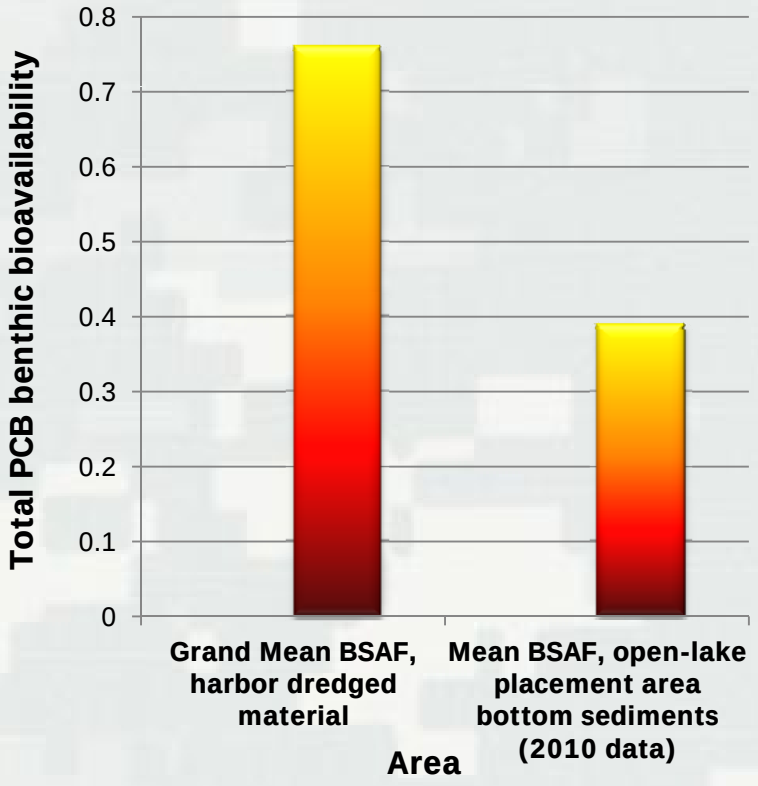
Regional problems require regional solutions

An example where the bioavailability of dredged material is different after open water placement

- **Short follow-up to the "Federal Standard" presentation last year: Does open-lake placement of dredged material increase the bioavailability of PCBs?**

Answer: Bioavailability goes down (BSAF ↑) after placement

FIGURE 2. Benthic bioavailability of total PCBs, Ashtabula Harbor vs. open-lake placement area



DOER FY12 Focus on the Great Lakes Assess Impacts/Benefits of Open Water Placement

- Survey regional risk decisions and rationale that limit open water placement for key projects
- Identify underlying assumptions driving decisions.
- Summarize existing data and recommend directed field studies to fill data gaps
- Propose science-based risk models and decision-making frameworks to refine management decisions
- Set the stage for updating the regional GLTM guidance

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Questions?. . .

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