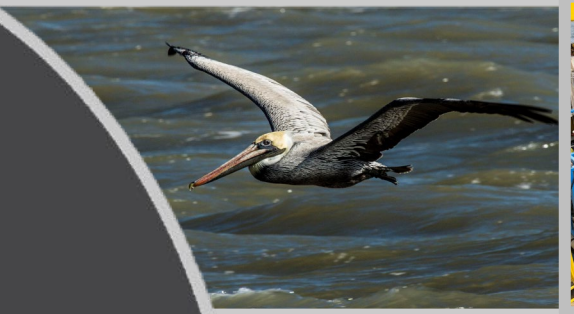
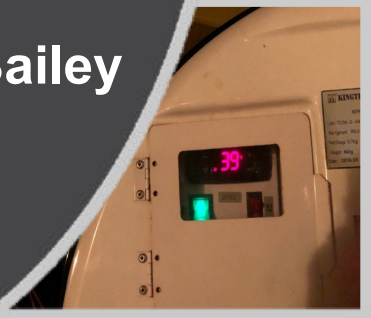
U.S.ARMY

Sabine-Neches Waterway

Integrating Lines-of-Evidence to Support the Ocean Disposal of New Work Channel Expansion Dredge Materials

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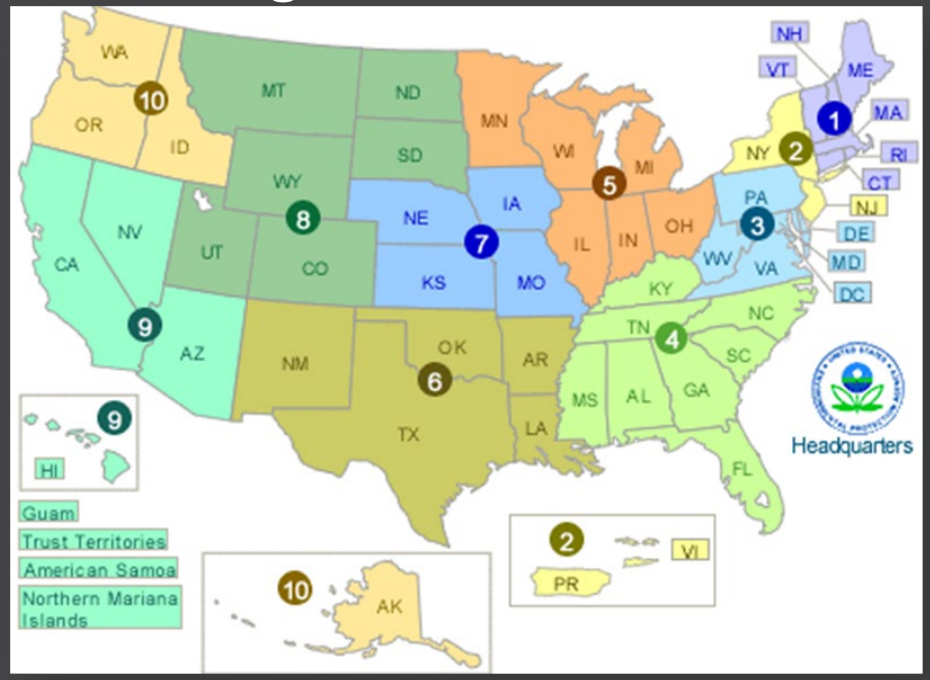
MPRSA SECTION 103 INTRODUCTION

- Marine Protection, Research, and Sanctuaries Act (MPRSA) authorizes USEPA to designate areas for ocean disposal
- Sites selected as disposal locations are required to mitigate adverse impacts to the greatest extent practicable
- Under MPRSA Section 103, USACE may issue ocean disposal permits for dredged material and must apply MPRSA requirements directly to federal projects involving ocean disposal of dredged material
- USEPA has region-specific information on ocean dumping

USEPA Regions



Sabine Pass Channel to Sabine Extension Channel

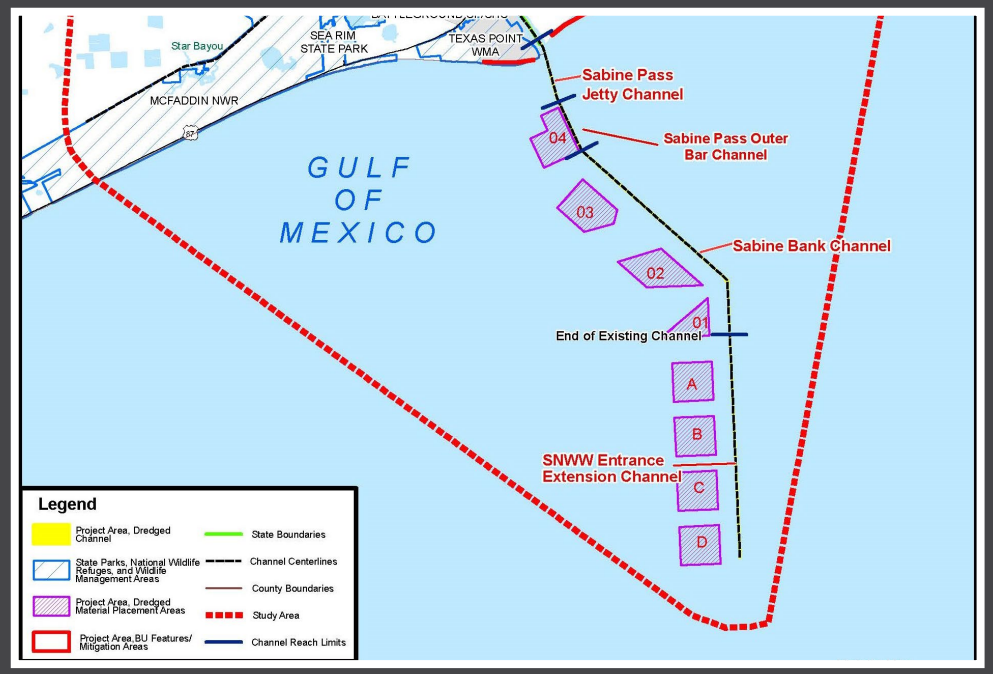
Channel Improvement Project

Deepening and Widening of the SNWW

- New work/new construction material
- USEPA Region 6 Case Study

Five Reaches of SNWW

- Extension Channel
- Sabine Bank Channel
- Sabine Pass Outer Bar Channel
- Sabine Pass Jetty Channel
- Sabine Pass Channel



Testing required under MPRSA 103 for TIER III testing to determine placement suitability

- Expected to adversely impact human health or the environment
- National technical guidance provided in the Ocean Testing Manual (OTM) or the “Green Book” Regional guidance provided in the Regional Implementation Agreement (RIA)

TIER II & III TESTING UNDER MPRSA SECTION103

Evaluation of Benthic and Water Column Impacts

Physical Analyses

- Assess the impact of disposal on the benthic environment and the water column at the disposal site
- Example analyses: grain size, TOC, TPH, ammonia, and percent solids

Example Sediment Sample

Chemical Analyses

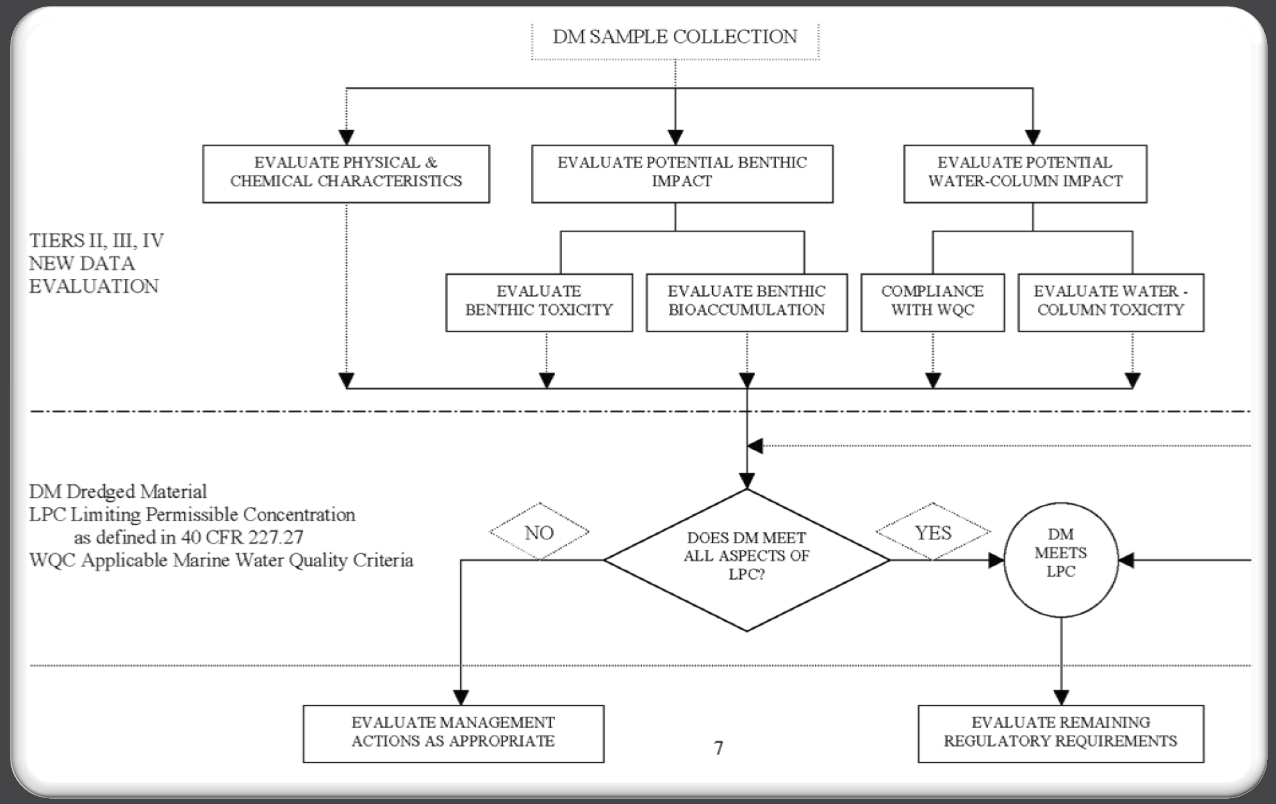
- Sediment, Surface Water, Elutriate
- Information about contaminants present in dredged material that, if bioavailable, could cause toxicity and/or bioaccumulate
- COCs for evaluation are USEPA priority pollutants that are published in the Federal Register

TIER II & III TESTING UNDER MPRSA SECTION103

Evaluation of Benthic and Water Column Impacts

Biological Evaluations

- Elutriate Bioassay
  - *A. bahia* (48- & 96-hour)
  - M. beryllina (96-hour)
- Whole Sediment Toxicity Bioassays
  - *L. plumulosus* (10-day)
  - *A. bahia* (10-day)
- Whole Sediment Bioaccumulation Tests
  - *A. virens* (28-day)
  - *M. nasuta* (28-day)



STFATE

- Short-Term Fate of Dredged Material Disposal in Open-Water Model (STFATE) module of the ADDAMS model to establish compliance with water column toxicity criteria

TIER III BIOLOGICAL TESTING RESULTS

Biological Evaluations

- **Elutriate Bioassay**
  - *A. bahia* (48-hour): toxicity → all 4 samples
  - M. beryllina (96-hour): toxicity → all 4 samples
  - Toxicity Reduction Evaluation → toxicity due to ammonia (2 samples)

- **Whole Sediment Toxicity Bioassays**
  - *L. plumulosus* (10-day): no acute toxicity
  - *A. bahia* (10-day): no acute toxicity

Elutriate Preparation

Elutriate Bioassays

Solid Phase Sediment Toxicity Test

Exposure Chambers in Environmental Chamber

LINES-OF-EVIDENCE ANALYSIS OF BIOACCUMULATION TESTS

Step 1: Comparison with FDA Action Levels

- **IF FDA action level is exceeded, the LPC is not met for bioaccumulation**
- **THEN disposal of dredged material without appropriate management is not supported**

- **SNWW CIP**
  - **No exceedances**

→ Step 2a

Step 2a: Compare Mean Tissue Concentrations to Background

- **IF background is exceeded**
- **THEN comparison to reference site is needed**

- **SNWW CIP**
  - ***M. nasuta*, copper (WGOMBC)**
  - ***A. virens*, no exceedances for WGOMBC**

→ Step 2b

LINES-OF-EVIDENCE ANALYSIS OF BIOACCUMULATION TESTS

Step 2b: Compare Mean Tissue Concentrations to Reference Site Bioaccumulation

- IF statistically higher than the reference
- THEN additional interpretation is required
- SNWW CIP
  - ➢ *M. nasuta*, copper did not exceed the Reference Area
- LOE Complete
  (if concentration had exceeded then → Step 3)

Step 3: Interpretation of Bioaccumulation Levels Statistically Higher than Reference Bioaccumulation

- IF contaminant concentration is found to be statistically higher than reference concentration
- THEN no additional interpretation is required
- SNWW CIP
  - ➢ Not required

SHORT-TERM FATE OF DREDGED MATERIAL DISPOSAL IN OPEN-WATER MODEL (STFATE)

- Modeling is required to evaluate dilution of the dredged material discharge through space and time to ensure water quality compliance with MPRSA Section 103.

- Impacts to the environment depends on
  - chemistry of the dredged material
  - how the material behaves upon release in the water column
  - mixing and dilution
  - hydrodynamic conditions

- STFATE is the model used in MPRSA Section 103 evaluations (presented next by Bailey et al. 2022)

CONCLUSIONS

- Dredge material chemistry → No adverse environmental impacts
- Dredge material placement → site-specific refinements needed

Follow-On

- STFATE modeling to support the development operational guidance (Bailey et al. 2022)
- Development of operational guidance for ocean disposal of new work sediments (Montgomery et al. 2022)

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QUESTIONS???