Sheboygan River Great Lakes Legacy Act Project - Rapid Confirmation Sampling and Re-Dredge Decision Making

Western Dredging Association (WEDA)

Midwest Chapter Annual Meeting – April 2013

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Overview

- Project Background
- Confirmation Sampling Goals and Objectives
- Sampling Approach
- Confirmation Sampling Rationale
- Data Collection and Evaluation
- Re-Dredge Design and Implementation
- Lessons Learned

Project Background

- Project Summary
  - Located within the Sheboygan River AOC in Sheboygan, WI
  - ~1.2 miles of river spanning 800 acres within a mixed land use
  - PCB and PAH contamination
  - Dredging occurred from Aug - Nov 2012
  - Two Superfund sites located within GLLA project area
    - Completed in 2011 and 2012

Project Background

- Project Partners
  - EPA GLNPO
  - WDNR
  - City of Sheboygan
  - Sheboygan County
  - Two Responsible Parties
    - Wisconsin Public Service
    - Pollution Risk Services (PRS)
- Contractors
  - Ryba Terra Joint Venture (RTJV)
    - Mechanical Dredging and Construction
  - CH2M HILL
    - Design and Data Management

Project Background

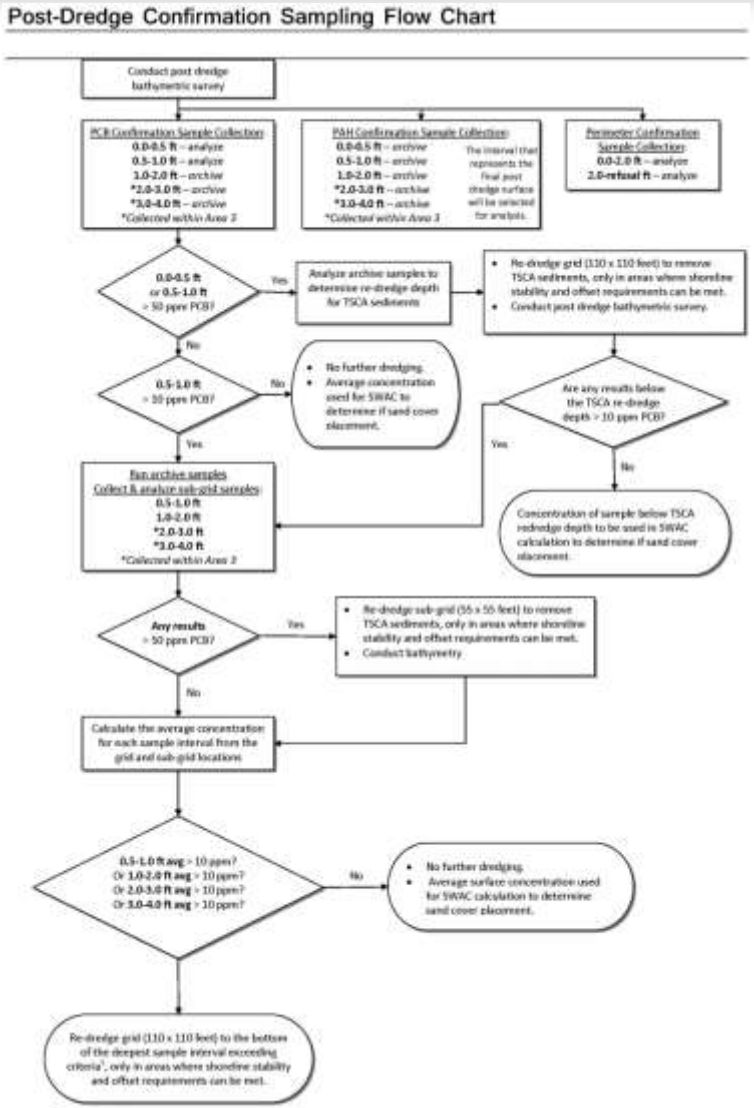
- Remedial Action Summary
  - Total Removal Volume: 146,875 cy
    - Non-TSCA and PAH =138,282 cy
    - TSCA = 8,593 cy
  - Sand Placement (2013)
    - ~9 acres of 6-inch sand cover

Confirmation Sampling Goals and Objectives

- Rapidly implement sediment confirmation sampling to provide quick-turn analytical results to determine need for further action
- Provide sufficient data to document post dredge PCB and PAH sediment concentrations and perform SWAC calculations
- Execute re-dredge design files accurately and timely to avoid dredge schedule delays
- Complete process with clear communication amongst project stakeholders and accurate documentation of re-dredge decision making

Sampling Approach

- Post Dredge Bathymetry
  - Multi-beam, Single-beam, & Poling
  - Daily collection and processing
    - daily dredging activities
    - Precipitation events
    - Air bubble curtain monitoring
  - Verification against design specs
- Sediment Confirmation Sampling
- Re-Dredge Implementation
  - Pending PCB and PAH analytical results
- Rolling SWAC Calculation
  - Residual sand cover placement considerations



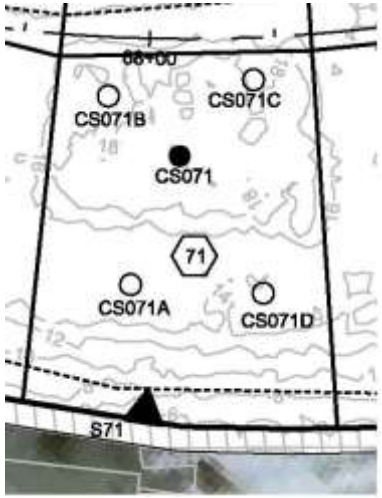
CH2MHILL.

Confirmation Sampling Rationale

- Sediment Coring vs. Surface Sampling
  - Sediment Coring
    - Can provide data for entire un-dredged inventory profile
    - Gives complete picture for re-dredge extent
    - Takes more front end time to collect (8-12 locations p/day)
    - Increases sample and data management needs
  - Surface Sampling
    - Fast collection rate (16-24 locations p/day)
    - May require additional sampling after re-dredge
    - Does not provide lithology information of un-dredged inventory

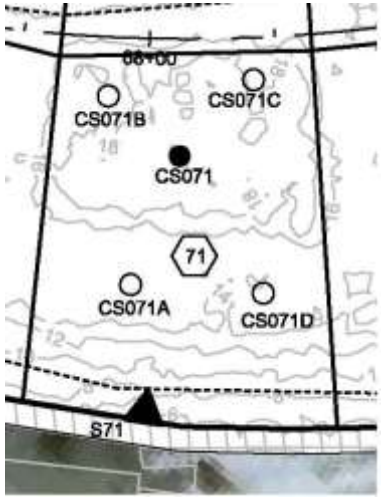
Confirmation Sampling Rationale

- Dredge Management Units (DMU)
  - Provides spacial management of dredge extents
    - 81 DMU's within project Areas 1 – 3
  - DMU Size Determination
    - Each DMU approximately 110 feet square
    - Investigation dataset sample density considerations
    - Analytical Model considerations
    - Dredge cycle time and scow capacity (~1500 cy p/ foot dredged)



Confirmation Sampling Rationale

- Sample Resolution Considerations
  - Sample Depth Selection
    - Determined by the anticipated un-dredged inventory thickness
    - Collected to 2 or 4-feet (DMU dependant)
  - Sample Interval Determination
    - Dredge and GPS vertical tolerance limitations
    - Bucket Capacity – water vs. sediment
    - (2) 0.5 ft intervals to 1 ft & 1 ft intervals > 1 ft
  - DMU Sample Distribution
    - (1) primary and (4) sub-grid sample locations per DMU
    - Primary location initially collected and surface samples analyzed. Sub-surface samples archived.
    - Sub-grid locations collected and analyzed pending result of primary location



Confirmation Sampling Rationale

- Analyzing vs. Archiving Samples
  - Cost Implications
    - Analytical costs
    - Sample management and reporting time
  - Data Need Prioritization
    - Are all data results critical at that same time?
    - What's the laboratory's capacity?
  - Combined Approach
    - Quick turn analysis of samples critical for triggering re-dredge
    - Archived samples to be used for delineating horizontal and vertical re-dredge extent
    - Normal analytical turn around for samples non-critical for re-dredge

Confirmation Sampling Rationale

- TSCA Confirmation Sampling

  Purpose: Confirm complete removal of TSCA material

  – 14 TSCA areas with 43 independent TSCA sample locations
    - 1 location per 6,000 sf, with a minimum of 3 locations per TSCA area
    - Randomly located in grid pattern
    - TSCA boundary determined by analytical model

Confirmation Sampling Rationale

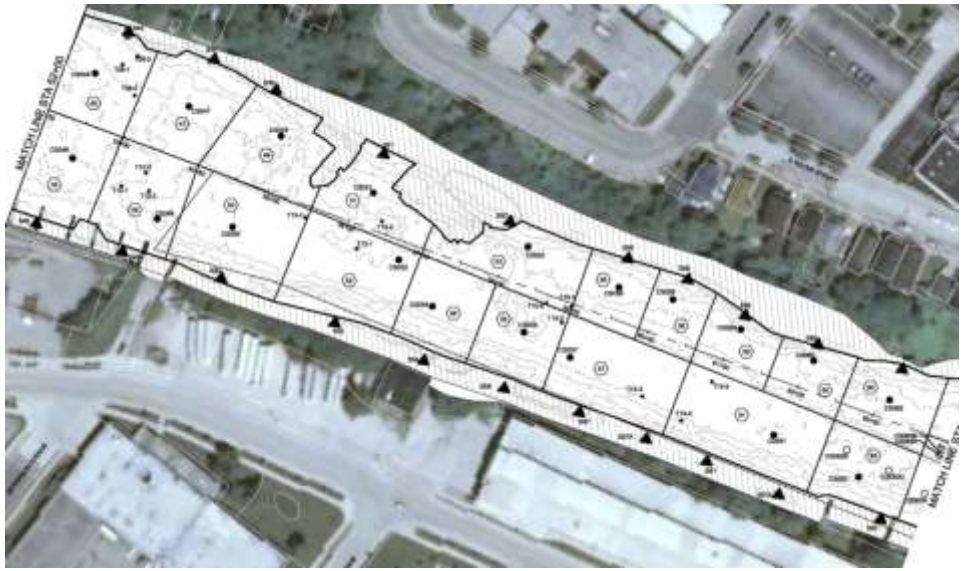
- TSCA Confirmation Sampling (Cont.)
  - Collected in 1-foot increments to 4 feet or refusal.
  - Composite Surface sample (0-1 ft)
    - Collected from each location within respective TSCA area sent for quick-turn analysis
    - Reduced number of samples initially analyzed
  - Grab samples
    - Grab samples of each interval stored onsite pending composite sample results
    - Grab samples used to define vertical and horizontal extent of TSCA material for re-dredge considerations

Confirmation Sampling Rationale

- Shoreline Sample Locations

  Purpose: Characterize in-situ concentration of sediments un-dredged due to offsets from shoreline

  - Project liability and property owner considerations
  - Utilization of existing data
  - Implemented into post remediation SWAC calculations



Data Collection and Evaluation

- Selection of Sampling Technology / Method

Data Collection and Evaluation

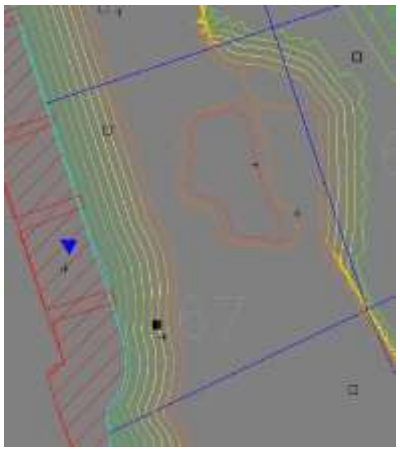
- Critical Data Needs
  - Analytical
    - Total PCB data
    - Total PAH data

	Location ID	Sample ID	Sample Date	Total PCBs[1] (mg/kg)	Total of 13 PAHs[2] (mg/kg)	Northing (WI SPS)	Easting (WI SPS)	Water Elevation (NAVD88)	Tide Elevation (ft from LWD)	Water Depth (ft)	Sediment Surface Elevation (NAVD88)	Core Penetration (ft)	Core Recovery (ft)
	CS040	SR-CS040-0.0/0.5	10/25/2012	2.09	2238.1	2571754.641	646075.006	576.93	-1.07	7.3	569.63	2.5	1.8
	CS040	SR-CS040-0.5/1.0	10/25/2012	0.182	7931.7	2571754.641	646075.006	576.93	-1.07	7.3	569.63	2.5	1.8
	CS040	SR-CS040-1.0/1.8	10/25/2012		1021.1	2571754.641	646075.006	576.93	-1.07	7.3	569.63	2.5	1.8
8	CS040-1	SR-CS040-1-0.0/0.5	12/12/2012	0.612 J	0.045 J	2571750.295	646069.897	576.2	-1.8	11.6	564.6	3	2.5
	CS040-1	SR-CS040-1-0.5/1.0	12/12/2012		842.7 J	2571750.295	646069.897	576.2	-1.8	11.6	564.6	3	2.5
	CS040-1	SR-CS040-1-1.0/2.0	12/12/2012		185.01 J	2571750.295	646069.897	576.2	-1.8	11.6	564.6	3	2.5
	CS040-1	SR-CS040-1-2.0/2.5	12/13/2012		2.8355	2571750.295	646069.897	576.2	-1.8	11.6	564.6	3	2.5
	CS040A	SR-CS040A-0.0/0.5	10/25/2012		209.42	2571788.157	646108.927	577.06	-0.94	9.5	567.56	2.8	2.1
	CS040A	SR-CS040A-0.5/1.0	10/25/2012		1611.8	2571788.157	646108.927	577.06	-0.94	9.5	567.56	2.8	2.1
	CS040A	SR-CS040A-1.0/1.7	10/25/2012		563.1	2571788.157	646108.927	577.06	-0.94	9.5	567.56	2.8	2.1
	CS040A	SR-CS040A-1.7/2.1	10/25/2012		29.529	2571788.157	646108.927	577.06	-0.94	9.5	567.56	2.8	2.1
	CS040B	SR-CS040B-0.0/0.5	10/25/2012		11.839	2571808.453	646060.479	576.927	-1.073	6.8	570.127	4.7	3.2
	CS040B	SR-CS040B-0.5/1.0	10/25/2012		16.931	2571808.453	646060.479	576.927	-1.073	6.8	570.127	4.7	3.2
	CS040B	SR-CS040B-1.0/2.0	10/25/2012		51.318	2571808.453	646060.479	576.927	-1.073	6.8	570.127	4.7	3.2
	CS040B	SR-CS040B-2.0/3.2	10/25/2012		901.6	2571808.453	646060.479	576.927	-1.073	6.8	570.127	4.7	3.2
8	CS040C	SR-CS040C-0.0/0.5	10/25/2012		5.641	2571723.067	646042.937	576.87	-1.13	6.8	570.07	2	1.8
	CS040C	SR-CS040C-0.5/1.0	10/25/2012		8.791	2571723.067	646042.937	576.87	-1.13	6.8	570.07	2	1.8
	CS040C	SR-CS040C-1.0/1.8	10/25/2012		3.544	2571723.067	646042.937	576.87	-1.13	6.8	570.07	2	1.8
8	CS040D	SR-CS040D-0.0/0.5	10/25/2012		7.3577	2571706.397	646085.419	576.93	-1.07	8.1	568.83	1.8	1.8
	CS040D	SR-CS040D-0.5/1.0	10/25/2012		29.169	2571706.397	646085.419	576.93	-1.07	8.1	568.83	1.8	1.8
	CS040D	SR-CS040D-1.0/1.8	10/25/2012		38.112	2571706.397	646085.419	576.93	-1.07	8.1	568.83	1.8	1.8

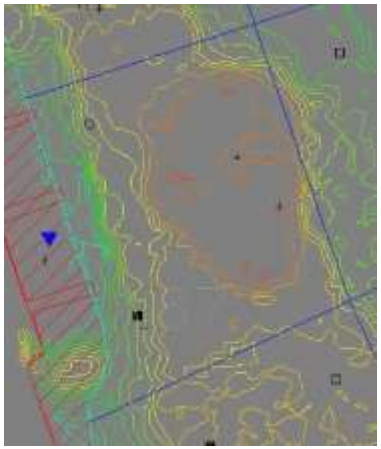
  - Physical
    - As sampled XY Coordinates
    - Elevation of sediment surface (bathymetric and static survey data)
    - Sediment descriptions (texture, odors, sheen, etc.)
    - Sediment core penetration and recovery

Re-Dredge Design and Implementation

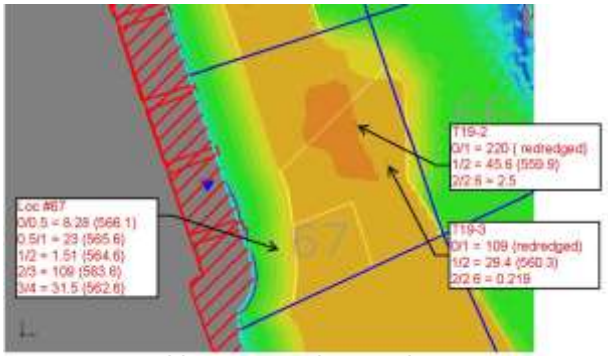
- Re-Dredge Design
  - Collaborative Effort
    - USEPA, WDNR, RTJV, and CH2M HILL
    - Superfund project updates
  - Re-dredge boundary and elevation determination
  - Re-Dredge Design Exports
    - XYZ data (.txt file)
    - Re-dredge boundary (.dwg file)



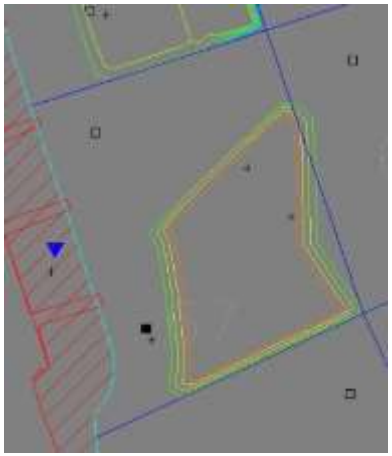
Remedial Design



Post-Dredge Bathymetry



Working Re-Dredge Design



Final Re-Dredge Design

Re-Dredge Design and Implementation

- Re-Dredge Implementation Summary
  - Primary Re-Dredge Areas
    - PCB's - Area 3 (navigation channel)
    - PAH's - Area 2 (Camp Marina)
  - Re-Dredge Volume Summary
    - Total Re-Dredge Volume: 9,208 cy (~6% of total dredged)
    - Non-TSCA and PAHs = 7,761 cy
    - TSCA = 1,447 cy

Lessons Learned

- Sampling Technology Evaluation
  - Vibracore vs. manual coring methods
  - Record low water levels
- Ideal vs. Implementable
  - Establish data objectives
  - Discuss implementation with dredge contractor

Questions / Discussion