EPA’s Phase 1 Evaluation

Discussion of Residuals Standard Application

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Residuals Standard Summary

- Requirements and targets
- Assumes that the design DoC (<1 ppm) was accurate:

  *Residuals Standard, Section 2.3, Page 21:* "Appropriate selection of the cut lines will be an important factor in minimizing the number of re-dredging attempts."

- Implementation
  - Four passes: 2 inventory plus 2 residuals
  - Post dredging sampling after reaching final cut line
  - Residuals passes after inventory removal
  - CU closure: re-dredging, backfill or capping based on statistically-derived thresholds
Some Project-Specific Terms

• **Dredging Pass** – The dredging that occurred to achieve a specific depth (regardless of how many bucket cuts were made at any location).

• **Inventory Pass** – Any dredging pass that removed inventory

• **Residuals Pass** – Any dredging pass designed only to remove residuals

• **Fine Grading** – the process of shallow dredging cuts to achieve a design depth tolerance

* Note that one inventory dredging pass may include inventory dredging + fine grading
Residuals Standard is not the Problem

• EPS are related but not in conflict

• Basic problems arise from the uncertainty in the design DoC
  – Core collection problems associated with refusal and recovery

• EPS are working but modifications are needed in the approaches for dredging and post-dredging sampling

• EPA is recommending simplifications to the Standard but not changes to the basic approach
First Dredging Pass

• Dredge attempted to reach design depth
  – May have included multiple inventory cuts

• When design depth thought to be reached
  – area surveyed by dredge contractor
  – areas out of tolerance ‘fine graded’ to achieve a 3-inch design tolerance

• Once dredged surface within tolerance
  – third-party ‘final’ bathymetric survey verification
  – post-dredging samples collected*

• Map presented to EPA describing the next step (either additional dredging, backfilling or capping).

* Later in the Phase 1 season, samples were collected at upstream subareas prior to surveying
Residuals vs. Inventory Passes

• Objective is to remove inventory on 1\textsuperscript{st} pass
  – Reduce resuspension
  – Increase productivity

• Volume achieved compared to design
  – 40–50 % 1\textsuperscript{st} pass
  – 30–40 % 2\textsuperscript{nd} pass
  – 20% of total in final pass(es)

• PCB Mass
  – 40–50 % 1\textsuperscript{st} pass
  – 30–40 % 2\textsuperscript{nd} pass
  – 20% of total final pass(es)

• 4 of 10 CUs required 4 or more passes
Inventory vs. Residuals

~21,000 cy*

~265,000 cy*

* Based on GE's estimate
Inventory vs. Residuals Passes

CU-4 Daily Dredged Volume

Dredged Volume (CY)

Dredging Pass 1
Dredging Pass 2
Dredging Pass 3

Days: 7/16, 7/23, 7/30, 8/6, 8/13, 8/20, 8/27, 9/3, 9/10, 9/17, 9/24, 10/1, 10/8, 10/15, 10/22
**Inventory vs. Residual Passes**

**CU-5 Daily Dredged Volume**

Dredged Volume (CY)

- **Dredging Pass 1**
- **Dredging Pass 2**
- **Dredging Pass 3**

Dates:
- 6/18
- 6/15
- 6/22
- 6/29
- 7/6
- 7/13
- 7/20
- 7/27
- 8/3
- 8/10
- 8/17
- 8/24
- 8/31
- 9/7
- 9/14
Note the mass removed from CUs 1, 2, 3, 6, 7 and 8 after Dredging Pass 2 are greater than the design estimate for CU 1.
Average Tri+ PCB in Samples Collected In Areas to be Re-dredged and the SSAP Cores

Note average concentrations stay high through all dredging passes.

Area dredged decreases for each pass.
Closure Summary

Percent of Phase 1 Area Closure

- Cap on Archaeologically Sensitive Areas: 0.26%
- Cap due to Schedule Constraints: 25%
- Cap per Residual Standard: 10%
- Cap on Bedrock/clay: 2%
- Backfill: 63%
Addressing Uncertain DoC

- Need to penetrate full contaminated thickness during post-dredging sampling
- Need to identify the core DoC and its uncertainty
- 3rd – 4th “re-dredging passes” actually removed inventory rather than residuals
- Need to modify post-dredging sample evaluation
Design vs. Final Dredging Depth
(High Confidence Cores only)

Type 1A

<table>
<thead>
<tr>
<th>Original Design Depth (in)</th>
<th>Additional Dredging Depth (ft)</th>
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<tbody>
<tr>
<td>3 (16)</td>
<td>2</td>
</tr>
<tr>
<td>6 (41)</td>
<td>1</td>
</tr>
<tr>
<td>12 (38)</td>
<td>1</td>
</tr>
<tr>
<td>18 (44)</td>
<td>2</td>
</tr>
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<td>24 (38)</td>
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<td>36 (10)</td>
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<td>48 (1)</td>
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</tr>
<tr>
<td>54 (2)</td>
<td>1</td>
</tr>
<tr>
<td>60 (3)</td>
<td>1</td>
</tr>
<tr>
<td>&gt;60 (5)</td>
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</tbody>
</table>

Mean: 6 inches
95th Percentile
75th Percentile
50th Percentile
25th Percentile
5th Percentile
Proposed Process Changes for Phase 2

• Inventory dredging passes should reach the bottom of the 1st core segment with concentration < 1 ppm plus 3”
  – Fewer bucket cuts and minimize fine grading

• When design depth is reached, collect post dredging cores
  – Analyze full length of 24” core to identify depth of contamination
  – Achieve at least two successive 6-in segments below 1 mg/kg at the bottom
Interaction with the Resuspension Standard in Phase 1

• Key to efficiency and reducing resuspension is to remove most inventory on 1st pass and reduce multiple cuts at the same place

• Dredged surfaces were left open for excessive time awaiting closure, increasing resuspension
Interaction with the Productivity Standard in Phase 1

- Underestimation of designed dredging depths
  - Final depth of dredging below sediment core–based design dredging depths
  - Increased volume of material dredged per CU
  - Decreased productivity
- Additional inventory had greatest impact on CU closure process, not the Residuals Standard
- Time spent in precision dredging to a specific designed depth where DoC was underestimated
Recap of Residuals Standard Implementation during Phase 1

- DoC was underestimated
- Mass was underestimated
- Dredged inventory was nearly twice the design inventory
- 75% of the dredged area was closed in accordance with the Residuals Standard
Simultaneously Meeting Standards

• Efficient dredging of inventory with fewer cuts (*productivity*) leads to fewer bottom disturbances and smaller dredging releases (*resuspension*) and quicker certification of post-dredging concentrations (*residuals*) reducing duration of exposed bottom surface (*resuspension*).

• Per Residuals Standard, appropriate selection of cut lines is important in minimizing re-dredging...and therefore in meeting the standards simultaneously.