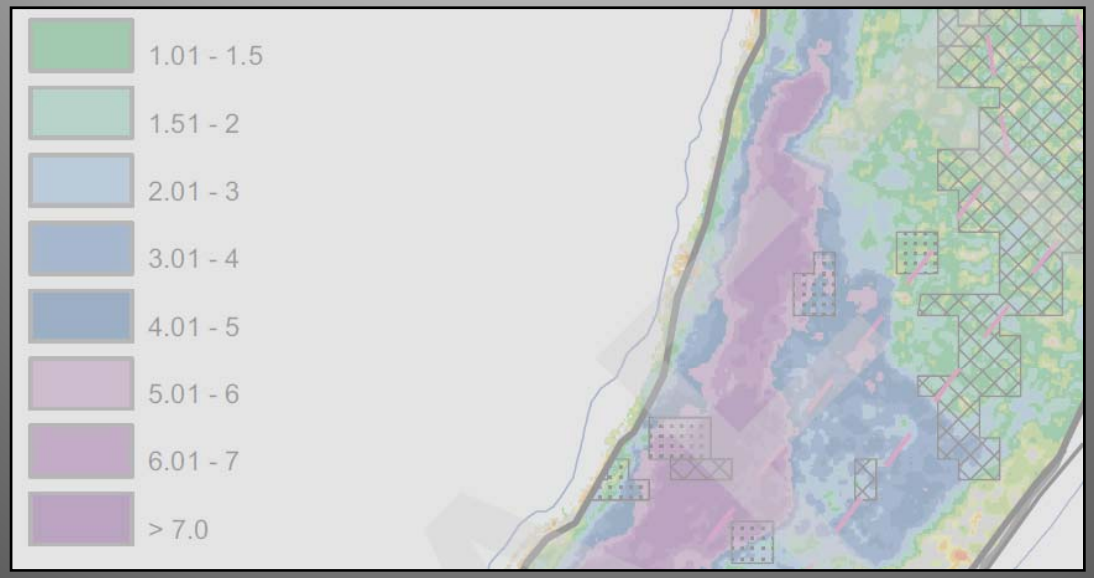
EPA's Phase 1 Evaluation



Discussion of Residuals Standard Application

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Residuals Standard Summary

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

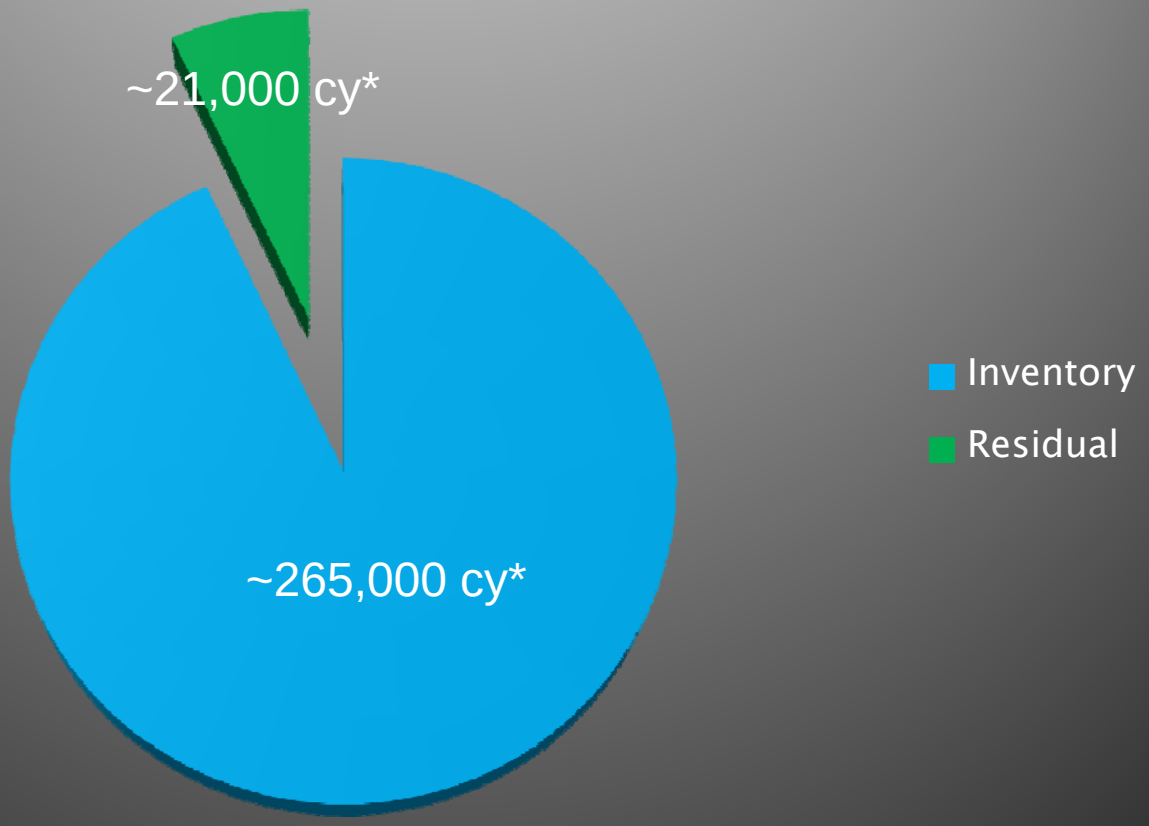
- Dredge attempted to reach design depth
  - May have included multiple inventory cuts
- When design depth thought to be reached
  - area surveyed by dredge contractor
  - areas out of tolerance 'fine graded' to achieve a 3-inch design tolerance
- Once dredged surface within tolerance
  - third-party '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

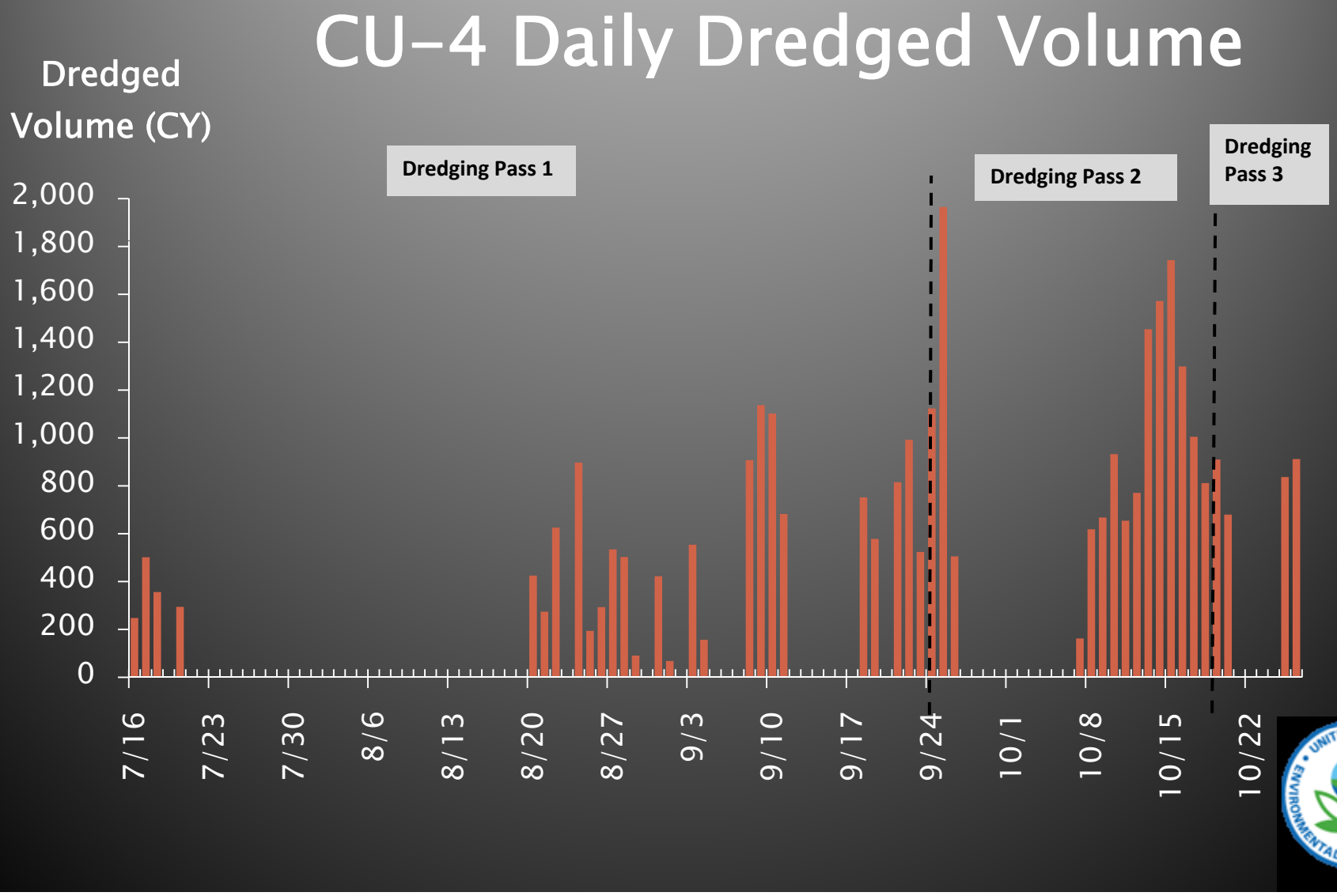
- Objective is to remove inventory on 1st pass
  - Reduce resuspension
  - Increase productivity
- Volume achieved compared to design
  - 40–50 % 1st pass
  - 30–40 % 2nd pass
  - 20% of total in final pass(es)
- PCB Mass
  - 40–50 % 1st pass
  - 30–40 % 2nd pass
  - 20% of total final pass(es)
- 4 of 10 CUs required 4 or more passes

Inventory vs. Residuals



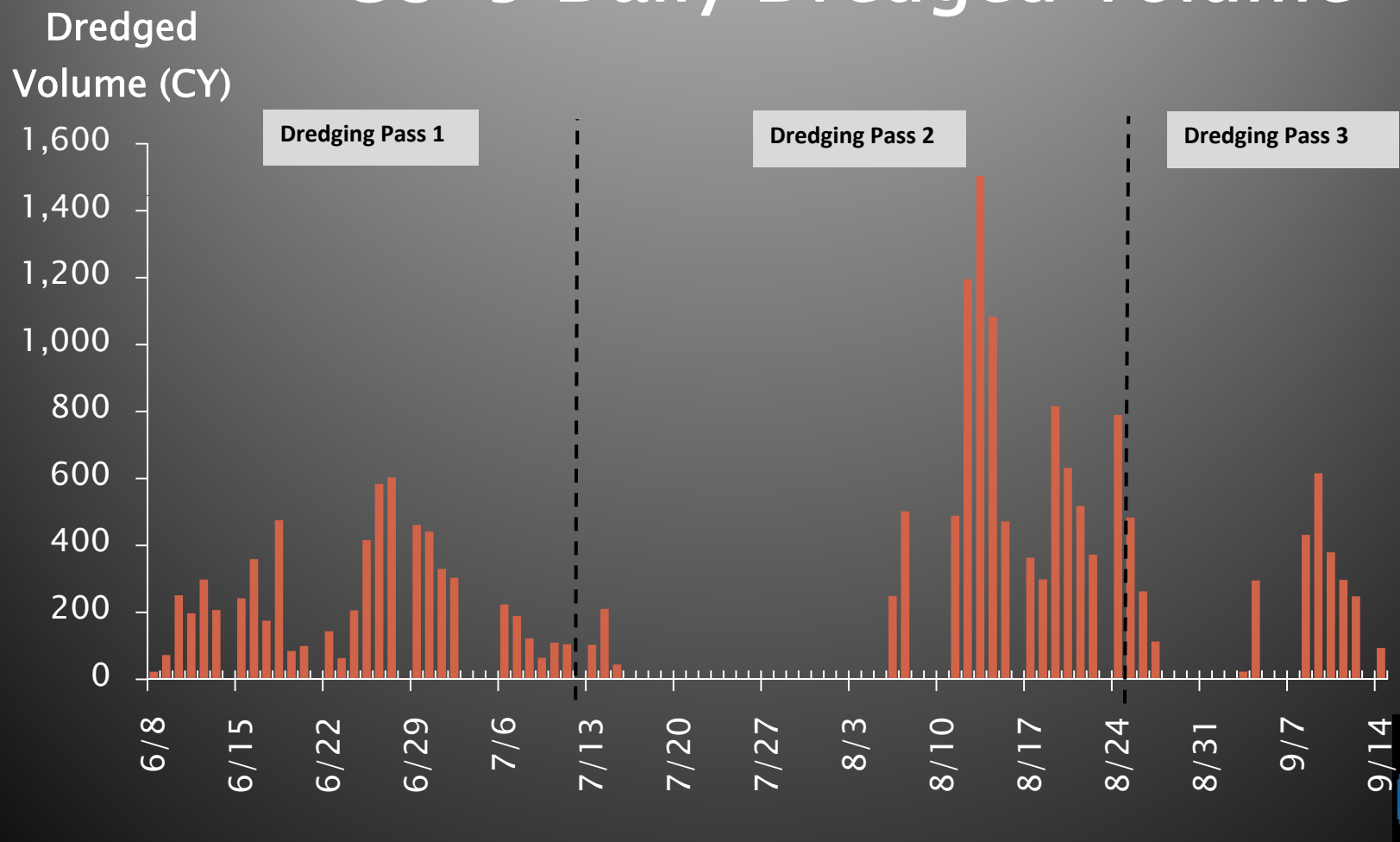
* Based on GE's estimate

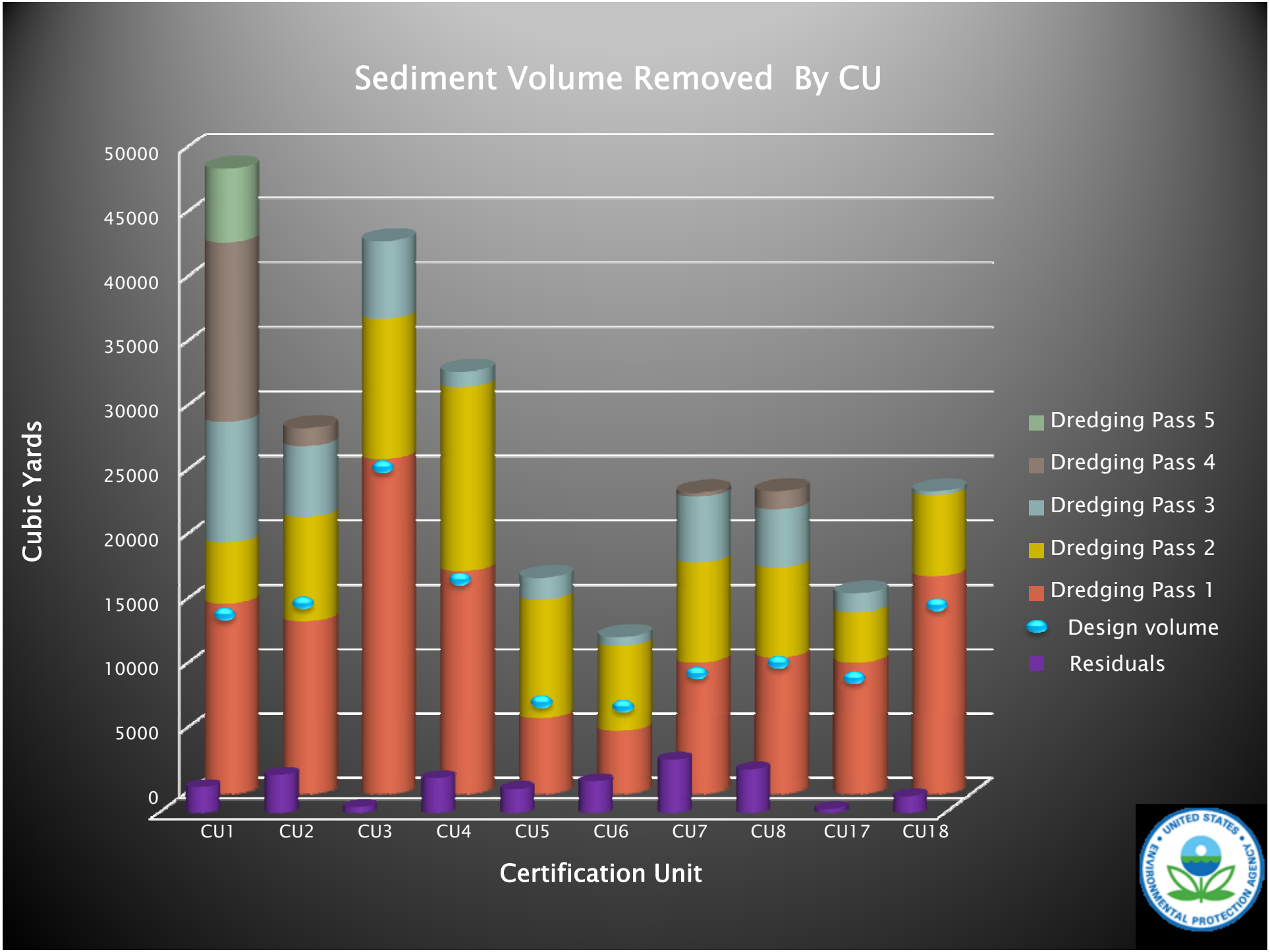
Inventory vs. Residuals Passes

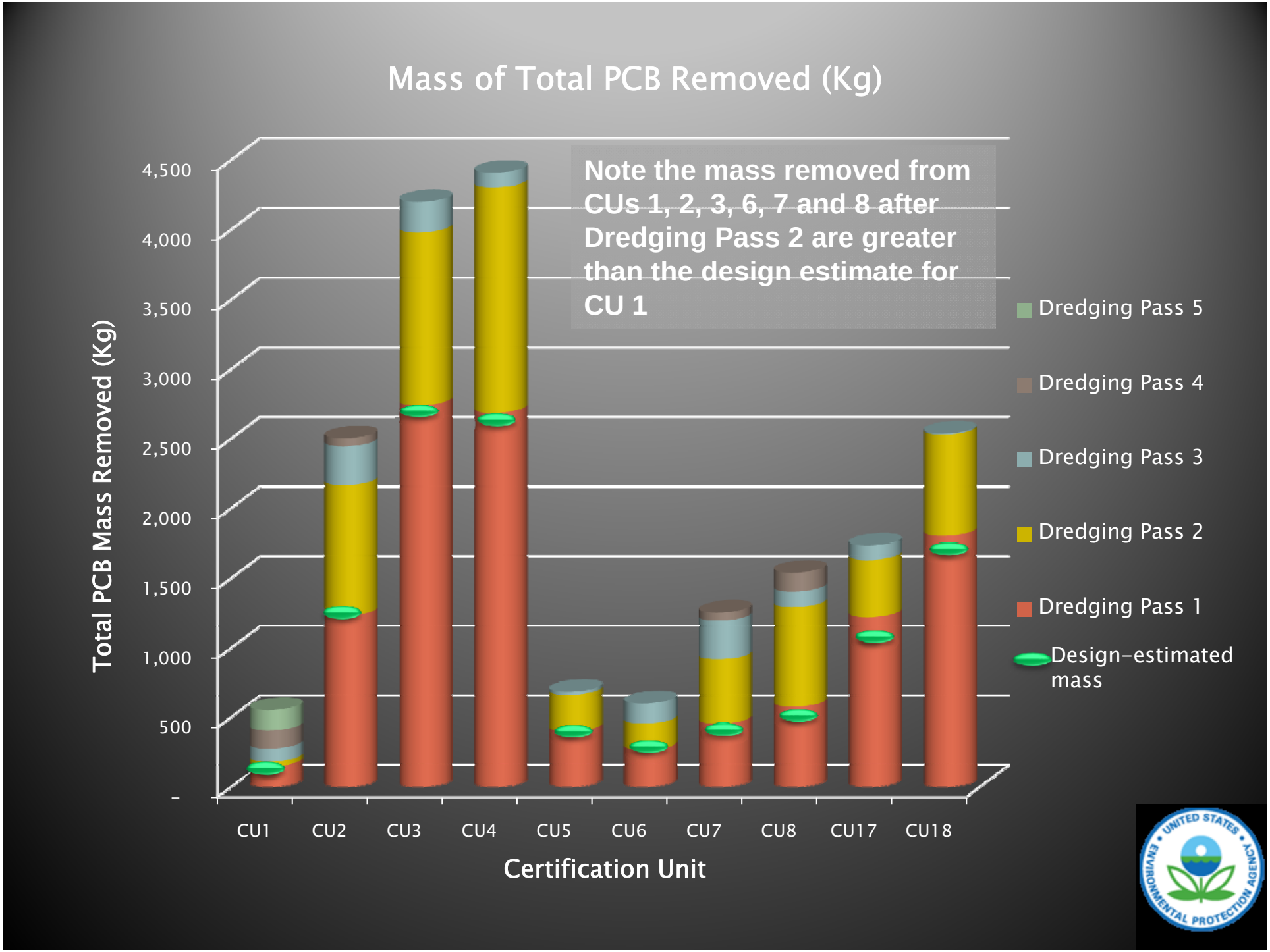


Inventory vs. Residual Passes

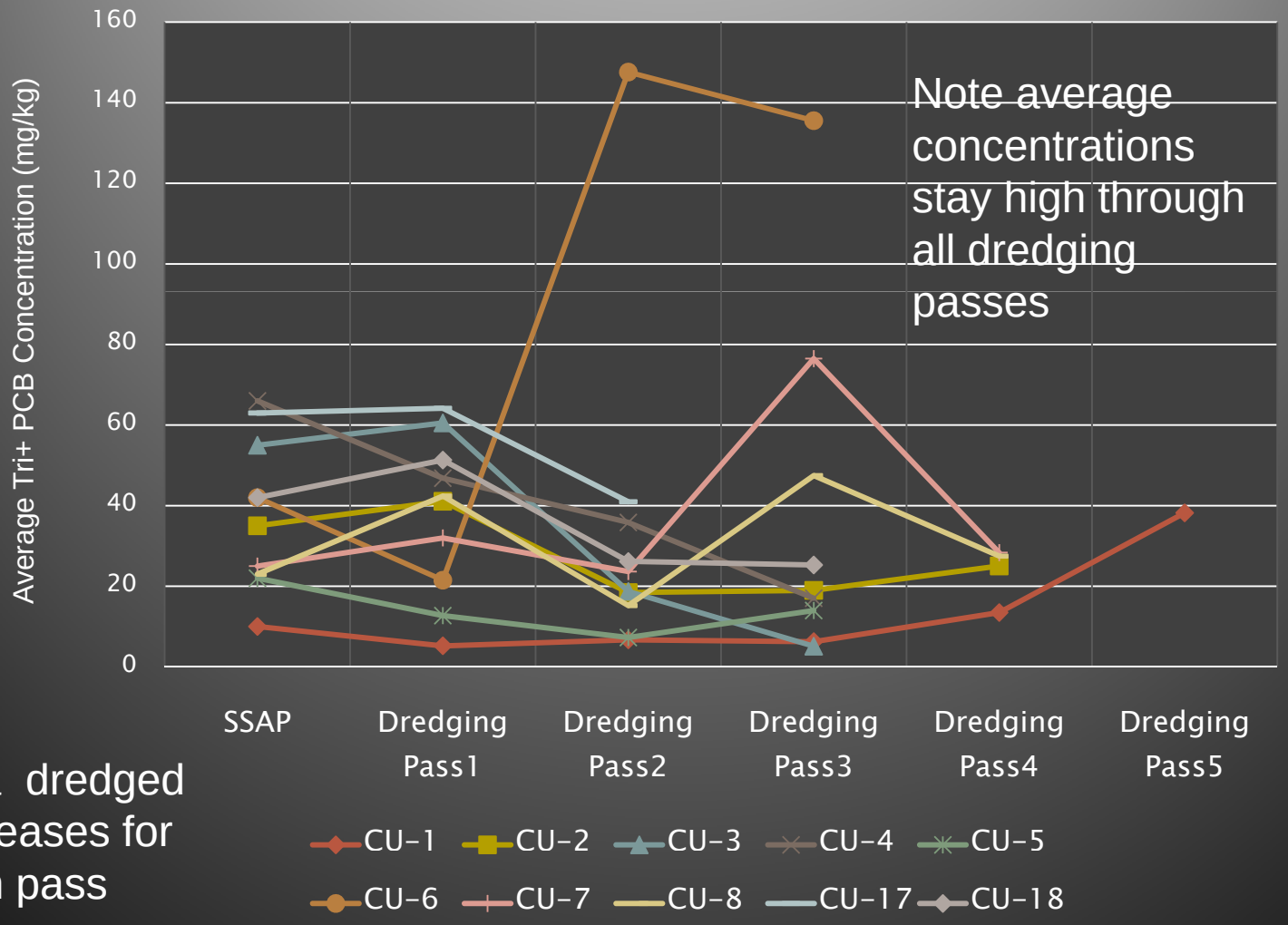
CU-5 Daily Dredged Volume




Sediment Volume Removed By CU
Cubic Yards
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
CU1
CU2
CU3
CU4
CU5
CU6
CU7
CU8
CU17
CU18
Certification Unit
Dredging Pass 5
Dredging Pass 4
Dredging Pass 3
Dredging Pass 2
Dredging Pass 1
Design volume
Residuals


Mass of Total PCB Removed (Kg)
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
Total PCB Mass Removed (Kg)
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
-
CU1
CU2
CU3
CU4
CU5
CU6
CU7
CU8
CU17
CU18
Certification Unit
Dredging Pass 5
Dredging Pass 4
Dredging Pass 3
Dredging Pass 2
Dredging Pass 1
Design-estimated mass

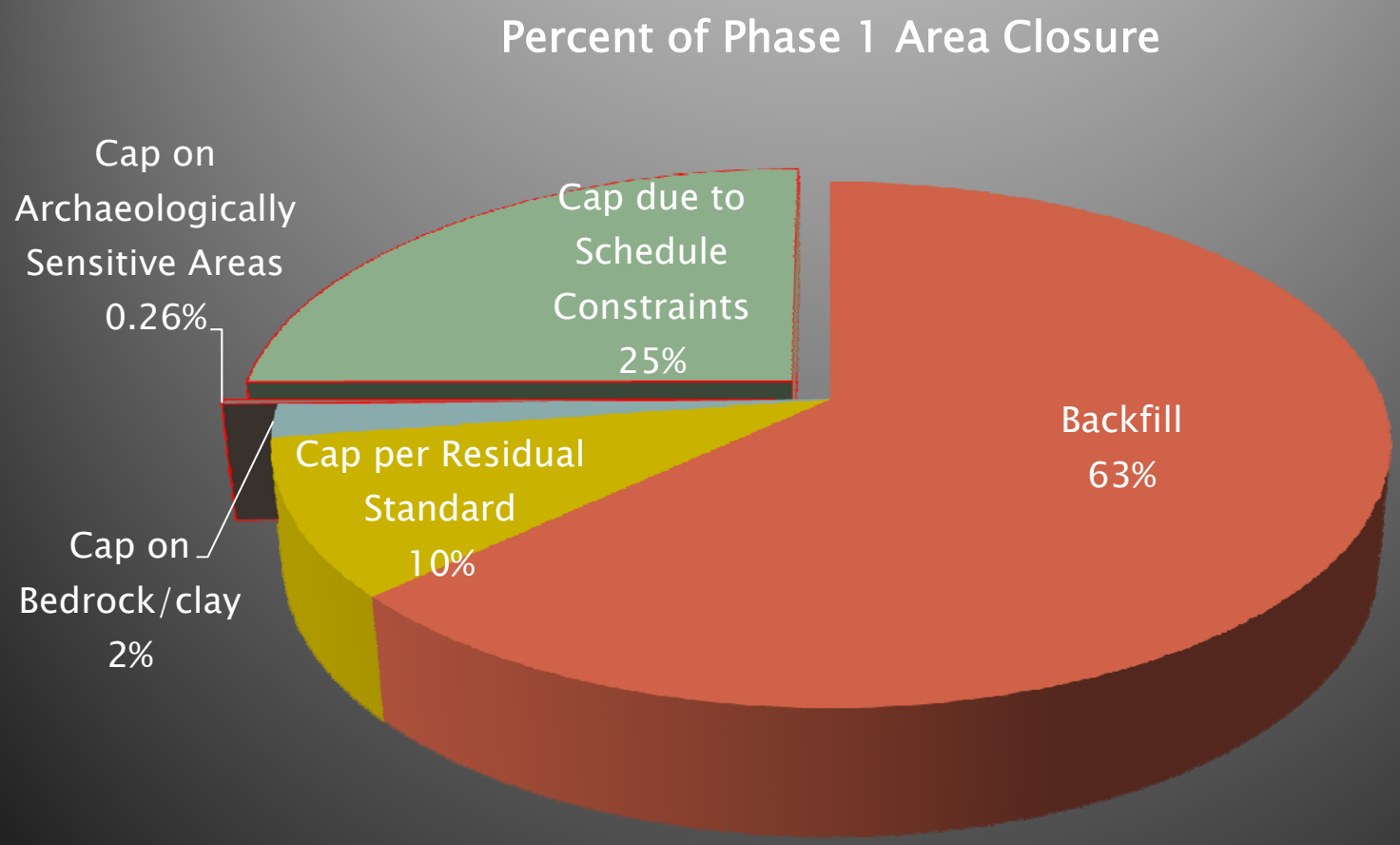
Average Tri+ PCB in Samples Collected In Areas to be Re-dredged and the SSAP Cores



Note average concentrations stay high through all dredging passes

Area dredged decreases for each pass

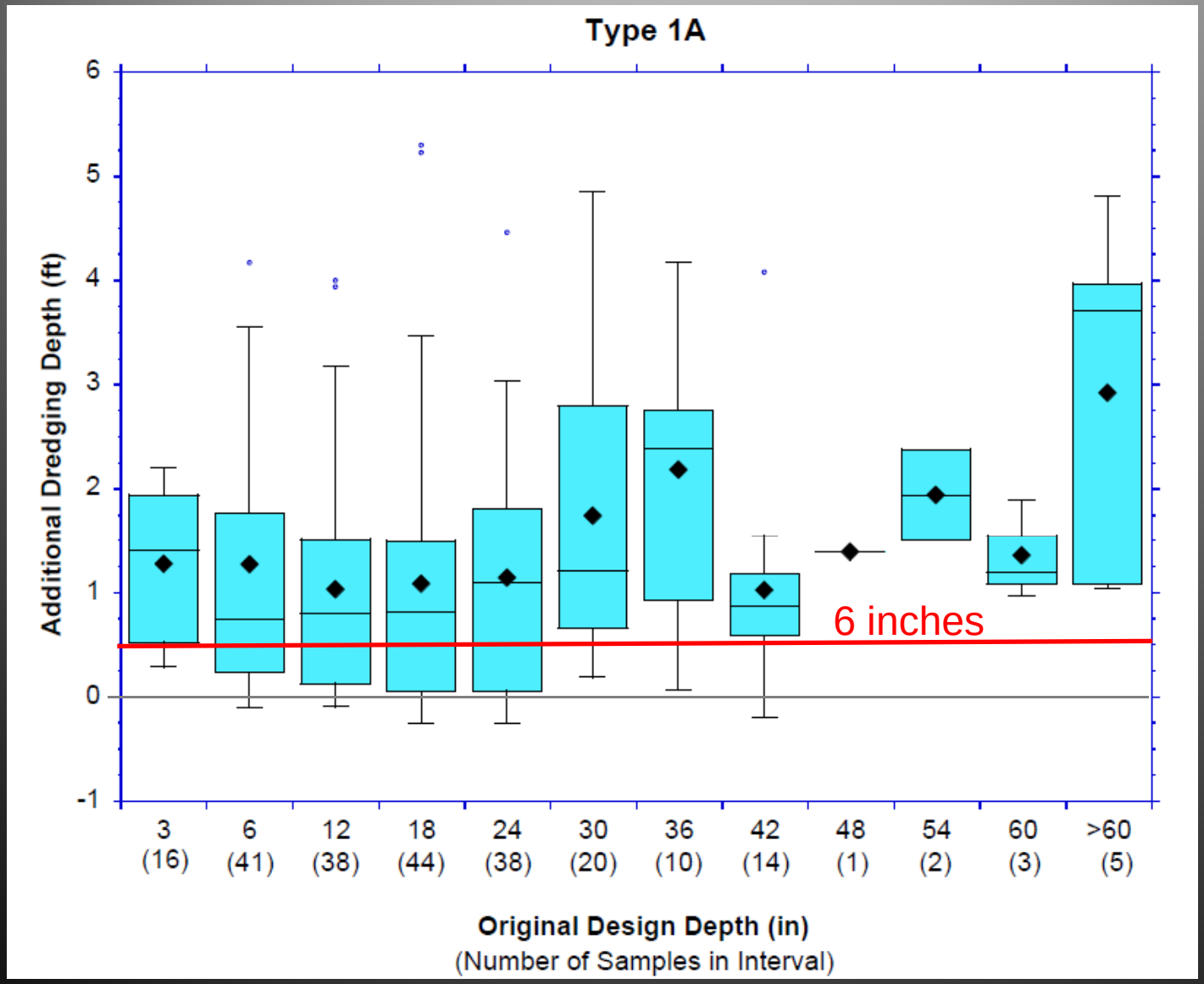
Closure Summary

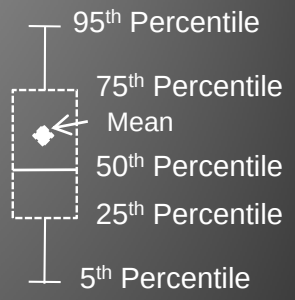


Addressing Uncertain DoC

- 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)





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.