

Importance of Recontamination Potential When Considering Remediation of Contaminated Sediment Sites in San Diego Bay



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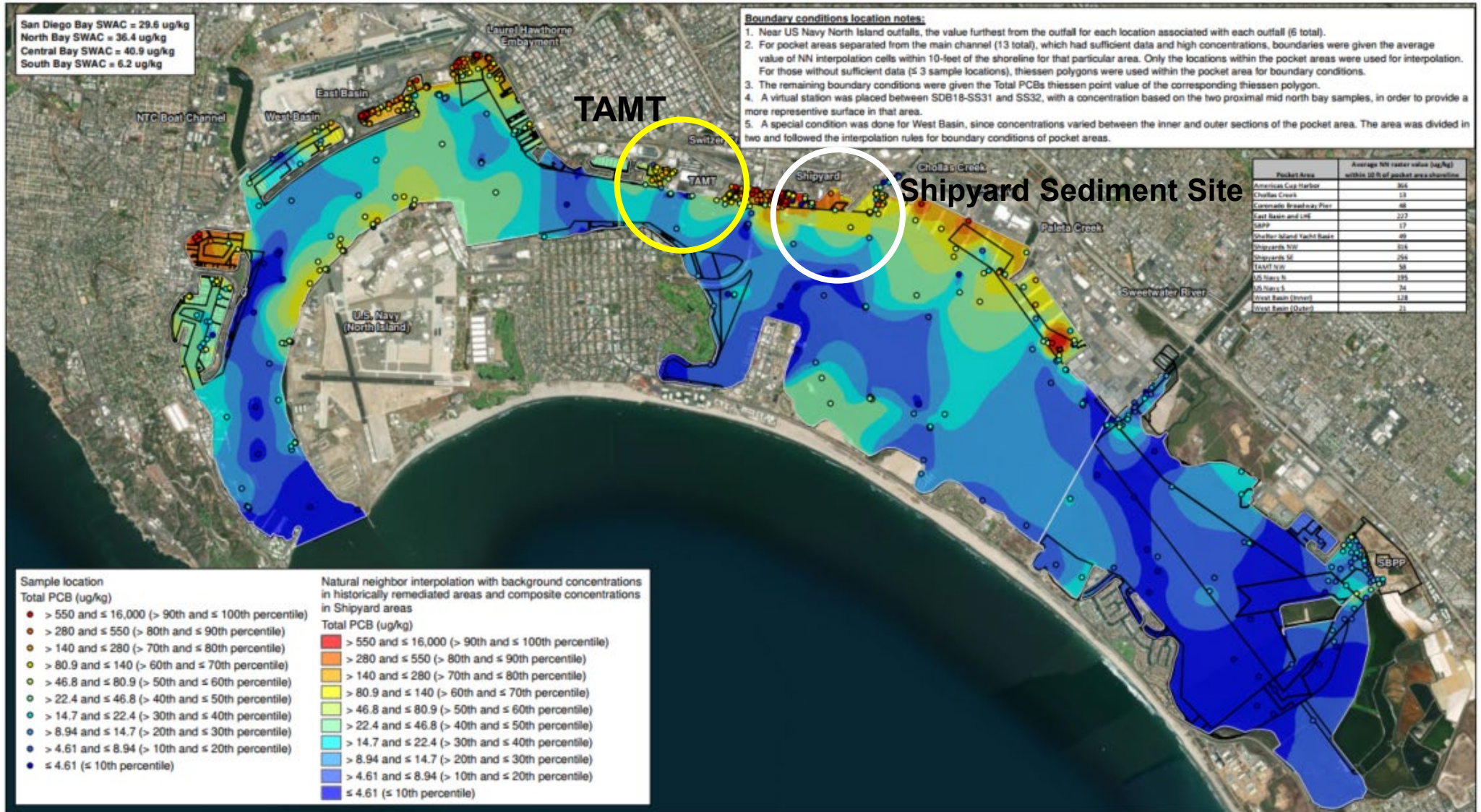
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ERM NewFields Environmental Forensics, Rockland, MA

October 22, 2025

Windward Environmental is now Barr Engineering Co.



PCBs in Surface Sediments



San Diego Bay Cleanup Levels Pursuant to Resolution No. 92-49



- Sediment remediation is conducted to protect beneficial uses like aquatic life, wildlife, and human health
- San Diego Water Board is obligated to have a presumptive cleanup goal to require cleanup to attain background water conditions (the water quality that existed before the discharge)
- San Diego Water Board may establish a cleanup level above background water quality conditions, if the Board determines it is technologically or economically infeasible to achieve background water quality conditions



Shipyard Sediment Site Background



Cleanup and Abatement Order
No. R9-2012-0024

March 14, 2012

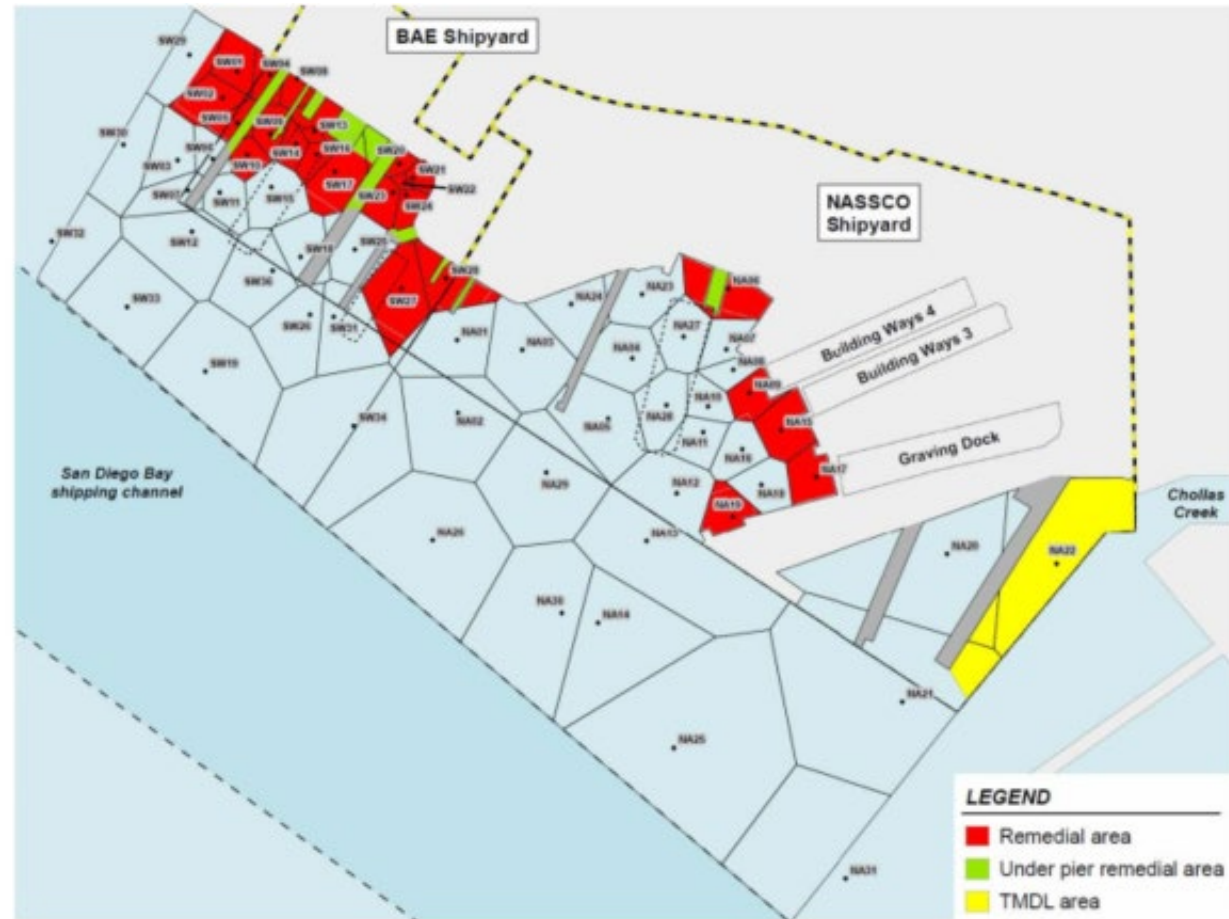
Table 1. Background Sediment Chemistry Levels

Chemicals of Concern	Units (dry weight)	Background Sediment Chemistry Levels ¹
Primary COCs		
Copper	mg/kg	121
Mercury	mg/kg	0.57
HPAHs ²	µg/kg	663
PCBs ³	µg/kg	84
Tributyltin	µg/kg	22
Secondary COCs		
Arsenic	mg/kg	7.5
Cadmium	mg/kg	0.33
Lead	mg/kg	53
Zinc	mg/kg	192

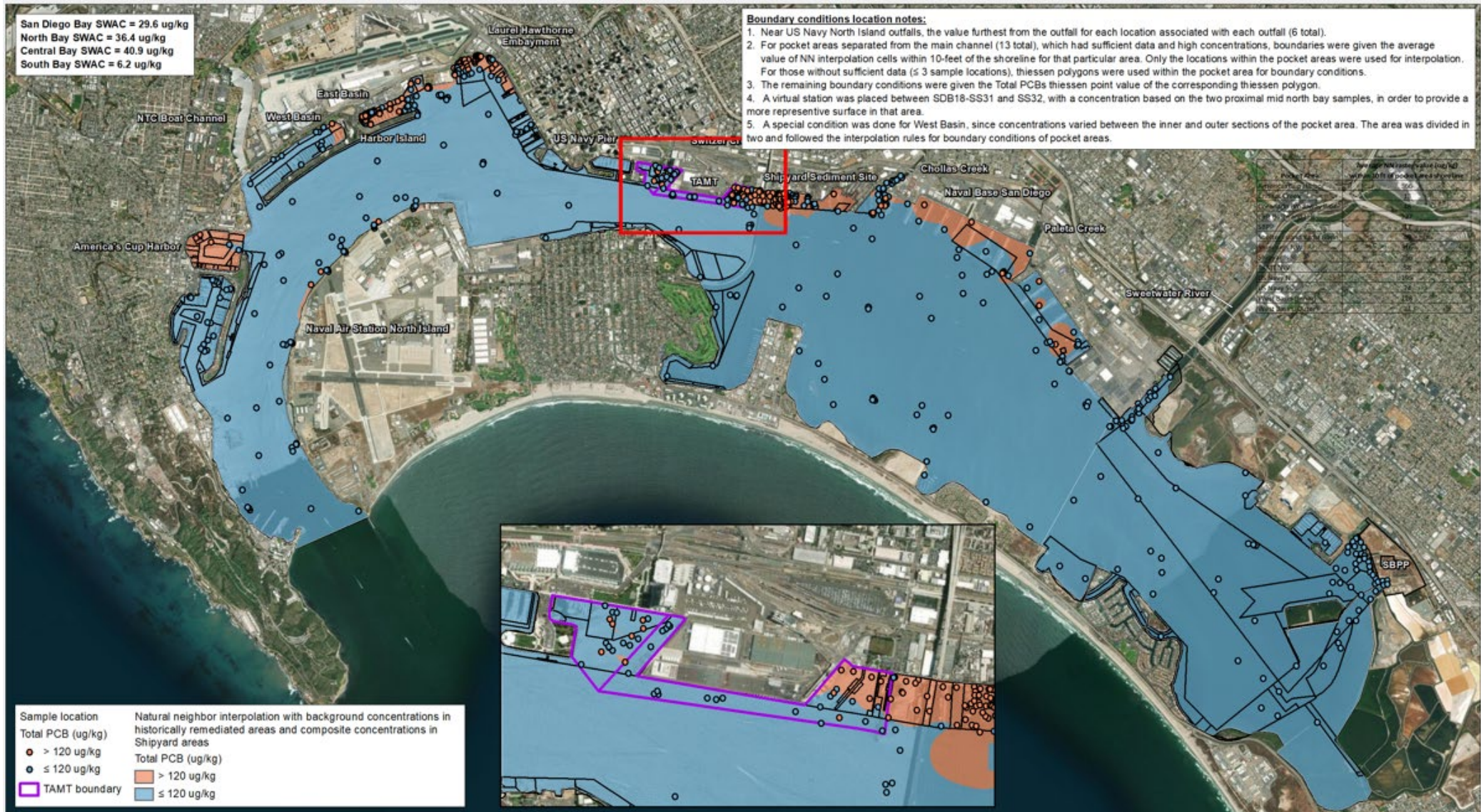
- Equal to the 2005 Reference Pool's 95% upper predictive limits shown in Section 18 of the *Technical Report for Cleanup and Abatement Order No. R9-2012-0024*. The background levels for metals are based on the %fines:metals regression using 50% fines, which is conservative because the mean fine grain sediment at the Shipyard Investigation Site is 70% fines.
- HPAHs = sum of 6 PAHs: Fluoranthene, Perylene, Benzo[a]anthracene, Chrysene, Benzo[a]pyrene, and Dibenzo[a,h]anthracene.
- PCBs = sum of 41 congeners: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

Table 2. Alternative Cleanup Levels: Shipyard Sediment Site

Aquatic Life	Aquatic Dependent Wildlife and Human Health	
Remediate all areas determined to have sediment pollutant levels likely to adversely affect the health of the benthic community.	Surface Weighted Average Concentrations (site-wide)	
	Copper	159 mg/kg
	Mercury	0.68 mg/kg
	HPAHs ¹	2,451 µg/kg
	PCBs ²	194 µg/kg
	Tributyltin	110 µg/kg



Distribution of PCBs in Surface Sediment in Relation to 120 $\mu\text{g}/\text{kg}$ (84 $\mu\text{g}/\text{kg}$ partial sum)



San Diego Regional Water Quality Control Board



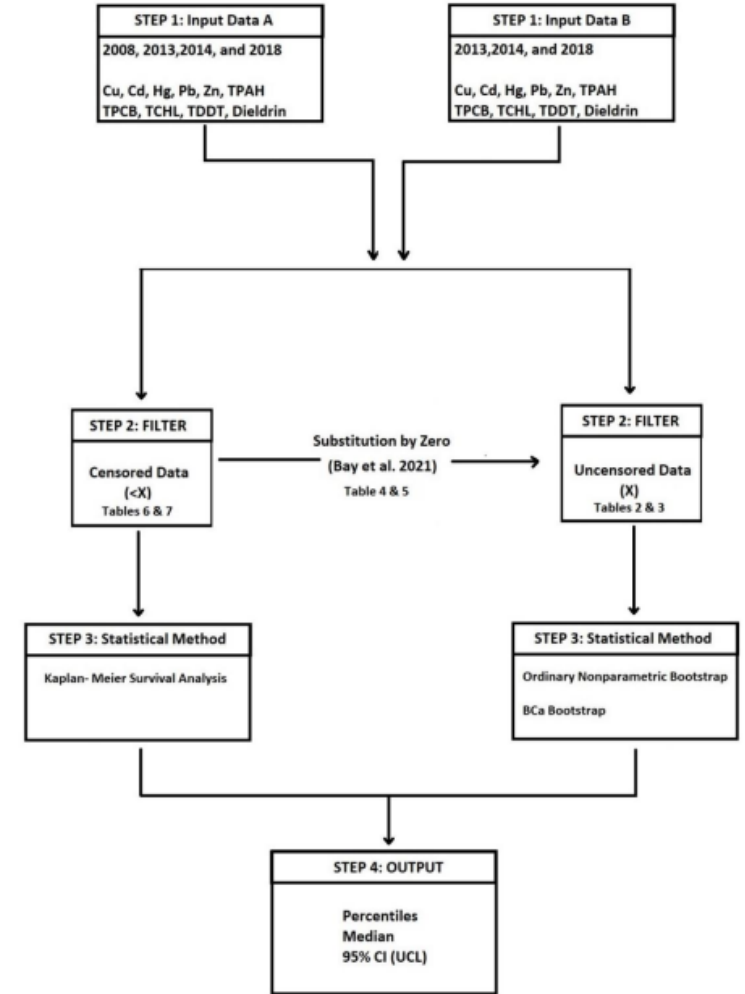
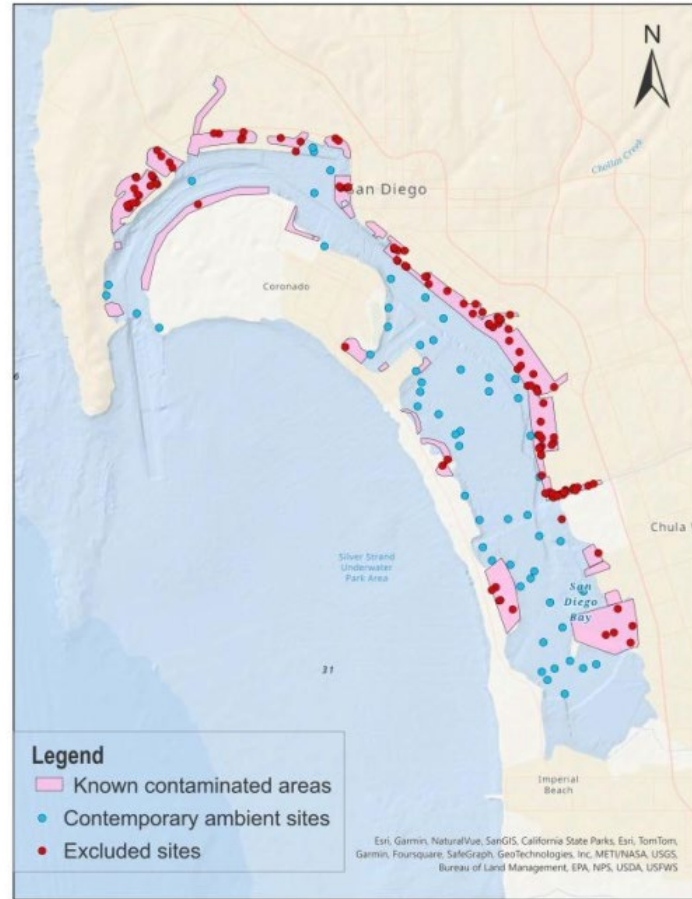
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD



SAN DIEGO BAY SEDIMENT POLLUTANTS: EVALUATION OF CONTEMPORARY AMBIENT CONCENTRATIONS TO INFORM WATER QUALITY MANAGEMENT

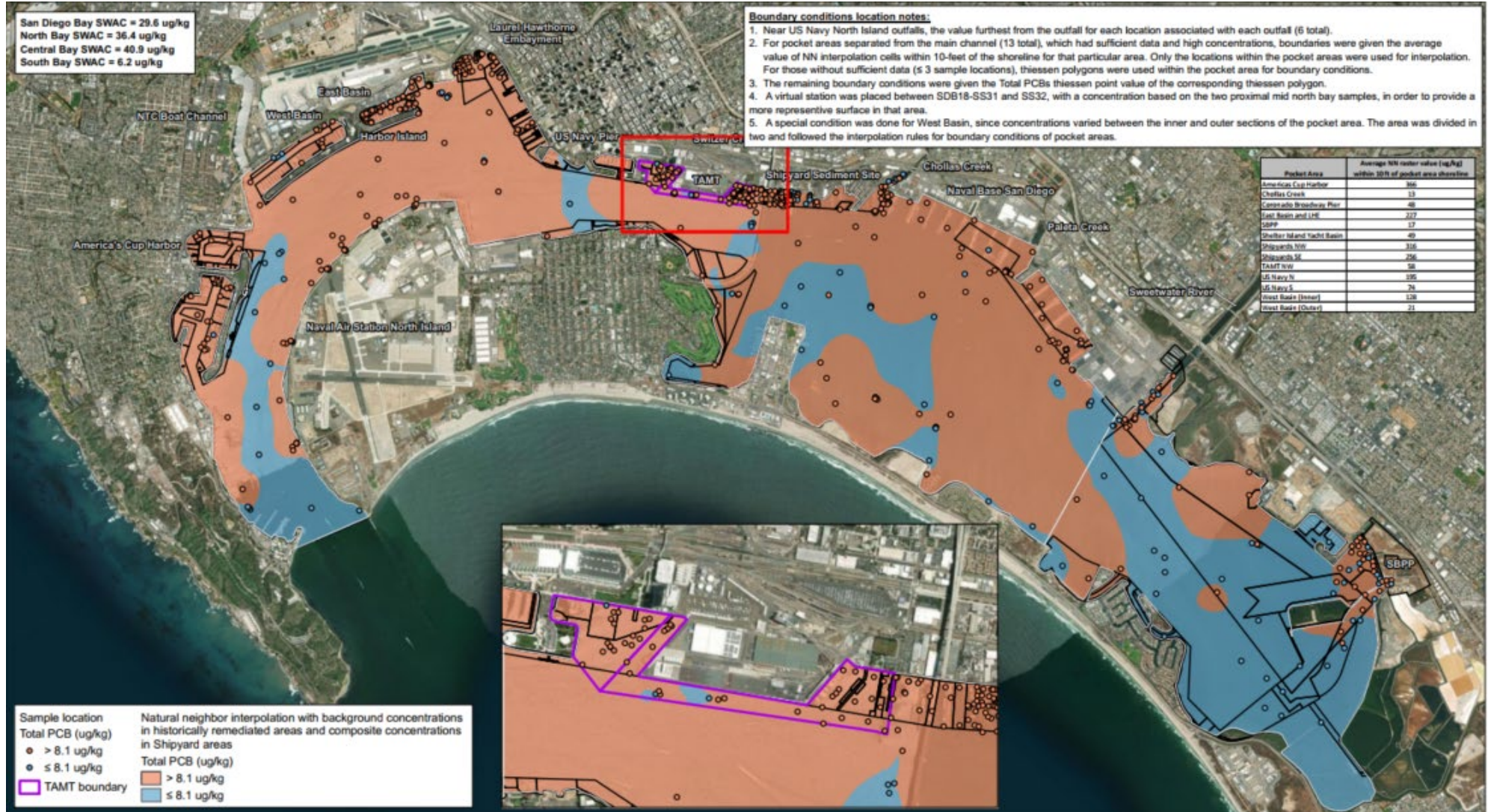
January 2024

Figure 5. Map of San Diego Bay Depicting Final Contemporary Ambient Sites, Known Contaminated Areas, and Excluded Sites.

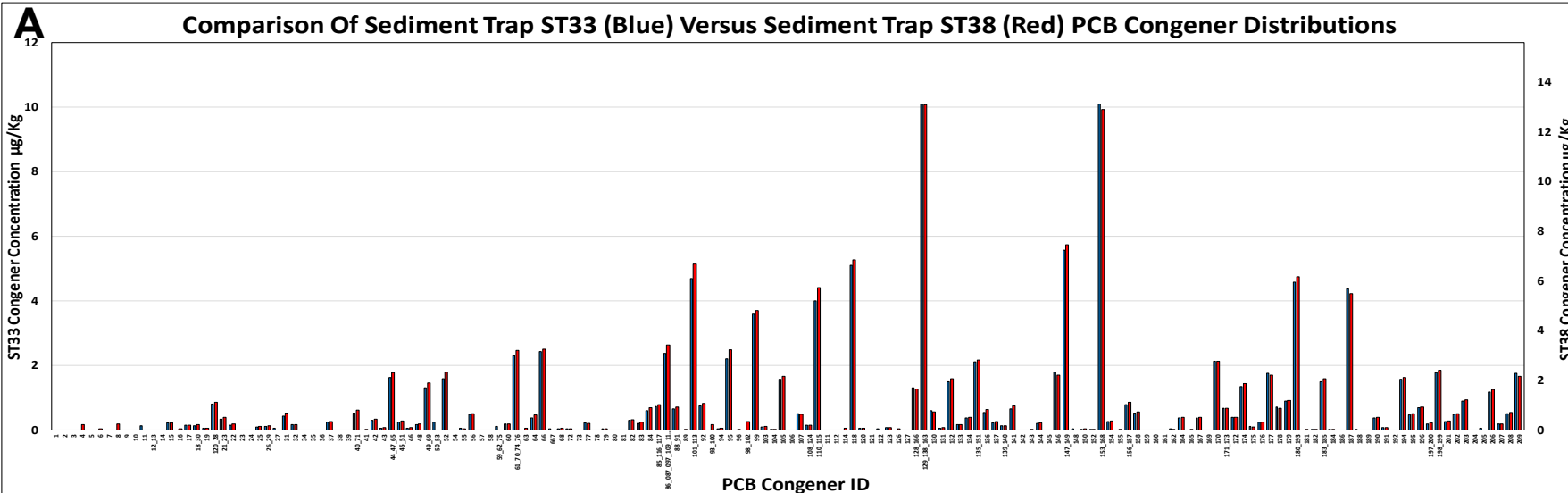
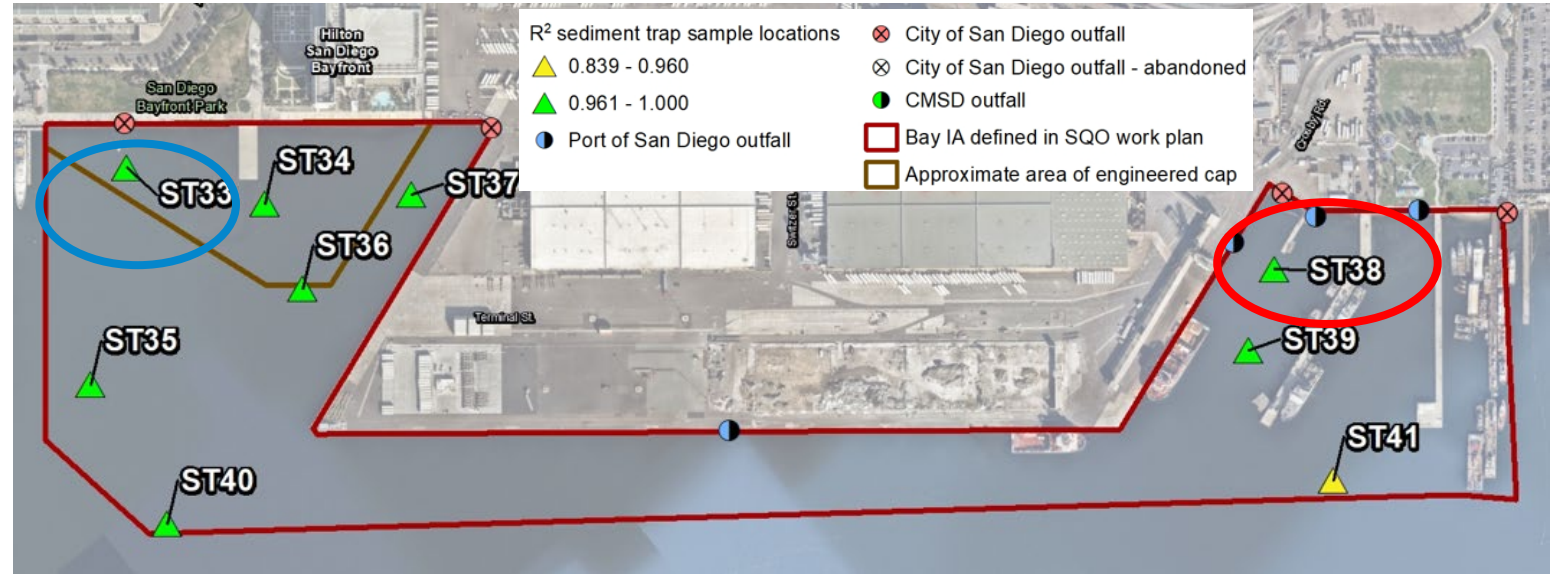
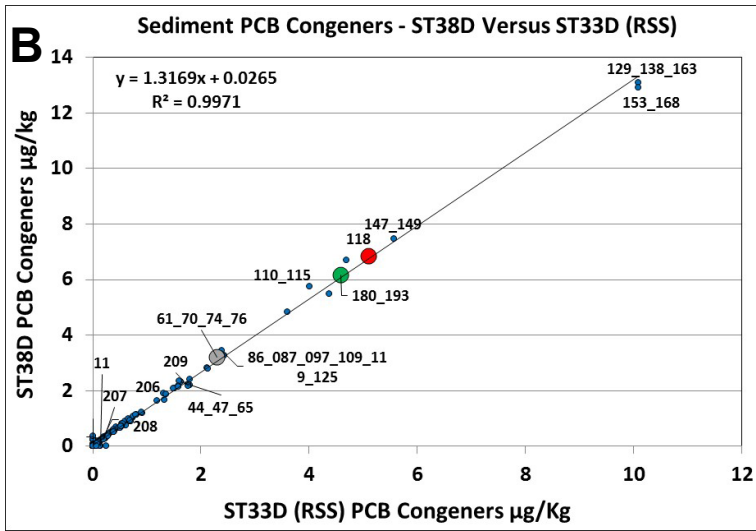


- Background of 5.27-5.67 µg/kg (subset of congeners), estimated 7.53 to 8.10 µg/kg (all congeners)
- Mediation at a site, Water Board used a background PCB value of zero.

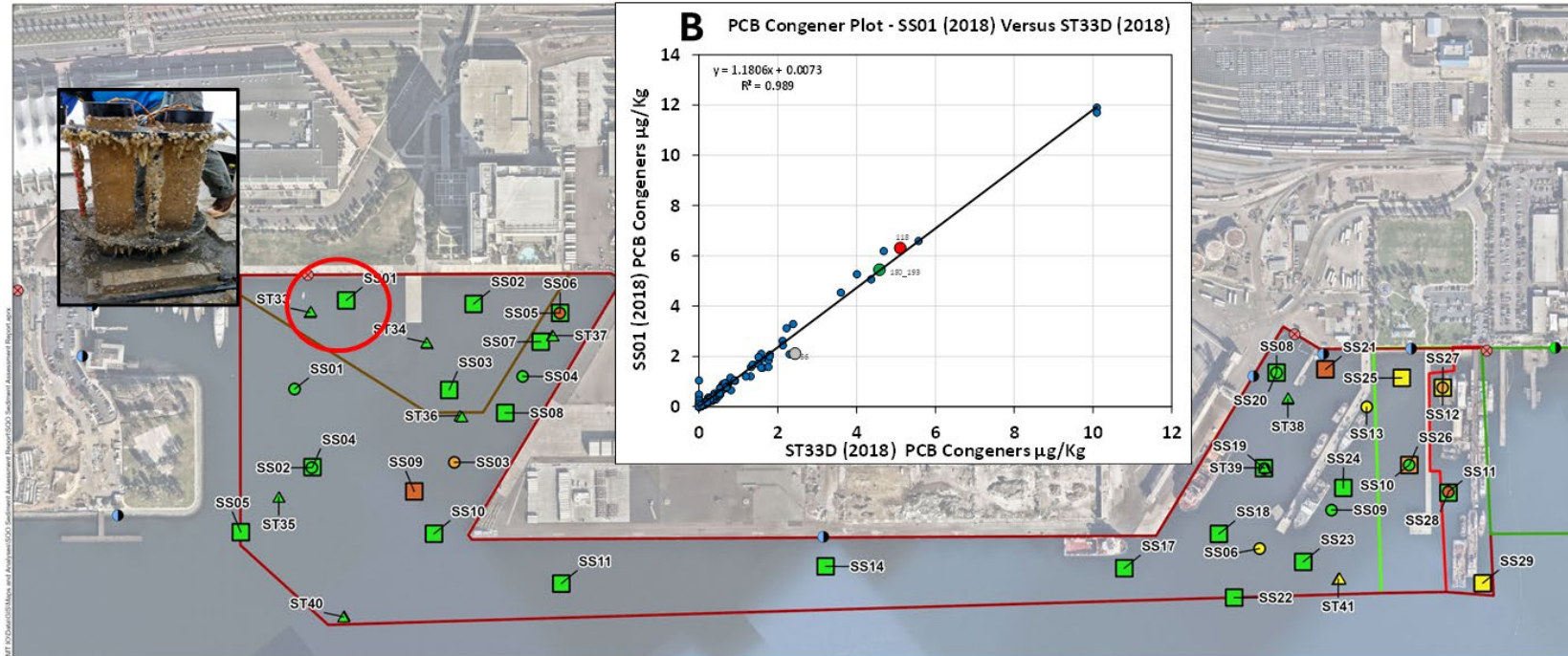
Distribution of PCBs in Surface Sediment in Relation to 8.10 $\mu\text{g}/\text{kg}$



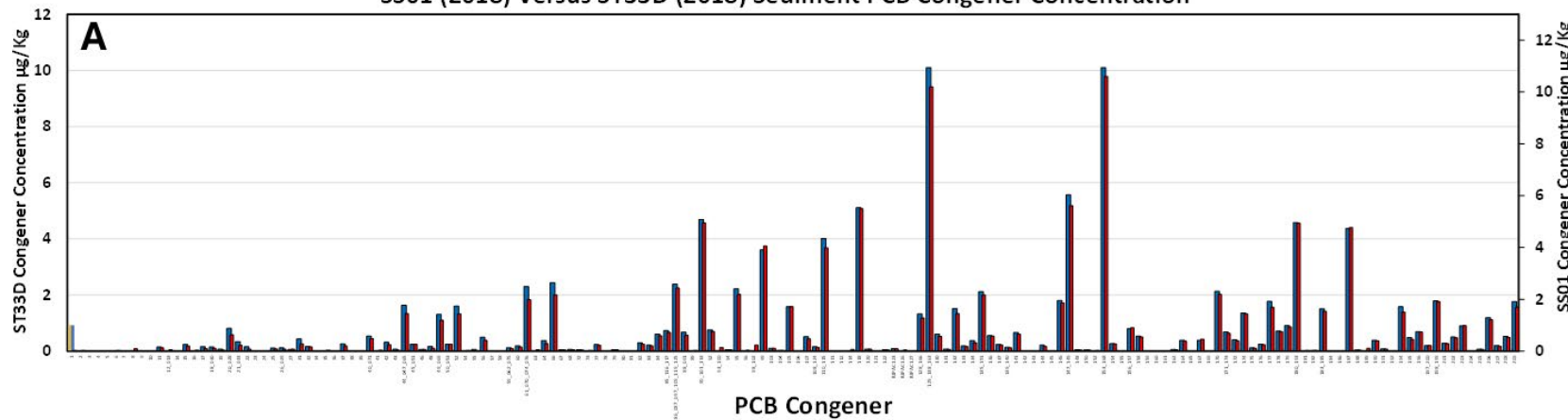
Use of Forensics to Evaluate PCB Patterns in Sediment Trap Samples



Comparison of PCB Signatures in Sediment Trap Samples to Surface Sediment



SS01 (2018) Versus ST33D (2018) Sediment PCB Congener Concentration



2018 and 2023 Total PCB Concentrations and Signatures in Surface Sediment Relative to RSS



Prepared by: address: 352005; by: 08/14/2024; of: San Diego; Title: T24M7 - PCBs in Sediment Assessment of Bay (SSO) Sediment Assessment Report.doc

San Diego Bay

Miss inch resolution aerial imagery for San Diego County from fall 2019.

- | | | | |
|---|--|---|---|
| <ul style="list-style-type: none"> ● Port of San Diego outfall ⊗ City of San Diego outfall ⊗ City of San Diego outfall - abandoned ● CMSD outfall ■ CMSD investigation area ■ Bay IA defined in SQO work plan ■ Approximate area of engineered cap | <ul style="list-style-type: none"> ■ Cesar Chavez Park in-water boundary ■ Pacific Maritime Freight in-water boundary ○ 2023 Sample location □ 2018 Sample location PCB Congeners ST33 R² Values Sediment depth: 0 - 5 cm ● > 0.960 and ≤ 1.000 | <ul style="list-style-type: none"> ● > 0.838 and ≤ 0.960 ● > 0.686 and ≤ 0.838 ● > 0.464 and ≤ 0.686 ● > 0.000 and ≤ 0.464 Total PCB Congeners (ug/kg dw) ■ > 910 µg/kg and ≤ 1490 µg/kg (max) | <ul style="list-style-type: none"> ■ > 780 µg/kg and ≤ 910 µg/kg (ave sed trap x 6) ■ > 520 µg/kg and ≤ 780 µg/kg (ave sed trap x 5) ■ > 390 µg/kg and ≤ 520 µg/kg (ave sed trap x 4) ■ > 180 µg/kg and ≤ 390 µg/kg (ave sed trap x 3) ■ > 130 µg/kg and ≤ 180 µg/kg (sed trap max) ■ ≤ 130 µg/kg (ave sed trap) |
|---|--|---|---|



Conclusions



Recommend use of sediment traps to assess site-specific recontamination potential

Offers a more accurate basis for predicting post-remedial sediment concentrations

Sets realistic expectations for long-term remediation outcomes

Thank you!



Jennifer Parker

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