Cleanup Thresholds

San Diego Shipyard Site

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On behalf of BAE Systems
Environmental Concentration Data

Current Copper Concentrations

Copper, mg/kg
Duplicate Laboratory Analyses

- **Inorganic chemicals**
  - Solids: Relative Percent Difference <20% (or <35%)

- **Organic chemicals**
  - Solids: Relative Percent Difference <19-50%
Accounting for Uncertainty During Post-Remedy Sampling

• For a sample: 120% of background
• For the site: upper confidence limit of the SWAC-based ACL
EPA Guidance on Background Comparisons

The action level for background comparisons is the largest value of the difference in means that is acceptable to the decision maker.

It is necessary to specify a gray region...because the decision may be “too close to call” due to uncertainty...

Dredging Results at BAE Systems

- Dry dock sump dredged
- Partially in cleanup area
- Dredged to < 120% background
- Result: All COCs were less than background
Dredging Results: Copper
Dredging Results: Mercury

![Graph showing Mercury content in different categories](image)

- **Background**
- **Background.120**
- **SWAC.ACL**
- **SWAC.trigger**

Mercury, mg/kg

0.0 0.2 0.4 0.6 0.8
Dredging Results: HPAH

- Background
- Background.120
- SWAC.ACL
- SWAC.trigger
Dredging Results: PCBs

![Graph showing Total PCB values in μg/kg with different categories and thresholds.](image-url)
Dredging Results: TBT

![Graph showing TBT results](image)

- Background
- Background.120
- SWAC.ACL
- SWAC.trigger
Example: Copper, Pre-Remedy

Current Copper Concentrations

Copper, mg/kg

Background
Background.120
SWAC.ACL
SWAC.trigger
Example: Copper, Post-Remedy

Copper in Remedial Footprint At Truncated Background Distribution

Copper, mg/kg

- Background
- Background.120
- SWAC.ACL
- SWAC.trigger
- SWAC.trigger
- Post-remedial SWAC
A confidence interval can be used to make decisions… Confidence intervals are analogous to two-sided hypothesis tests. If the threshold value lies outside of the interval, then there is evidence that the population parameter differs from the threshold value. In a similar manner, confidence limits can also be related to one-sided hypothesis tests. If the threshold value lies above (below) an upper (lower) confidence bound, then there is evidence that the population parameter is less (greater) than the threshold.

Confidence Limits on the Mean

HPAH Distribution

Points

0 5000 10000 15000
HPAH, µg/kg

Point density

0 5000 10000 15000
HPAH, µg/kg

Equivalent lognormal distribution

0 5000 10000 15000
HPAH, µg/kg
Confidence Limits on the Mean

Five Samples (1)

- Samples
- Sample mean
- True mean

HPAH, µg/kg

0 5000 10000 15000
Confidence Limits on the Mean

Five Samples (2)

- Samples
- Sample mean
- True mean

HPAH, μg/kg
Confidence Limits on the Mean

Five Samples (3)

HPAH, µg/kg

- Samples
- Sample mean
- True mean
Confidence Limits on the Mean

Ten Sample Means

HPAH, μg/kg

Sample means
True mean
Summary

- Sample concentration limit of 120% of background
  - Allows for measurement variability
  - Average concentrations expected to be below background

- SWAC limit at the upper confidence limit of the ACL
  - Allows for measurement variability
  - Consistent with EPA guidance
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