East Waterway Anthropogenic Background

Group Meeting #6
Anthropogenic Background
Small Group Update

East Waterway Group

January 13, 2020

Meeting Agenda

- Large Group Meeting Series Refresher
- Small Group Meeting Series Summary
- Preliminary Anthropogenic Background (AB) Values
- Next Steps
  - AB Memorandum

Large Group Meeting Series

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Large Group Meeting Series

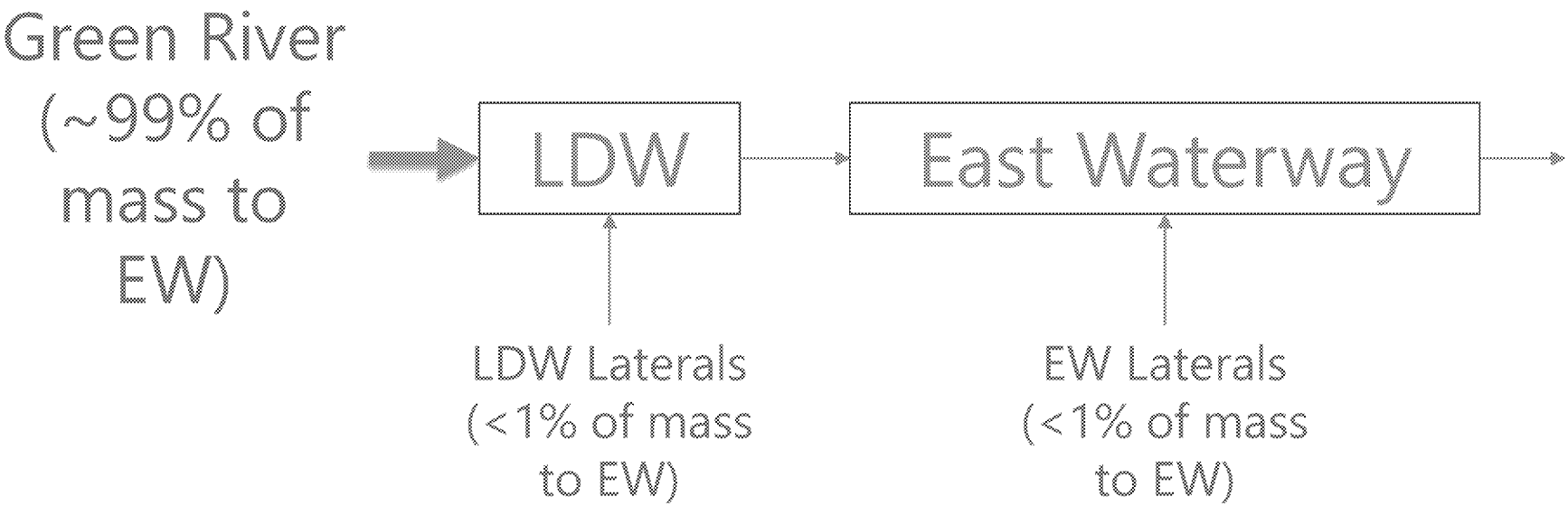
- AB Considerations and Datasets (8/12/2020)
- Supporting Information, Problem Definition, Goals and Conceptual Site Model (9/9/2020)
- Green River Datasets (9/24/2020)
- Lateral Inputs Datasets (10/7/2020)
- Data Sufficiency Determination (10/21/2020)

Large Group Meeting Outcome

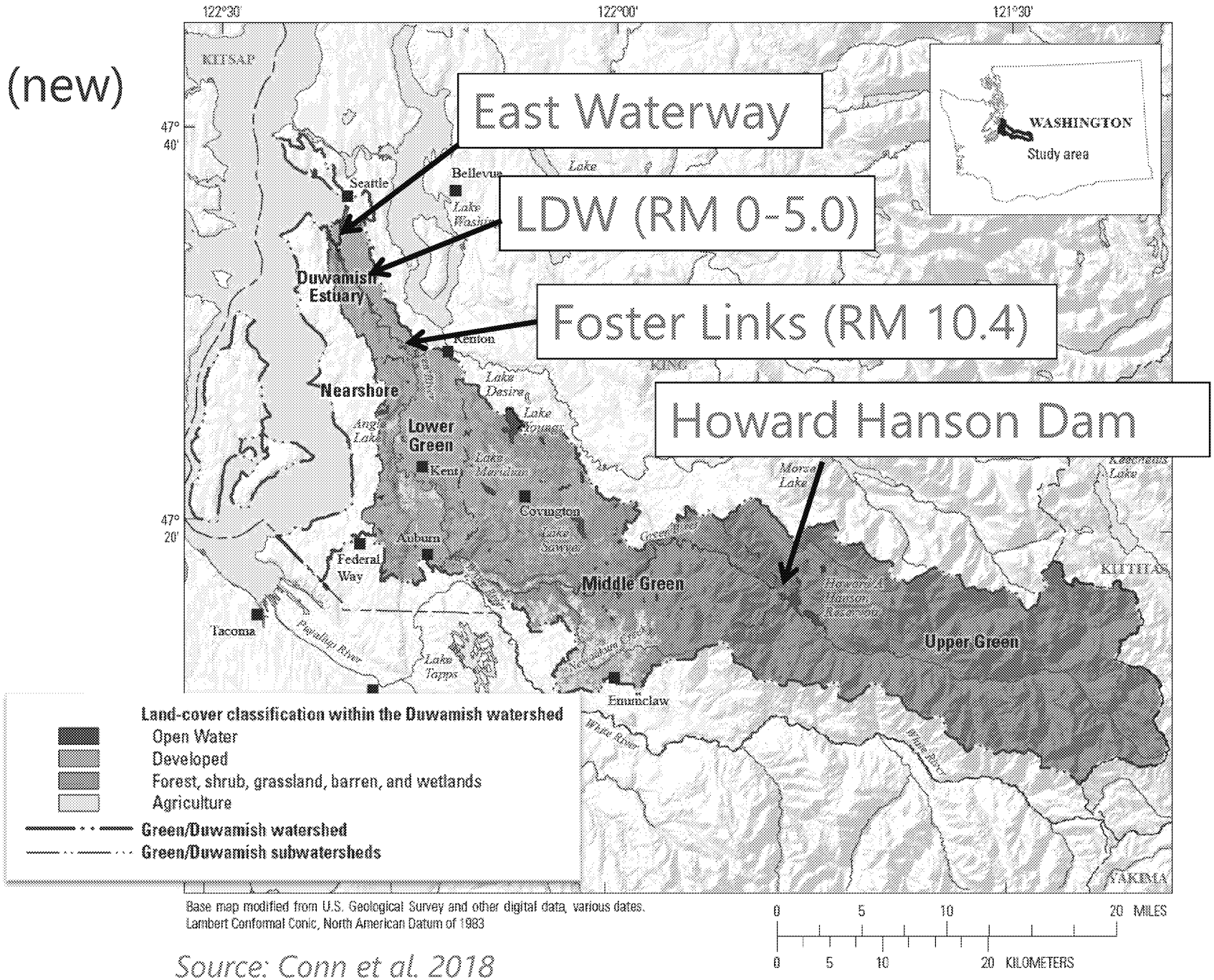
- Data are sufficient to move forward with AB determination using upstream Green River suspended solids data collected at Foster Links Golf Course
- Data selection, AB calculation, and uncertainties will be documented in the AB technical memorandum
- Small breakout focus group formed to work through the details and calculations protocols of the AB analysis for the suspended solids data

Conceptual Site Model (new)

- Net sediment deposition rate = 1.2 cm/yr
  - >99% of sediment entering EW are silts and clays
- 20% to 33% of incoming sediment deposits in the EW
- 67% to 76% of EW lateral input solids deposit in the EW



(new)



Source: Conn et al. 2018

Small Group Meetings

Suspended Solids Dataset Topics

- PCB Aroclors
- Sediment trap samples
- Total PCB summing method
- Dioxin/furan congeners
- Outliers
- Data weighting
  - Grainsize adjustments
  - River flow and precipitation conditions

Total PCB Aroclors

- Total PCB Aroclors were screened out of the dataset
- All but seven Aroclor samples were also analyzed for congeners
- Screening out PCB Aroclors did not impact AB statistics
  - Sufficient sample counts for total PCB congeners allowed consideration of dropping Aroclor results
  - Total PCB Aroclor distributions were similar to total PCB congener distributions; therefore, excluding total PCB Aroclor data had little effect on summary statistics
- Greater detection sensitivity for congeners. Some samples had no Aroclors detected (at very low concentrations).
- PCB Aroclors will be included in sensitivity analysis

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Suspended Solids Sampling Methods

- Sediment trap data are biased low compared to centrifuge and filter solids due to high sand content
- Sediment traps were screened out from the AB dataset
- Sediment traps will be included in the sensitivity analysis

Sample Summing for Total PCBs

- Not all congeners are detected in all samples
- Non-detect (ND) values need to be specified during sample summing for total PCB congeners
- Multiple ND treatments were compared (Kaplan-Meier summing, 0x, 0.5x, 1.0x ND report value)
- Total PCB statistics were not sensitive to any non-detect treatment
- ND = 0 selected for non-detected PCB congeners when summing total PCBs for each sample

Non-Detect Treatment For Dioxin/Furan Congener Means and 95% UCLs

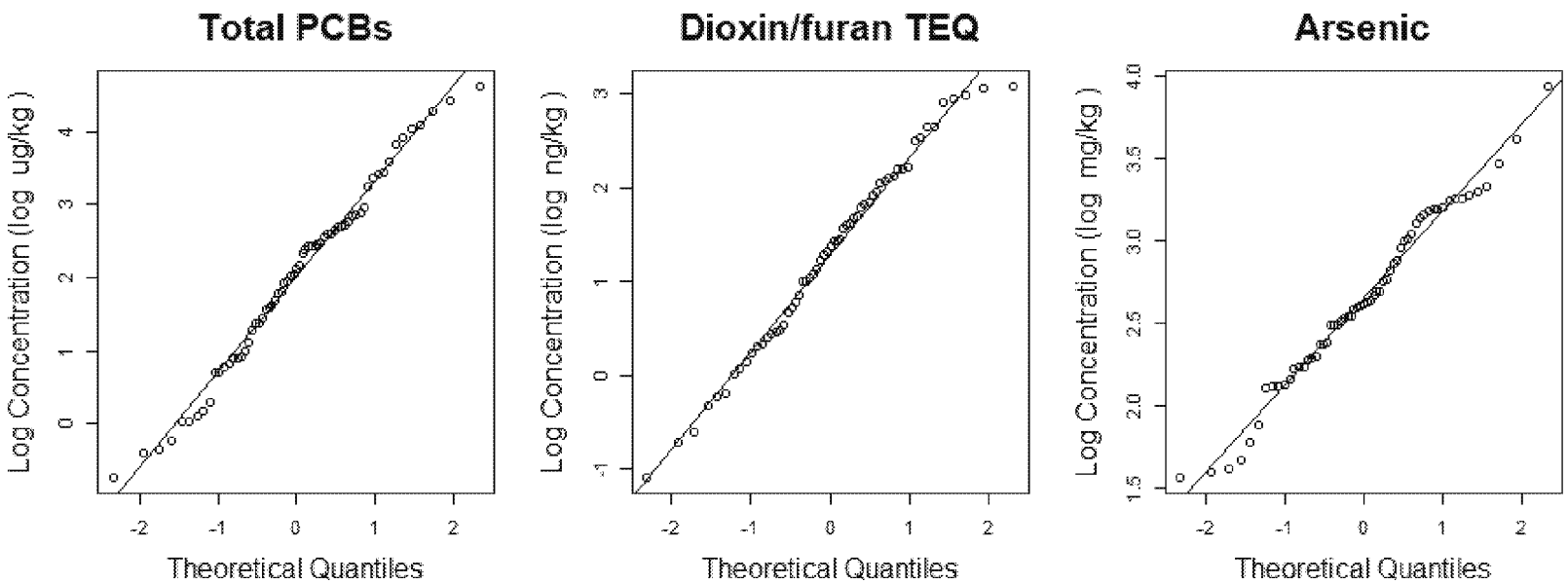
- Some samples are ND for some dioxin/furan congeners
- ND values need to be specified to compute population statistics
- Multiple ND treatments were compared (Kaplan Meier, 0x, 0.5x, 1.0x ND report value)
- Dataset was not sensitive to any ND treatment

Dioxins/Furans

- EPA intends to use congener-specific AB values
  - Small Group developed AB values for a subset of four D/F congeners
  - 2,3,7,8-TCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDD; 2,3,4,7,8-PeCDF
  - These are the most significant contributors of site D/F seafood consumption risk
- EWG prefers presenting AB as ~~a~~ toxic equivalents (TEQ) to match use throughout the RI/FS
- The small group agreed that D/F TEQ will also be calculated for comparison to RI/FS analyses (remedial action levels [RALs], risk-based threshold concentrations [RBTCs], risk estimates, maps of D/F data)

Outliers

- The suspended solids dataset was analyzed for potential outliers
- Concentrations fit a log-normal distribution (including highest)
- Highest concentrations were consistent with the Green River CSM (river flow and precipitation conditions)
- No outliers were identified; all data were retained



Grain Size Adjustments for Organics

- Organic contaminant concentrations correlate to grain size based on known relationships to organic carbon and grain size, consistent with Green River bedded sediment data
- Green River suspended solid samples have a higher percentage of sand compared to fine-grained sediment entering the EW, resulting in a low bias in the dataset
- Multiple methods were explored for adjusting for grain size:
  a) Fines normalization
  b) Screening out samples with low fines
  c) Particle surface-area weighting
- Group decided on fines normalization for organic contaminants. Other adjustments will be part of the sensitivity analysis.

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River Flow and Precipitation Weighting

- Suspended solids concentrations vary with river flow and precipitation conditions
- Flow and precipitation weighting was explored to adjust for different river conditions
- Weighting was not selected for AB estimation
  - Uneven sample numbers per river weighting condition increases uncertainty
  - The river flow and precipitation weighting will be included in sensitivity analysis

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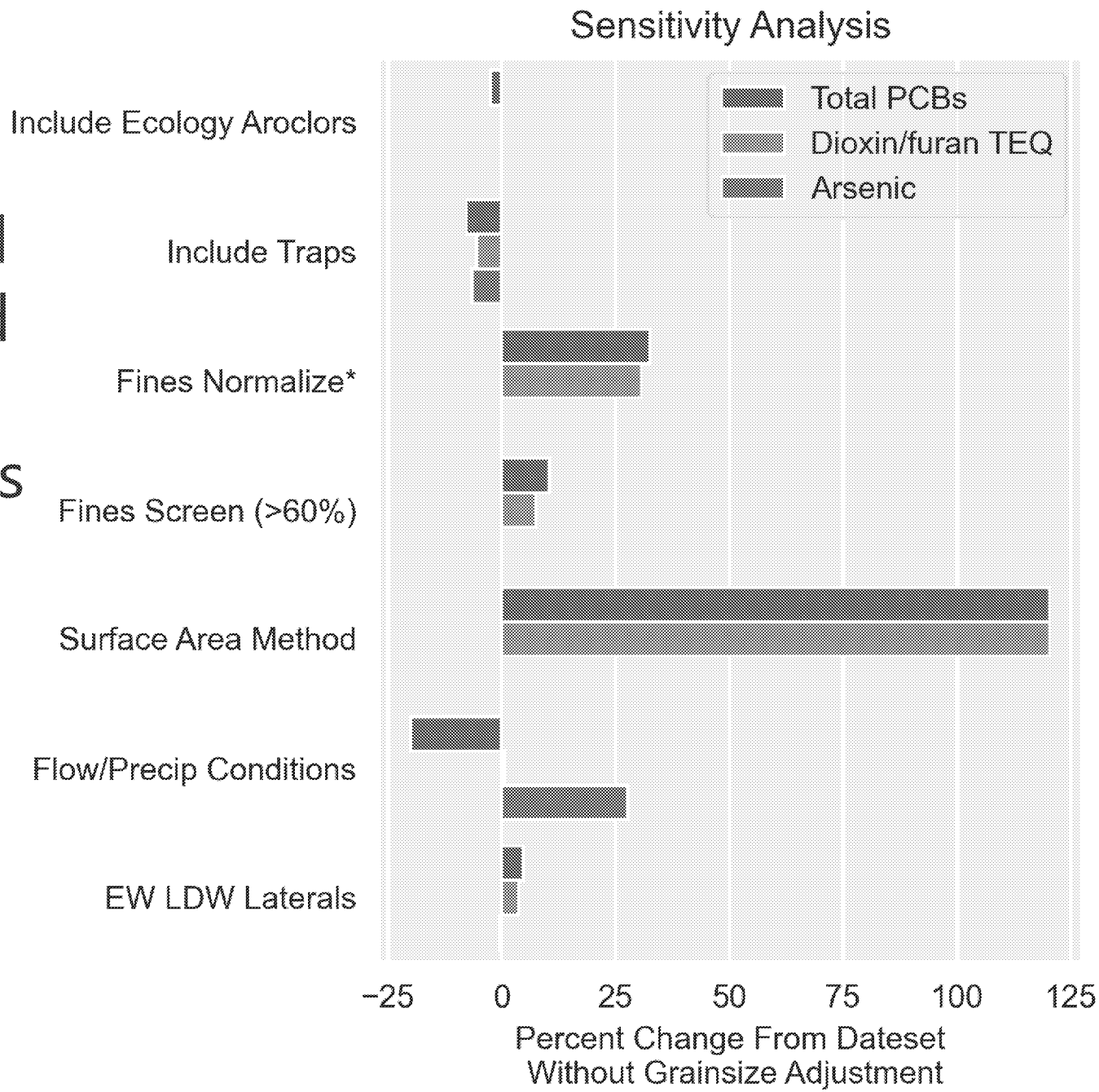
Arsenic

- Green River suspended solids data are generally representative of material entering the EW
- Average bedded sediment concentrations in East Waterway are lower than Green River suspended solids concentrations likely due to post-depositional biogeochemical processes
- Biogeochemical reactions can result in the release of arsenic from anaerobic sediment following deposition
- Green River arsenic concentrations are influenced by natural geogenic sources
- Arsenic AB will be based on suspended solids; additional lines of evidence in the uncertainty discussion will acknowledge a high bias in AB value.

Sensitivity Analysis Based on Unadjusted Average Concentrations



- AB for Total PCBs and dioxins/furans will be the fines normalized concentrations

Draft AB Values

Chemical	Unit	Detect	Mean	95% UCL
Total PCBs	ug/kg	49/49	22.6	29.3
Arsenic	mg/kg	52/52	17.2	19.3
1,2,3,7,8-PeCDD	ng/kg	46/54	1.7	2.1
2,3,4,7,8-PeCDF	ng/kg	45/54	1.0	1.2
2,3,7,8-TCDD	ng/kg	42/54	0.61	0.72
2,3,7,8-TCDF	ng/kg	46/54	0.96	1.2
Dioxin/Furan TEQ	ng/kg	54/54	8.0	9.7

Next Steps

1. EWG develop Technical Memo
2. Draft Technical Memo to EPA in February