

# APPENDIX F: DATA MANAGEMENT

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*Lower Duwamish Waterway Group*

*Port of Seattle / City of Seattle / King County / The Boeing Company*



Juvenile Chinook Data Report

## LABORATORY REPLICATES

Chemical concentrations obtained from the analysis of laboratory duplicates or replicates (two or more analyses done on the same sample) were averaged for a closer representation of the "true" concentration compared to the results of a single analysis. Averaging rules were dependent on whether the result was a "detect" or "non-detect." If all concentrations were detects for a given parameter, the values were simply averaged arithmetically. If all concentrations were undetected for a given parameter, the minimum detection limit was reported as the "average." If the concentrations are a mixture of detects and non-detects, the detection limit for the non-detect is compared to the detected concentration. If the detection limit is higher than the detected concentration, only the detected concentration is used and the result is considered a "detect." If the detection limit is equal to or lower than the detected concentration, the two results are arithmetically averaged using the full value for the non-detect. Table F-1 illustrates the four cases with example data.

Identical data averaging rules were applied to calculations of mean concentrations for groups of field samples reported in Section 4 of this data report.

**Table F-1. Example calculations**

CHEMICAL	CONCENTRATION 1	CONCENTRATION 2	AVERAGE CONCENTRATION
Lead	50	40	45
Hexachlorobenzene	10 U	20 U	10 U
Toxaphene	0.50	5.0 U	0.50
Mercury	0.50	0.40 U	0.45

U represents a non-detect concentration

## SIGNIFICANT FIGURES AND ROUNDING

The laboratory typically reports results with 2 or 3 significant figures depending on the instrument. Examples are shown in Table F-2.

**Table F-2. Examples of different numbers of significant figures**

2 SIGNIFICANT FIGURES	3 SIGNIFICANT FIGURES
19	19.1
120	122
3,500	3,550

When a calculation involves addition, such as totaling PCBs or PAHs, the calculation can only be as precise as the least precise number that went into the calculation.

Example (assuming 2 significant figures):

$210+19=229$ , but this would be reported as 230 because the trailing zero in the number 210 is not significant.

When a calculation involves multiplication or division, such as when carbon normalizing, all significant figures are carried through the calculation and then the total result is rounded at the end of the calculation to reflect the value used in the calculation with the fewest significant figures. Example:

$59.9 \times 1.2 = 71.88$ , to be reported as 72 because there are 2 significant figures in the number 1.2

When rounding, if the number following the last significant figure is less than 5, the digit is left unchanged. If the number following the last significant figure is equal to or greater than 5, the digit is increased by 1.

## CALCULATING TOTALS

Concentrations for several analyte sums were calculated as follows:

- ◆ **Total PCBs** were calculated using only detected values for 7 Aroclor mixtures<sup>1</sup> in accordance with Ecology's Sediment Management Standards. For individual samples in which none of the 7 Aroclor mixtures were detected, total PCBs were given a value equal to the highest detection limit of the seven Aroclors and assigned a "U" qualifier indicating the lack of detected concentrations.
- ◆ **Total LPAHs, HPAHs, alkylated PAHs, and benzofluoranthenes** were calculated as follows. Total LPAHs are the sum of detected concentrations for naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. Total HPAHs are the sum of detected concentrations for fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3,-c,d)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene<sup>3</sup>. Total non-alkylated PAHs, are the sum of LPAHs and HPAHs. Total alkylated PAHs represent the sum of detected concentrations for 1-methylnaphthalene, 2-methylnaphthalene, C2-naphthalenes, C3-naphthalenes, C4-naphthalenes, C1-fluorenes, C2-fluorenes, C3-fluorenes, C1-dibenzothiophenes, C2-dibenzothiophenes, C3-dibenzothiophenes, C1-phenanthrenes/anthracenes, C2-phenanthrenes/anthracenes, C3-phenanthrenes/anthracenes, C4-phenanthrenes/anthracenes, C1-fluoranthenes/pyrenes, C1-chrysenes, C2-chrysenes, C3-chrysenes, and C4-chrysenes. For samples in which all individual compounds within any of the groups described above were undetected, the single highest detection limit for that sample represents the sum.
- ◆ **Total DDTs** were calculated using only detected values for the six DDT isomers: 2,4'-DDD, 2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. For individual samples in which none of the isomers were detected, total DDTs were given a value equal to the highest detection limit of the six isomers and assigned a "U" qualifier indicating the lack of detected concentrations.

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<sup>1</sup> Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260