

Data Gaps and Recommendations

This section identifies data gaps that were identified based on the results of the Phase I Fish Tissue Sampling and makes recommendations for obtaining additional information to fill the data gaps. The evaluation approach described in this report was intended to facilitate information sharing, communicate preliminary Phase I findings, and provide context for subsequent RI/FS scoping documents and work plans to be prepared by Teck Cominco. Given this, the evaluation was not intended to be a comprehensive analysis of the Phase I data. The following subsections discuss gaps in the data evaluation methods and the data obtained.

4.1 Gaps in Data Analysis

Several areas of analysis are considered data gaps that need to be or should be filled during the subsequent RI/FS analysis. They include the treatment of PCB congener results, arsenic speciation, spatial aggregation of data, statistical comparison of data, and normalization of the data.

4.1.1 PCB Congeners

Because of funding limitations and the high cost of analysis the study design limited PCB congener analysis to a subset (i.e., approximately 20 percent) of the samples. The objective was to quantify concentrations of PCB congeners within our constraints and to determine if it was feasible to focus future analysis on a subset of the most frequently detected congeners and the co-planar congeners known to be most toxic. Because of the limited number of PCB congener results available at the time this Data Evaluation Report was prepared, a detailed presentation of the results was not undertaken. Additional collection of fish tissue for PCB and/or alternative analyses are at this time considered data gaps that must be filled as part of the human health and ecological risk assessments.

4.1.2 Arsenic Speciation

Because of funding limitations and the high cost of analysis, the study design limited arsenic speciation analysis to a subset (i.e., approximately 20 percent) of the samples and many of those analyses failed to meet our Analytical Concentration Goals causing the majority of samples to be non-detect or otherwise qualified as estimated values. Consequently, additional collection of fish tissue for arsenic speciation analyses using a more sensitive analytical method are at this time considered data gaps that should be filled as part of the human health and ecological risk assessments.

4.1.3 Spatial Aggregation of Data

The study design focused on six locations spaced throughout the 150-mile length of the study area for sampling and analysis. The study was designed to allow for the six locations to be aggregated into three reaches for statistical analysis. The analysis presented is based

on that study design, and is not as comprehensive an analysis as the fish tissue data might undergo. The need for additional and/or alternative sampling locations and the application of additional data evaluation approaches are at this time considered potential data gaps that will be filled as part of the human health and ecological risk assessments if identified as a data need during future planning efforts.

4.1.3 Statistical Comparisons

The statistical comparisons presented in this report were intended to present the picture of the nature and extent of PCOIs in the target fish species in the UCR. In addition, the comparisons were intended to analyze the data relative to the secondary objectives described in Section 1. As stated above, the analysis presented in this report is based on the study design. A more comprehensive analysis of the fish tissue data is considered a data gap that will be filled as necessary to evaluate human health and ecological risk.

4.1.4 Normalization of Data

The Phase I Fish Tissue data were presented and evaluated on a wet weight basis. The use of alternative methods, such as presentation on a lipid basis, may aid in the interpretation of the data for lipophilic contaminants (e.g., PCBs). Additional and/or alternative analyses of the data (e.g., adjusting comparisons by normalizing to size, age, or sex) are at this time considered data gaps that will be filled as part of the UCR human health and ecological risk assessment.

4.2 Gaps in Data Obtained

The Phase I fish tissue study was intended as the first phase of an investigation of contaminants in biota within the UCR site. Collection of additional and/or alternative data was beyond the scope of the Phase I fish tissue study and is a data gap requiring further analysis. These data gaps should be filled as part of the UCR human health and ecological risk assessments if a need is identified during future planning efforts. Additional data that will support the evaluation of human health and ecological risk include additional sample locations, additional target species, expanded fish sizes, sampling individual fish, an expanded analyte list, further investigation of the potential effects of gut contents on largescale sucker whole body measurements, and measurements of temporal trends in fish tissue concentrations.

4.2.1 Sample Locations

The number and placement of FSCAs were selected to try to maximize the utility of the data relative to the stated objectives of the Phase I study. It was anticipated that, based on the Phase I results, additional and/or alternative sampling and analysis programs would be required. At this time, the spatial distribution and number of fish tissue sample locations are considered data gaps requiring further evaluation.

In addition, the results of the current study suggest that exposure to mercury and 2,3,7,8 TCDF is greatest in the more lake-like portion of the UCR. The source of exposure is undefined, but is some combination of the water column, sediment, and the food web. If the risk and public health analysis indicates the need for risk reduction due to these

contaminants, a better understanding of the portioning of these contaminants in the potential exposure media will be required to assess the effectiveness of risk reduction options.

4.2.2 Target Species

By necessity, the Phase I fish tissue study focused on target species that were chosen to represent key species in the UCR fish community, and various potential exposure pathways. The issue of whether the results from the current study could or should be applied to other species needs further evaluation. The results seen in the largescale sucker suggest that the potential for exposure to all contaminants appears to be particularly high for bottom-feeding species. Piscivorous species, such as walleye and burbot, also have higher potential for exposure to certain bioaccumulative contaminants. This suggests that the white sturgeon may have a uniquely great exposure potential because they feed from both the water column and bottom organisms. Given the status of the white sturgeon population in the UCR, tissue studies should also be designed and implemented to determine the concentration of contaminants in various size classes of white sturgeon.

The white sturgeon was considered as a candidate target species during the development of the Phase I study design, but because of the sensitive nature of the white sturgeon population in Lake Roosevelt, nontraditional methods for collection of tissue samples were considered necessary. Given the timing of the field effort, it was not possible to develop appropriate sampling methods and include the white sturgeon as a target species during the Phase I sampling. Tissue contaminant analysis and toxicological studies involving the white sturgeon are at this time considered data gaps that will be filled as part of the human health and ecological risk assessments.

4.2.3 Fish Size

As with the selection of sample locations, the target size range was selected to try to maximize the utility of the data relative to the stated objectives of the Phase I study. It was anticipated that, based on the results, additional or alternative sampling and analyses would be required. At this time, the lack of data on smaller size classes of the target species and, to a lesser extent, the lack of data on smaller forage species (e.g., dace and sculpin) are considered data gaps that will be filled as part of the ecological risk assessment.

4.2.4 Use of Composite Samples

A compositing approach to sampling precludes measurement of contaminant concentrations in individual fish and the calculation of certain measures of central tendency. However, the variance of the individuals around the mean concentration for the population could be estimated based on the composite scheme used. Compositing was selected to maximize the number of fish submitted to the laboratory for analysis. It was anticipated that, based on the results, additional and/or alternative sampling and analyses would be required. Use of measures of individual fish to improve estimates of the spread in the data is considered a potential data gap that may be filled as part of the human health and ecological risk assessments.

4.2.5 Target Analytes

The preliminary target analytes were selected based on historical data and were intended to maximize the utility of the data, within project constraints, relative to the stated objectives of the Phase I study. Other potential contaminants of concern, such as pesticides, polycyclic aromatic hydrocarbons (PAHs), Teck Cominco discharged wastes (including specialty metals such as indium, germanium, etc.), and fire retardants in fish tissue are considered potential data gaps at this time that will be filled as part of the UCR ecological risk assessment.

4.2.6 Largescale Sucker Gut Analysis

The decision to conduct the largescale sucker gut analysis was made in response to unforeseen field observations of significant amounts of slag in the gut of this species, and in recognition of the potential role of the slag in the uncertainties of the tissue measurements and the future use of the data. This unplanned and opportunistic effort attempted to optimize the use of the samples in hand. Although this analysis is not ideal or comprehensive, it is a reasonable response to the potentially significant and unanticipated field observations.

The results of the gut/gut contents analysis demonstrates that in some areas, largescale sucker may be exposed by ingesting large quantities of sediment and slag. However, the gutless whole body results show for certain contaminants there may be correlations between slag and whole body concentrations and that contaminants found in the ingested sediment/slag may not be taken up equally. These results, in conjunction with the limited sediment/tissue relationships observed, suggest that the bioavailability of contaminants in sediment/slag may be variable. The bioavailability of contaminants needs to be better understood to assess risk from exposure, as well as the effectiveness in any risk reduction option. Additional and/or alternative analyses are at this time considered data gaps that will be filled as part of the UCR ecological risk assessment.

4.2.7 Temporal Sampling

Because of limited and non-comparable historical data, statistical analysis of temporal trends was not possible, as noted in Section 3.3.3. The Phase I fish tissue study was designed to provide baseline data for future studies investigating temporal trends of contaminants in UCR fish. In addition to the data gaps discussed, periodic fish tissue study should be repeated at approximately 5-year intervals to assess temporal trends in fish tissue contaminant concentrations. The details of the trend analysis will depend on the results of the human health risk and ecological risk assessments, as well as any remedial actions.