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Charge to Peer Reviewers
Human Health Risk Assessment (HHRA) –
Flin Flon, Manitoba and Creighton, Saskatchewan

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Problem Formulation and Supplemental Sampling (Chapters 2 and 3)

1. Comment on the adequacy of the data gap analysis and supplemental sampling. Were the appropriate types of data collected and analyses performed that are necessary to assess the extent of contamination? Did they adequately characterize the distribution and concentration of COCs in each of the media of interest?[1]
2. Were the appropriate Chemicals of Concern (COC) selected for the communities?
3. Does the conceptual model adequately demonstrate the potential human receptors and the related exposure pathways? Do the selected exposure scenarios sufficiently cover the situations, behaviors, and conditions under which receptors are likely to be exposed?
4. *In vitro* bioaccessibility testing was conducted to provide information for the soil ingestion pathway. Were the approach and results valid? Are the recommended relative absorption factors (RAFs) appropriately calculated?
5. Are there any concerns or limitations of these studies that affect the usefulness of the data in the HHRA? Do you have any further concerns or comments regarding the problem formulation or supplemental sampling?

Exposure Assessment (Section 4.1)

6. The authors evaluated the sampling data, and calculated the exposure point concentrations (EPCs) for ambient air, indoor air, drinking water, garden produce, fish, indoor dust, wild game, blueberries, surface water, and snow. Are the selected exposure point concentrations appropriate for the risk assessment?
7. Which size fraction of particulate matter and its associated metal constituents should be used to best estimate the risk associated with the ambient air exposure pathway? (Section 4.1.1.2)[2]
8. Were the best available data used to calculate appropriate background exposure values?
9. Are the selected receptor characteristics and values the most appropriate for use in this assessment? Were the assumptions and exposure input parameters appropriate and were the intake rates calculated correctly?
10. The exposure assessment predicts the rate of exposure using site-specific data and conservative assumptions. Are the exposure estimates correctly calculated?

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[1] For example - Were the appropriate major data gaps identified and have the relevant media been tested or estimated? Is there an adequate description of the sampling methodologies and did they follow a standard method? Were the methods appropriate for the communities? Do the study reports include a description of quality assurance and quality control measures for each study?

[2] Recently, the US EPA revised its National Ambient Air Quality Standard (NAAQS) for lead and discusses use of TSP (see in particular page 66988, Federal Register, Vol. 73, NO. 219, November 12, 2008, http://www.epa.gov/fedrgstr/EPA-AIR/2008/November/Day-12/a25654.pdf)

11. Was the US EPA Integrated Exposure Uptake Biokinetic Model (IEUBK) model for lead used appropriately in the HHRA?
12. Do you have any further concerns or comments regarding the exposure assessment?

Hazard Assessment (Section 4.2)

13. Were the most appropriate exposure limits or toxicological criteria selected for each of the COCs, and are the rationales for the selections defensible?
14. Was the approach used to account for bioavailability and bioaccessibility of the COCs in the various media appropriate and are the results incorporated into the HHRA appropriately?
15. Do you have any further concerns or comments regarding the hazard assessment?

Results and Risk Characterization (Chapters 5 and 6)

16. Was the approach used to estimate Concentration Ratios (CRs) and Hazard Quotients (HQs) for acute inhalation and ingestion risk, respectively, consistent with accepted risk assessment methods, and were the values calculated correctly?
17. Was the approach used to calculate the HQs and Incremental Lifetime Cancer Risks (ILCRs) for residential, outdoor workers, and recreational scenarios consistent with accepted risk assessment methods, and were these calculated correctly?
18. To assess lead exposure, the authors used the HHRA exposure model as well as the US EPA IEUBK model. Comment on the analysis and scientific defensibility of the results.
19. Soil Preliminary Remediation Goals (PRGs) and Provisional Trigger Concentrations (PTCs) were derived in Chapter 5 for the COCs. Was the approach consistent with accepted risk assessment methods and were the values calculated correctly?
20. Chapter 6 identifies and evaluates other risk issues relevant to the HHRA. Are the analyses and conclusions for these issues scientifically sound? Have the issues been appropriately considered in the overall HHRA and recommendations? Have potentially sensitive populations been adequately addressed?
21. Are there additional issues or concerns that the authors should have addressed regarding the hazard assessment, the selection of exposure limits and the appropriate use of the values in the risk assessment? Do you have additional comments regarding aspects of the risk characterization and results?

Uncertainties (Chapter 7)

22. Chapter 7 presents uncertainty and sensitivity analyses. Were all the significant sources of uncertainty identified and characterized? Were quantitative uncertainty and sensitivity analyses done correctly? Are the conclusions regarding the significance and impact of the uncertainties on the resulting assessment correct?

Conclusions and Recommendations

23. Are the conclusions for each COC valid and are they supported by the data and the risk assessment? What is the likelihood that actual health risks have been over or under estimated? Are the potential human health hazards of the COCs adequately addressed?
24. The authors discuss biomonitoring and make recommendations regarding arsenic, lead and mercury. Are these recommendations appropriate and adequately supported?
25. Have the key objectives of the HHRA been addressed by this assessment? (Section 1.3)
26. Was the approach used for this community assessment consistent with commonly accepted methods and procedures by government agencies (such as Environment Canada, Health Canada, the Canadian Council of Ministers of the Environment, and the U.S. EPA)?
27. Overall, were the input data and assumptions valid and appropriate for the Flin Flon and Creighton communities?
28. Is the Human Health Risk Assessment presented clearly and completely?
29. Are there additional important issues that should have been addressed?