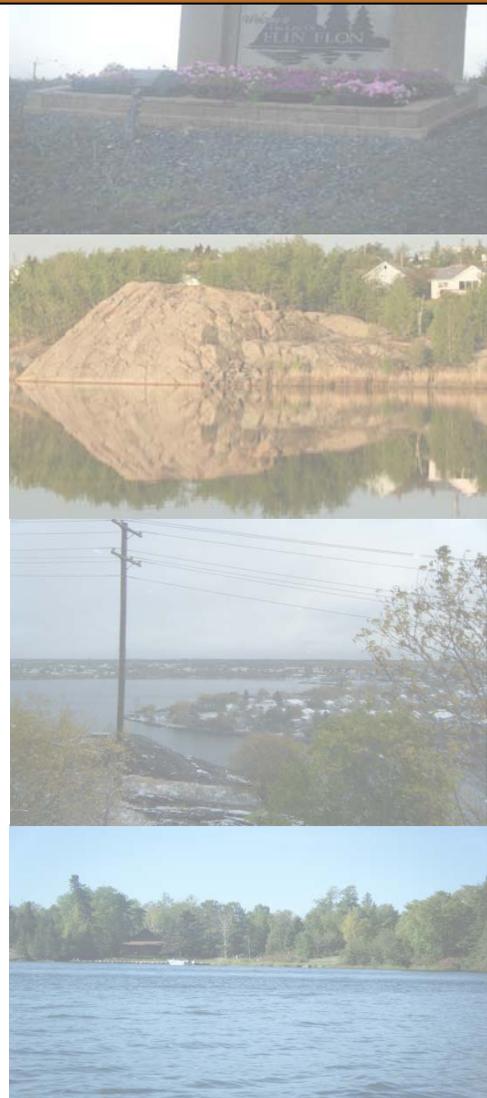


APPENDIX A

**BACKGROUND ON RECENT ENVIRONMENTAL
CONTAMINATION ISSUES IN THE FLIN FLON AREA**



Appendix A - Background on recent environmental contamination issues in Flin Flon Area

A human health risk assessment (HHRA) was conducted for Hudson Bay Mining and Smelting (HBMS) by Intrinsic Environmental Sciences Inc. (Intrinsic) to address the potential human health risks associated with exposure to smelter-related metals in soils and other environmental media in the Flin Flon and Creighton area. A Technical Advisory Committee (TAC) was formed to provide technical guidance to this process. The TAC is comprised of representatives of HBMS, Health Canada, Saskatchewan Environment, Saskatchewan Health, Manitoba Conservation, Manitoba Health, Manitoba Water Stewardship, and Manitoba Science, Technology, Energy and Mines. In addition, a Community Advisory Committee (CAC) has been established to enable HBMS, its consultants and the various collaborating agencies to obtain input and comments from members of the public, and to demonstrate how HBMS uses that input in the decision making process.

The HHRA was initiated in response to the outcome of a Manitoba Conservation soils study which indicated several metals associated with past or present atmospheric emissions of the HBMS complex were at concentrations in excess of those from a selected reference location. The primary objectives of the HHRA were as follows:

Objective 1: To assess risks to human receptors residing in Flin Flon, Manitoba and Creighton, Saskatchewan as a result of exposure to metals in soil and other environmental media impacted by the activities of the HBMS complex. The HHRA will estimate the contribution from individual exposure pathways and environmental media to assist in the development of risk management objectives; and,

Objective 2: Develop risk management objectives and/or mitigation plans if unacceptable risk levels are identified in the HHRA. These risk management plans will be based on scientific approaches in consultation with the Technical Committee and the community.

This area-wide risk assessment provides an evaluation of current metal exposures, and projected estimated risk levels into the future (*i.e.*, lifetime exposures) based on current chemical concentrations. The HHRA did not evaluate historical impacts of, or risks related to, historical metal exposures, and was not intended or designed to consider the impacts of occupational exposures on the overall health of community members. This report addresses the assessment of health risk, and provides recommendations for interim risk management measures and further study to lessen uncertainties and inform the risk management decision making process.

Human Health Risk Assessment Methods

An HHRA is a scientific study that evaluates the potential for the occurrence of adverse health effects from exposures of people (receptors) to chemicals of concern (COC) present in surrounding environmental media (*e.g.*, air, soil, sediment, surface water, groundwater, food and biota, *etc.*), under existing or predicted exposure conditions. Calculations of the potential risk (*i.e.*, the chance or likelihood that a particular event will occur) that a given population will experience adverse health effects from exposure to COC are based on mathematical models. Although risk predictions are typically based on real environmental data, the risk predictions are theoretical because they are calculated using models and assumptions about the population and their exposure to environmental chemicals.

It is acknowledged that the various uncertainties associated with the HHRA process have the potential to influence estimates of exposure and risk. The methods and assumptions used in this HHRA were designed to be conservative (*i.e.*, health protective), and have a built-in tendency to overestimate, rather than underestimate, potential health risks.

The Flin Flon HHRA was conducted in general accordance with regulatory guidance provided by Health Canada, the U.S. EPA, the Ontario Ministry of the Environment, and the Canadian Council of Ministers of the Environment (CCME). While many of the elements of an area-wide assessment have their roots in the approaches used to evaluate risk on a site-specific basis, it is important to note that there is limited guidance available governing area-wide risk assessment in Canada.

A three-phased approach was applied to the HHRA to ensure it proceeded in a logical and sequential manner, and allowed for unresolved issues or major uncertainties to be addressed as they were identified. The process consisted of a Literature Review, Data Gap Analysis and Supplemental Sampling phase, a Problem Formulation phase, and finally, the detailed HHRA.