

CANTOX ENVIRONMENTAL

DELORO VILLAGE EXPOSURE ASSESSMENT AND HEALTH RISK CHARACTERIZATION FOR ARSENIC AND OTHER METALS

PART 1 - INTRODUCTION

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INTRODUCTION****Table of Contents**

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PART 1 INTRODUCTION

1.0 INTRODUCTION

The Village of Deloro, located on the Moira River in southeastern Ontario, approximately 40 km north of Belleville, is the focus of an extensive risk assessment and remediation effort by the Ontario Ministry of the Environment (OMOE). The village is located along the property line of a former mine and refinery, and is home to a population of 140 people (40 of which are children) in 65 residences. Contamination of the former Deloro mine site and the vicinity is the result of a century of refining various ores from mines in the vicinity as well as from other mines in Northern Ontario. In addition, radioactive slag was imported to Deloro from Eldorado Nuclear. The mine site and refinery were abandoned in the 1960s. The current effort is aimed at quantifying and mitigating exposures and risks to the residents of Deloro which are associated with the contamination of the former mine site by heavy metals and radiological agents and the subsequent emission of contaminants from the site via liberation of dusts, volatilization, and/or leaching into the Moira River watershed.

The OMOE has conducted a screening level risk assessment on the contaminated soils of the village of Deloro, and have identified several heavy metals (arsenic, cobalt, lead, nickel, and silver) as well as radiological agents as being of potential health concern to residents.

Under the leadership of OMOE and CH2M Gore & Storrie Limited (CGS), a multidisciplinary approach has been adopted to characterize the media-specific concentrations of chemicals of concern in Deloro Village, to assess the exposures experienced by Deloro residents (both through exposure modelling and through biological monitoring), and to determine potential risks to the residents, based on these parameters. CANTOX ENVIRONMENTAL INC. has been requested to conduct an exposure assessment and health risk characterization for the residents of Deloro, Ontario, based on concentrations of arsenic and the other metals of potential concern in media (air, drinking water, soil, food) throughout the village. For the purposes of this assessment, the former mine was considered to be the "site", and the current assessment was conducted for off-site exposures experienced by individuals dwelling in the vicinity of the former mine, but without routine access to the mine site; although occasion visits onto the site were considered.

The exposure assessment and risk characterization was conducted in compliance with the risk assessment procedures endorsed by regulatory agencies including the Ontario Ministry of the Environment (OMOE, 1997), Health Canada, and the United States Environmental Protection Agency (U.S. EPA, 1989). In addition to ongoing communications with OMOE personnel specifically in regard to this assessment, past experience with the Standards Development Branch of the OMOE was considered during the methods development stage of this assessment, in order to ensure compliance with all regulations governing the use of risk assessment in Ontario.

The objectives of this assessment were as follows:

- (i) to review the exposures and/or risks posed to the public in the vicinity of other mining or smelting operations in North America;
- (ii) to review the sources and levels of exposure of chemicals of concern to typical Ontarians, including home grown and market basket foods, soils, drinking water, and air;
- (iii) to determine if the concentrations of arsenic and the other metals of concern in various media in Deloro would pose a risk of adverse health effects for adults and children dwelling in the village, and to compare results to exposures in other mining/smelter areas as well as exposures of typical Ontario residents;
- (iv) to compare the results of exposure assessment to those of biological monitoring efforts (specifically urinary arsenic determinations); and,
- (v) review various options of exposure and risk mitigation and make estimates of possible risk reductions.

The following report details the exposure and risk assessment for the residents of the village of Deloro. Part 2 of this report provides a general methodology for exposure, toxicological and risk assessment as well as uncertainty and sensitivity analysis. Part 3 contains a comprehensive review of arsenic exposures experienced near mining/smelting operations and by typical Ontario residents. Part 4 presents comprehensive toxicological reviews for each of the chemicals of concern. Part 5 provides the specific methodologies, results and discussion of the risk assessment and the urinary arsenic modelling efforts. Part 6 presents overall conclusions of this report, together with recommendations regarding future activities. Receptor parameters, environmental concentrations and detailed results are provided in Appendices A, B, and C, respectively. Appendix D provides the expert peer review comments and CANTOX ENVIRONMENTAL's response to the peer review.

2.0 REFERENCES

- OMOE. 1997. Guidance on Site Specific Risk Assessment for Use at Contaminated Sites in Ontario. Ontario Ministry of the Environment, Standards Development Branch, May, 1996; updated April, 1997.
- U.S. EPA. 1989a. Risk Assessment Guidance for Superfund. Volume 1. Human Health Evaluation Manual. Part A. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Office of Solid Waste and Emergency Response, Office of Research and Development, Washington, D.C.