



Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health

INTRODUCTION

This chapter is divided into three sections: (1) the Canadian soil quality guidelines recommended by the CCME, (2) a summary of the protocol used to derive these guidelines, and (3) general guidance for the development of site-specific soil quality remediation objectives. Development of the soil quality guidelines and related documents was initiated through the National Contaminated Sites Remediation Program (NCSRP), which was officially sunsetted in March 1995. Given the need for national soil quality guidelines suitable for use in contaminated site management and many other applications, the CCME Soil Quality Guidelines Task Group directed the development of guidelines after the sunsetting of the NCSRP.

In the first section of this chapter, soil quality guidelines are presented on a chemical-by-chemical basis in a summarized fact sheet format. These fact sheets provide general information (e.g., background information, fate and behaviour, and toxicity) for each chemical, as well as the actual recommended Canadian soil quality guidelines. These guidelines are derived specifically for the protection of ecological receptors in the environment or for the protection of human health associated with four land uses: agricultural, residential/parkland, commercial, and industrial.

The environmental soil quality guidelines are derived using toxicological data to determine the threshold level of effects for key ecological receptors. Exposure from direct soil contact is the primary derivation procedure for environmental quality guidelines regarding residential/parkland, commercial, and industrial land uses. Another derivation procedure, based on soil and food ingestion, is also applied in the case of agricultural land use, with the lowest of the two values considered as the environmental soil quality guideline for this land use.

The derivation of human health soil quality guidelines is based on a different procedure using steps similar to those employed in a site-specific risk assessment. Several basic assumptions were made about the sensitive receptor and the nature of chemical exposure for each land use to establish these generic guidelines. Guidelines derived for noncarcinogens are based on an assumed threshold for toxic effects. For carcinogens presenting some risk at any level of exposure, guidelines are derived based on

estimated lifetime incremental cancer risk from exposure to soil.

For both environmental and human health soil quality guidelines, check mechanisms are used to consider important direct and indirect soil exposure pathways, such as leaching of contaminants from soil into groundwater used as a drinking source, migration of contaminants from soil to the vapour phase and into basements and indoor air, and uptake of contaminants from soil by plants and garden produce. The CCME-recommended soil quality guidelines are based on the lowest value generated by the environmental and human health approaches for each of the four land uses. Table 1 gives an overview of the recommended Canadian soil quality guideline values.

A summary of the soil protocol, “A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines” (March 1996), is presented in the second section of this chapter and describes the procedures used to derive the Canadian soil quality guidelines for environmental and human health protection, the various check mechanisms, and the physicochemical variables used in these check calculations.

The third section of this chapter is a reprint of the “Guidance Manual for Developing Site-Specific Soil Quality Remediation Objectives for Contaminated Sites”, which was designed to help provincial, territorial, and federal governments and other site managers as they address contaminated site remediation. It describes the specific procedures recommended for deriving remediation objectives for soil using the criteria-based approach. These recommendations include procedures for evaluating the applicability of the generic guidelines to individual contaminated sites and for modifying these guidelines to account for atypical or unique site characteristics. In addition, examples to illustrate the application of the recommended procedures for deriving site-specific remediation objectives are presented.

In 1991, the CCME published “Interim Canadian Environmental Quality Criteria for Contaminated Sites”. These criteria, presented in Table 2, were provided to assist managers of contaminated sites while soil quality guidelines based on the CCME soil protocol were being

developed. The interim criteria should be used only when soil quality guidelines based on the CCME soil protocol have not yet been developed for a given chemical.

Similarly, the most recent CCME water quality guidelines should be used in place of 1991 interim criteria (see Chapters 2, 3, 4, and 5).

Reference listing:

Canadian Council of Ministers of the Environment. 1999. Canadian soil quality guidelines for the protection of environmental and human health: Introduction. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

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