

Input to Questions from the Standing Senate Committee on Agriculture and Forestry (Status of soil health in Canada)

Background Context: The issue will be addressed by Dr. Steven Siciliano, from the University of Saskatchewan to the Senate. ECCC (Biological Assessment and Standardization Section, Wildlife and Landscape Sciences Directorate, Science and Technology Branch) collaborates with Dr. Siciliano on soil research related to the fate and impact of contaminants on invertebrate and microbial endpoints, and the development of genomic endpoints for soils. BASS' mandate includes method development and standardization, published through ECCC ([Biological test methods publications - Canada.ca](#)) or as contributors to international standardization organizations. The soil test methods assess pollutants in soils for multiple contaminant scenarios. The methods have been used to support the derivation of soil quality guidelines, published through the Canadian Council of Ministers of the Environment, and form the basis of the Canadian Council of Ministers of the Environment national standards for petroleum hydrocarbons in soil and site-specific remedial objectives (e.g., Alberta Tier 2 Guidelines). We conduct research on impacts to soil health from a pollution and toxicity perspective, as well as ecosystem function (microbial), and provide support to the ECCC regulatory community.

1. What are the main causes of soil contamination, related to chemical and other substances, in Canada?

E. There are many causes of soil contamination, including industrial and agricultural activities, waste from consumer and industrial products, by-products of wastewater treatment (biosolids), etc. Sources of soil contamination are also varied, and may result from direct input (e.g., chemical spillage or application of chemicals or chemically treated materials) or indirectly through industrial operations (e.g., oil and gas, mining, agricultural), atmospheric deposition of pollutants (e.g., vehicle exhaust), landfills, and the application of municipal biosolids to agricultural lands, where substances may partition to surface soils. Soil contamination has also arisen through historical industrial activities, wherein the risk of contaminants was largely unknown at the time, and operations have since stopped or been abandoned, leaving legacy contaminants behind. With regards to Federal contaminated sites, substances contributing to contamination typically include heavy metals, petroleum hydrocarbons and polycyclic aromatic hydrocarbons, among others ([Action plan for contaminated sites - Canada.ca](#)).

2. How and why does soil contamination vary throughout the country?

E. Soil contamination varies throughout the country, depending on human activities in specific regions (e.g., agriculture, industry, urban) but also through indirect atmospheric deposition of chemicals. In some instances, the contamination is a result of historical industrial activities, which are no longer operational or have long since been abandoned, leaving legacy contaminant issues under provincial, territorial, or federal jurisdictions.

3. How do Environment and Climate Change Canada (ECCC) and Health Canada (HC) work together to address environmental health risks to regulate chemical substances that can be found in the air, soil, food, water and consumer products?

E. ECCC and HC work together to address environmental health risks to regulate chemical substances that can be found in the air, soil, food, water and consumer products by assessing and remediating or risk managing contaminated sites under the Federal Contaminated Sites Action Plan (FCSAP). ECCC and HC also collaborate in the development of soil and groundwater quality guidelines for ecological and human health when developed through the Canadian Council of Ministers of the Environment (CCME). ECCC and HC jointly administer the Chemicals Management Plan (CMP), which is aimed at reducing the risks posed by chemical substances to Canadians and the environment. Through the CMP, the Government of Canada assesses and manages risks to human health and the environment posed by chemical substances that can be found in food and food products, consumer products, cosmetics, drugs, drinking water and industrial releases. Risks to the environment or human health are determined through risk assessments. Once it has been determined that a chemical substance poses a risk, risk managers identify how best to manage the risk to help protect Canadians and the environment. Risk management instruments are then developed to help prevent, reduce, or eliminate that risk.

There are many federal programs that work to address environmental health risks to regulate chemical substances that can be found in the air, soil, food, water, and consumer products. As an example, the *Canadian Environmental Protection Act, 1999 (CEPA)* establishes a precautionary and preventive approach to manage the risks of substances that enter the environment and could harm the environment (including soil dwelling organisms) or human health that is implemented through programs such as Chemicals Management Plan. Toxic substances that have been assessed, in accordance with criteria, to be: (i) persistent and bioaccumulative and inherently toxic (PBiT); (ii) carcinogenic, mutagenic, or toxic for reproduction (CMR); or (iii) otherwise found to pose the highest risk, must be prioritized for prohibition (total, partial or conditional). For other toxic substances, priority must be given to pollution prevention, which could include regulatory or non regulatory measures. Under this process, ECCC and HC prepare a risk management strategy which outlines the proposed approach for reducing risks to human health or the environment posed by a substance found toxic under the Act.

ECCC and HC also jointly implement the New Substance Program to assess and control the risks from new substances before they enter into Canadian commerce (chemicals, polymers and living organisms).

The Federal Contaminated Sites Action Plan manages legacy contaminated sites on crown land; this is jointly administered by multiple departments, with ECCC, HC and Fisheries and Oceans Canada providing guidance, advice, and risk assessment reviews. ECCC and HC also collaborate in the development of soil and groundwater quality guidelines for ecological and human health when developed through the Canadian Council of Ministers of the Environment (CCME).

4. What other initiatives does ECCC lead or support related to the regulation and remediation of contaminated soil in Canada?

E. The National Guidelines and Standards Office (NGSO) of ECCC develops soil and groundwater quality guidelines for the remediation of contaminated sites. Guidelines are developed either as ECCC Federal Environmental Quality Guidelines or through the CCME as Canadian Environmental Quality Guidelines. ECCC chairs the CCME Contaminated Sites Working Group, which develops guidelines and guidance for contaminated site assessment and remediation. The NGSO also provides advice and training on the development and implementation of environmental quality guidelines.

Environment and Climate Change Canada [also](#) directly support initiatives such as the Chemicals Management Plan to reduce the risk and manage pollutants in the environment, under the Canadian Environmental Protection Act. Specific to soils, the Chemicals Management Plan integrates soils as part of their ecological risk assessment and management activities, using exposure and toxicity (effect) data, when available, or through predictive modelling exercises. Environment and Climate Change Canada researchers supports the derivation of data for toxicity and fate modelling, as gaps and needs are identified.

Standardized soil toxicity methods have been developed by ECCC (Biological Test Method Series: [Biological test methods publications - Canada.ca](#)), with application to the assessment of pollutants in soil. These methods have been adapted to assess multiple contaminant scenarios (e.g., single chemicals, mixtures, contaminated soils) and have supported the derivation of soil quality guidelines, published through the Canadian Council of Ministers of the Environment, and form the basis of the CCME national standards for petroleum hydrocarbons in soil and site-specific remedial objectives (e.g., Alberta Tier 2 Guidelines).

Contaminated sites are either managed provincially, territorially, or federally. ECCC leads the implementation of the Federal Contaminated Sites Action Plan (FCSAP): a horizontal program whose primary objective is to reduce environmental and human health risks from known federal contaminated sites in Canada and their associated federal financial liabilities. FCSAP guidance, tools and resources help to ensure that federal contaminated sites are managed in a scientifically sound and a nationally consistent manner. The following guidance documents have focused specifically on the remediation of soil contamination:

- [Federal Guidelines for Landfarming Petroleum Hydrocarbon Contaminated Soil](#)
- [Guidance document on monitored natural attenuation for soil and groundwater remediation](#)
- [Supplemental guidance on implementation of Canada-wide standard for petroleum hydrocarbons in soil at federal contaminated sites.](#)

5. What federal policies are currently in place, or should be in place, to regulate soil pollution and soil pollution management?

E. The Federal Contaminated Sites Action Plan manages contaminated sites on federal land. Other programs include the Chemicals Management Plan, which conducts risk assessments and management of chemicals and other substances in a more anticipatory manner. Federal Environmental Quality Guidelines are also established to support risk assessment and management, including the setting of site-specific remedial objectives. ECCC works with CCME to set Canadian Environmental Quality Guidelines and standards in collaboration with provinces and territories. These guidelines are reassessed periodically to take into consideration scientific advances in assessment tools to measure exposure and risk (e.g., toxicological, new chemical forms).

Relevant links:

[Chemicals Management Plan - Canada.ca](#)

[Action plan for contaminated sites - Canada.ca](#)

[Federal Environmental Quality Guidelines \(FEQGs\) - Canada.ca](#)

[Canadian Council of Ministers of the Environment | Le Conseil canadien des ministres de l'environnement \(ccme.ca\)](#)