



Sterilant Sampling Best Management Practices

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Soil sterilants are non-selective residual herbicides that render the treated soil unfit for plant growth for relatively long periods of time. Sterilants were commonly used in Alberta from the 1960s to late 1990s for non-selective vegetation control on oil and gas wells, gas processing plants, rights-of-way, railways, sawmills, pulp mills, and electrical utility sites; residues may also be found at agrochemical dealer sites. Sterilant application patterns, mobility, persistence, and low guideline values lead to several challenges. Sterilants on impacted sites can have high spatial variability with hot spots, be widespread due to their mobility and age of sites, and be difficult to detect with a high potential of cross-contamination during sampling. These challenges leave practitioners uncertain about when and where to screen for soil sterilants, leading to unnecessary intrusive sampling following Phase I environmental site assessments, excessive and/or uncertain analysis due to cross-contamination, and identification of sterilants late in the assessment process that cause reclamation delays.

Established in 2019, the Soil Sterilants Program was established to address knowledge gaps and challenges in managing sites impacted by residual soil sterilants, including site assessment. To ensure sterilants are effectively identified and delineated, Tetra Tech Canada Inc. developed a Sterilant Sampling Best Management Practices (BMP) to provide specific sampling guidance for low level concentrations of bromacil and tebuthiuron (≤ 0.2 mg/kg) in soil and groundwater in Alberta. The BMP is intended for use by practitioners involved in environmental site assessment or remediation and reclamation activities at sterilant-impacted sites. The BMP provides guidance in respect to regulatory considerations, site evaluations, soil, and groundwater characterization, and data evaluation and interpretation.

To effectively identify and delineate sterilants on impacted sites, the BMP provides guidance on the following considerations:

- Objectives of the site investigation (initial or detailed assessment, delineation)
- Fate and transport of the sterilants
- Site historical information and characteristics
- Spatial variability of soils and sterilants

To mitigate the challenges of low-detection limits, low-level guidelines, and high potential for cross contamination, the BMP provides special sampling techniques for sterilant delineation sampling. The sampling techniques recommend soil and groundwater sampling equipment, soil sampling depth intervals, groundwater sampling protocols, sample handling and holding times, and equipment cleaning.

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Kathryn Bessie

Ms. Kathryn Bessie, B.Sc., former P.Ag. Senior Environmental Scientist (retired). Ms. Bessie is a senior soil scientist with over 40 years of consultant experience in sampling plans, soil classification, remediation and reclamation. She was registered as a professional Agrologist in Alberta and was a Registered Environmental Assessor in California. Ms. Bessie managed pre-development studies, site assessments for contaminated soil and groundwater, and completed numerous remediation and reclamation projects for oil and gas wellsite, facilities and pipelines, commercial or industrial developments, mines and oilsands. She first became involved with sampling programs and impacts of sterilants in the early 1980s. She continued to work on sampling and application of various technologies for sterilant remediation throughout her career and presented numerous times on sterilants for PTAC, RemTech and CLRA. Ms. Bessie raised the alarm in Alberta in the early 2000s that Tebuthiuron and Bromacil impacts can extend into the groundwater. Ms. Bessie has worked throughout western Canada and California, using many types of soil and groundwater sampling equipment and using various methods to prevent and quantify potential cross-contamination and decontaminate sampling equipment. She was the first professional in Alberta to use USEPA decontamination

procedures and California split barrel samples for quantifying concentrations of volatile organic compound (VOC) in the ppb range. She was on numerous technical subcommittees for both reclamation and contamination standards and for professional practice within Alberta. She created and implemented Standard Operating Procedures (SOP) for best management practices for sampling and was on the expert committee for AIA to set Practice Standards (PS) for the Contaminated Lands Practice Area. She taught the Environmental Assessment for Linear Disturbances through PITs and Salt Damaged Soil Course through ESAA as well as teaching many internal and external training courses about environmental sampling procedures. Ms. Bessie was contracted by Environment Canada to write the field sampling collection procedures section for their 2012 publication "Guidance Document for the Sampling and Preparation of Contaminated Soil for use in Biological Testing". Ms. Bessie was awarded professional recognition awards from the Alberta Institute of Agrologists (AIA) and Alberta Chamber of Resources (ACR). The latter award was for mentorship and research on Tebuthiuron and Bromacil impacted sites. The research was provided to the Alberta Government to set Tier 1 guidelines for the eco-direct soil contact pathway. Ms. Bessie was on the expert advisory committee for the Innotech Alberta sterilant program. She fully retired in 2022.