



Soil Sterilants Program: Addressing Challenges Managing Sterilant Impacted Site in Alberta

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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 treated areas can remain devoid of vegetation for many years, depending upon the type, rate and frequency of application of soil sterilant and the climatic conditions. Soils treated with sterilants often become a source of contamination to adjacent land and waterbodies through leaching, surface runoff, and wind dispersion.

When a site with sterilant impacts in soil or groundwater is no longer needed for industrial use, remediation and reclamation challenges are often encountered due to the:

- Difficulty to remediate sterilants in soil and water, especially to current Tier 1 guideline concentrations
- Widespread impacts of sterilants from the amount of time they have had to migrate, making remedial excavation expensive due to high soil and water volume
- Differences in chemical structure and environmental behaviour from the 2 commonly found sterilants in Alberta, bromacil and tebuthiuron, and associated unique challenges for remediation
- Contaminant issues associated with remediation at legacy sites where sterilants are typically found.

Industry workshops, literature reviews, and consultations with the environmental industry identified key knowledge gaps that are creating challenges in managing sterilant-impacted sites. In 2019, InnoTech Alberta initiated the Soil Sterilants Program (SSP) to develop proven technical and cost-effective strategies and best management practices for management of sterilant-impacted sites, funded by key industry and government members (InnoTech Alberta, TC Energy, ATCO Gas, ATCO Electric, and Alberta Innovates).

Through the SSP, twelve projects were completed to establish best practices, develop advanced laboratory methods, and test a variety of remediation technologies at various scales. This summary includes key learnings, recommended practices, and remaining knowledge gaps from the 5-year SSP, including:

- Identification and delineation of sterilants on impacted sites: Sampling Best Management Practices.
- Risk Assessment and Management: Considerations for application of the Alberta Tier 1 and 2 risk assessment approaches for more effective management of sterilant-impacted sites.
- Remediation technology testing: Identification and bench-top evaluation of commercial- or near commercial-ready remediation technologies for the reduction of bromacil and tebuthiuron in Alberta soils.
- Remediation technology evaluation: Meso-scale testing, optimization, and logistical assessment of potential remediation technologies for use at field-scale on Alberta soils.

The SSP projects were intended to break new ground and address gaps in the management of sterilant-affected soil and water. Continued work is required to validate and refine these findings through the evaluation of sites within a variety of Alberta conditions for broad applicability.

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Bonnie Drozdowski is the Executive Director of Environment and Bio-Industrial Services at InnoTech Alberta, part of which focuses on developing of innovative and practical land reclamation and remediation procedures and technologies for landscapes disturbed by industrial activities. She has been working in applied reclamation and remediation research for nearly 20 years managing and participating in multifaceted projects integrating business and science in various industries including upstream oil and gas, mineable and in-situ oil sands, coal mining, sand and gravel, diamond mining, forestry, pulp and paper, and clean technologies. She is passionate about working collaboratively with colleagues in industry, academia and the environmental services sector to capitalize on varying expertise and experience in developing innovative solutions to complex problems.