

Remediation Options and Treatment for Tebuthiuron at an Upstream Oil and Gas Site

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Sterilants are strong herbicides that generally include six compounds, of which tebuthiuron is one. Sterilants have been identified as an issue for remediation and reclamation since the 1980s in Alberta when AENV was reclaiming some abandoned wells. In Alberta, surficial soils with tebuthiuron have often been treated with charcoal (adsorption). However, there is no study that proves the long term effectiveness of this method. A literature review of remedial technologies specific to tebuthiuron identified thermal desorption and soil flushing as remedial alternatives. Other techniques such as biodegradation and photolysis, listed for some of the other sterilants, are not suitable for tebuthiuron because of its differing chemical and physical properties. Also, soil characteristics such as pH affect the success of some of the alternatives.

EBA was the project manager on a site near Brooks, Alberta where an oil and gas facility was in the process of remediation and reclamation and had tebuthiuron as one of the contaminants of concern. Tebuthiuron concentration in soil exceeded the standard laboratory method detection limit (0.005 mg/kg) to a maximum depth of 4.0 m and in groundwater exceeded Alberta Environment (AENV) Tier 1 remediation guidelines of 0.00027 mg/L in one of five wells on lease.

Thermal desorption was selected by the client as the preferred remedial technique. Thermal desorption is an environmental remediation technology that utilizes heat to increase the volatility of organic contaminants such that they can be removed from the solid matrix. A pilot test conducted using a thermal desorption unit (TDU) provided by Nelson Environmental Remediation Ltd. (NER) successfully treated soils with known tebuthiuron concentrations to below a special laboratory detection limit of 0.00016 mg/kg. To determine the optimum temperature for treating the soil with tebuthiuron based on remediation effectiveness and fuel consumption, discrete volumes of soil were treated at increasing temperature increments and submitted for laboratory analysis. This process was referred to as “temperature ramping”. Once the optimum temperature was determined and the technology proven as effective for these soils, site remediation proceeded. Approximately 15,000 tonnes of soil with tebuthiuron was treated with a TDU, confirmed clean, and used as backfill on this site.

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Mr. Lin was the project manager for this multidisciplinary project consisting of soil scientists, hydrogeologists, risk assessors, chemists, toxicologists and thermal desorption and dewatering contractors. Mr. Lin has eight years of experience in a variety of environmental projects. These projects have included Phase 1 and Phase 2 environmental site assessments (ESAs), remediation projects, and hydrogeological assessments at upstream oil and gas facilities. He has also been involved in hydrological, soil, and silviculture studies in Alberta’s boreal forests.