

In Situ Chemical Oxidation of Herbicides in Groundwater Using Klozur™ Activated Persulfate

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Poster and Platform Presentation

Herbicides, while commonly used in agricultural industry throughout North America, present a significant risk to human health and other ecological receptors when dissolved phase herbicides accumulate in near surface groundwater. Failure to immediately contain and mitigate a large spill of concentrated liquid fertilizer in Southern Saskatchewan resulted in a significant groundwater herbicide plume containing bromoxynil, MCPA and naphthalene as the contaminants of concern (COC). At the time, remediation options available in Canada tended to be cost prohibitive (ex situ pump and treat, carbon filtration) and timely (monitored natural attenuation – MNA). An alternative timely and cost-effective remediation strategy needed to be explored. Documented success using Klozur™ Activated Persulfate (the oxidant) to treat other traditional organic contaminants (PHCs, PAHs) led us to believe the oxidant could be applied to treat the groundwater herbicide plume, as all three COC are benzene ring-structured organic compounds.

A bench trial was initially completed in July and August 2009 to evaluate the potential for the herbicide-impacted groundwater to be remediated via in situ chemical oxidation using the oxidant. The results of the bench trial indicated that the COC were reduced by over 90%. As such, a field trial was completed involving the direct injection of the oxidant under high pressure into the subsoils at the site. Initial results from the field trial completed in November 2009 indicated that the COC were reduced by over 50%. A full-scale remediation program was subsequently initiated in the summer of 2010.

The methodology used in both the bench and field scale trials will be presented along with analytical results showing the degradation of the COC and potential by-products of the reaction. A review of the chemistry involved in chemical oxidation of herbicides using Klozur™ activated persulfate will also be discussed.

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