

**FUNCTIONALITY OF KLOZUR[®] CR IN ACHIEVING CLOSURE CONDITIONS
VIA CHEMICAL OXIDATION AND ENHANCED BIODEGRADATION
DEMONSTRATED WITH ADVANCED DIAGNOSTICS**

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Klozur[®] CR (engineered calcium peroxide and sodium persulfate) was applied to a site in New York USA exhibiting unacceptable benzene contaminated groundwater. Klozur[®] CR provides three separate chemistries to attenuate petroleum-affected groundwater in a single application. In addition to being a strong chemical oxidant, Klozur[®] CR has aerobic and anaerobic biostimulant properties that promote “chem-bio” treatment.

Application of 24,000 lbs of Klozur[®] CR using direct push slurry injection methods resulted in a downward trend in benzene concentrations (18,000 to less than 500 ug/L over two years of monitoring). Site closure conditions were achieved. However, observed fluctuations in benzene concentration over time were significant, resulting in uncertainty over the relative importance of non-destructive processes such as dilution. Advanced site diagnostics (ASDs), based on microbial phospholipid fatty acid, nucleotide and contaminant stable isotope screening, were applied to directly demonstrate contaminant degradation and the mechanism of destruction. ASDs definitively attributed decreased post-application concentrations to destructive degradation. The ASDs also identified a class of naphthalene dioxygenase-producing microbes that adapted over a series of weeks to Klozur CR oxidation reactions and elevated groundwater pH. Messenger ribonucleic acid (mRNA) qPCR data documented microbes actively producing large quantities (1.73E+10 gene copies/bead) of naphthalene dioxygenase.

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