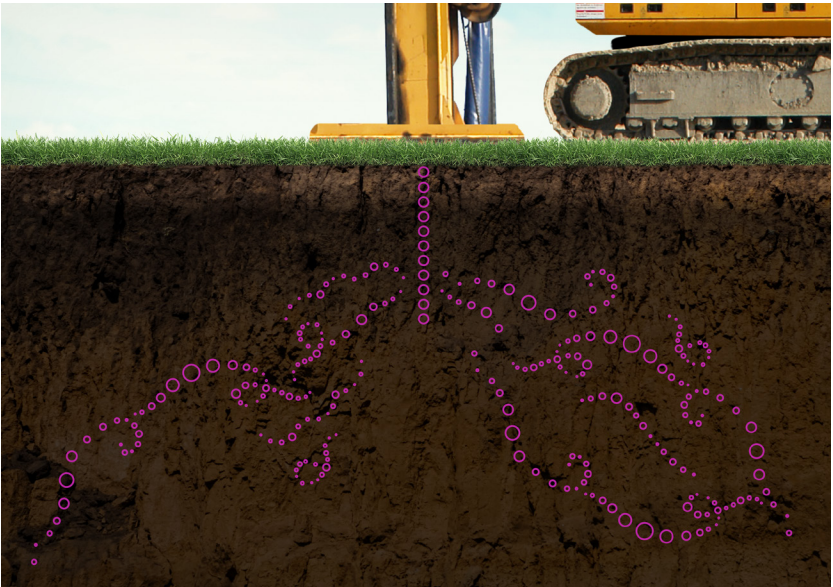


Field-proven  
remediation  
technologies  
for the most  
challenging sites.

**SOIL &  
GROUNDWATER  
REMEDICATION**



# Field-Proven Remediation Technologies

---

The Evonik team provides a portfolio of field-proven products and technologies that support soil and groundwater remediation for both in situ and ex situ applications. Our portfolio of chemical oxidation, chemical reduction, metals treatment and bioremediation technologies promotes the rapid and cost-effective removal of a wide range of organic compounds and heavy metals. For more than 20 years Evonik products have been used to successfully treat thousands of sites with impacted groundwater, soils, sediments and industrial process wastes around the globe.



## CHEMICAL OXIDATION

**KLOZUR® SP** is a highly soluble environmental grade sodium persulfate that is commonly used for source zone treatment. KLOZUR® SP is effective in treating a wide range of recalcitrant contaminants, including chlorinated solvents, petroleum and polycyclic aromatic hydrocarbons (PAHs). When properly activated, KLOZUR® SP provides an unmatched combination of oxidative power and control that can be delivered both safely and cost effectively.

**KLOZUR® ONE** is an all-in-one product containing KLOZUR® SP and carefully selected activator reagents. This fully soluble product can be prepared using a single injection system to treat highly contaminated source areas or plumes. KLOZUR® ONE builds upon the successful history of KLOZUR® SP by delivering activated persulfate chemistry more conveniently than ever before.

**KLOZUR® KP** is an extended release, environmental grade potassium persulfate with the same power of sodium persulfate but a much lower solubility. KLOZUR® KP creates a sustained persulfate concentration in the subsurface making it effective for PRB applications, plume treatment or low permeability zones. It can be applied through slurry injection or in situ mixing.

**KLOZUR® CR** is an easy-to-use product consisting of alkaline activated KLOZUR® SP and PERMEOX® ULTRA engineered calcium peroxide. This combined remedy approach of chemical oxidation and bioremediation can be used to treat contaminant source zones and down-gradient plumes.

## CHEMICAL REDUCTION

**EHC® REAGENT** in situ chemical reduction reagent is a combination of controlled-release organic carbon and micro-scale zero valent iron (ZVI), stimulating both abiotic and biotic dechlorination mechanisms for the treatment of groundwater and saturated soil impacted by persistent halogenated compounds; including chlorinated solvents, pesticides and organic explosives.

**EHC® LIQUID REAGENT** is a combination of ELS® MICROEMULSION and ferrous iron to provide both abiotic and biotic reduction of halogenated compounds in groundwater in an easy-to-use, cold water soluble, liquid form.

**EHC® PLUS** is a combination of EHC® REAGENT plus powdered activated carbon (PAC). This combined remedy approach can be used for the treatment of groundwater and saturated soil impacted by persistent halogenated compounds, including chlorinated solvents, pesticides and organic explosives.

**DARAMEND® REAGENT** is a cost-effective treatment technology for soils impacted by recalcitrant organic compounds, such as chlorinated solvents, pesticides and explosives. DARAMEND® provides a low-cost treatment alternative compared to excavation and offsite disposal.

## AEROBIC BIOREMEDIATION

**TERRAMEND® REAGENT** is a cost-effective treatment technology for soils impacted by recalcitrant organic compounds that can often be applied without excavation, generates no odors or leachate and does not result in soil bulking. TERRAMEND® is capable of treating recalcitrant compounds including PAHs, phthalates and chlorophenols, as well as biodegradable petroleum compounds.

**PERMEOX® ULTRA** is a specially formulated grade of calcium peroxide engineered to provide an extended oxygen release and essential nutrients for enhanced aerobic bioremediation. Available in powdered and granular forms, PERMEOX® ULTRA contains ≥18% Active Oxygen for enhanced performance.

## BIOGEOCHEMICAL

**GEOFORM® REAGENTS** are engineered to deliver the building blocks needed to promote in situ biogeochemical reactions. GEOFORM® provides a source of sulfate, ferrous iron, electron donors, pH buffer and nutrients to promote mechanisms for dehalogenation via enhanced anaerobic bioremediation, abiotic degradation and the formation of reactive minerals.

## METALS TREATMENT

**METAFIX® REAGENTS** are custom formulated blends of ZVI, other reducing agents, reactive minerals, adsorbents and pH modifiers. Treatment of soil or groundwater with METAFIX® results in formation of iron-bearing heavy metal precipitates. These iron-bearing precipitates have greater stability than the metal hydroxide precipitates formed with traditional alkaline metals treatment approaches. A METAFIX® blend is developed based on a site's specific conditions through a low-cost treatability study.

## ENHANCED REDUCTIVE DECHLORINATION

**ELS® MICROEMULSION** is a lecithin-based substrate of food-grade carbon used for treatment of a wide range of groundwater contaminants by rapidly creating sustained reducing conditions and providing enhanced reductive dechlorination reactions. Available in 25% and 100% concentrate, ELS®'s unique composition delivers structurally bound nutrients, a high hydrogen equivalent and high bioavailability to the subsurface.

## NAPL STABILIZATION/MASS FLUX REDUCTION

**ISGS® TECHNOLOGY** is an in situ geochemical stabilization technology that utilizes a permanganate-based solution to geochemically stabilize dense non-aqueous phase liquids in the aquifer, such as creosote.

## **OUR APPROACH**

Our experienced team of environmental professionals works collaboratively with customers to develop cost-effective solutions to achieve site objectives. In addition, we support our customers with services including treatability studies, remedial design support and field application expertise.

## **PORTFOLIO OF PROVEN TECHNOLOGIES**

- Chemical oxidation, chemical reduction, metals stabilization and bioremediation technologies based on proven science and decades of field-proven results
- Ability to address a broad range of contaminants
- Products suited for multiple application methods including fixed well, direct push, pneumatic and hydraulic fracturing, soil blending and more

## **TECHNICAL EXPERTISE**

- A team of experienced environmental professionals, including PEs, PhD level scientists and recognized subject matter experts in chemistry, microbiology, geology and field applications
- Over 80 years of chemical manufacturing experience and a current member of the American Chemistry Council's Responsible Care® initiative
- A broad patent portfolio demonstrating continued market-driven innovation

## **ANALYTICAL AND EQUIPMENT**

- State-of-the-art environmental laboratory focused on R&D and customer treatability studies
- Quantitative field test kits designed specifically for soil and groundwater applications
- Product mixing and handling equipment and expertise

## **TECHNICAL SUPPORT**

- Product demand estimation and remedial design support
- Experienced field implementation experts
- Complimentary post-application data evaluation

**EVONIK INDUSTRIES AG**  
Active Oxygens  
Rodenbacher Chaussee 4  
63457 Hanau  
Germany  
remediation@evonik.com  
[www.evonik.com/remediation](http://www.evonik.com/remediation)

**DISCLAIMER** This information and any recommendations, technical or otherwise, are presented in good faith and believed to be correct as of the date prepared. Recipients of this information and recommendations must make their own determination as to its suitability for their purposes. In no event shall Evonik assume liability for damages or losses of any kind or nature that result from the use of or reliance upon this information and recommendations.

EVONIK EXPRESSLY DISCLAIMS ANY REPRESENTATIONS AND WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, AS TO THE ACCURACY, COMPLETENESS, NON-INFRINGEMENT,

MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE (EVEN IF EVONIK IS AWARE OF SUCH PURPOSE) WITH RESPECT TO ANY INFORMATION AND RECOMMENDATIONS PROVIDED.

Reference to any trade names used by other companies is neither a recommendation nor an endorsement of the corresponding product, and does not imply that similar products could not be used.

Evonik reserves the right to make any changes to the information and/or recommendations at any time, without prior or subsequent notice.