

## Atlas of Precipitates in the Zero-valent Iron Beds Used for TCE Dechlorination and Uranium Reduction

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Formation of iron hydroxide and carbonate during the treatment with passive reactive wall applications is an important issue regarding the performance of the technology because by-products of the process will decrease the reactivity and permeability of the iron bed. The objective of this study is to conduct geochemical and mineralogical characterization of the precipitated phases, corrosion products, and contaminant phases in reactive  $\text{Fe}^0$  barrier during treatment of contaminated waters under varying conditions.

The principal corrosion products in reactive iron medium are magnetite, intermediate products (green rusts), and hydrated forms of ferric oxides such as akaganeite ( $-\text{FeOOH}$ ), goethite ( $-\text{FeOOH}$ ), or lepidocrocite ( $-\text{FeOOH}$ ), depending on the degree of oxidation. Other minerals including calcite, aragonite, siderite, mackinawite, and elemental sulfur are also precipitated on the surface of the reactive medium depending on the groundwater chemistry. Many factors contribute to the mineralogy of the precipitates including (a) contaminants and chemical composition of groundwater and (b) occurrence of sulfate-reducing bacteria. The mineral assemblage observed after treatments reflects the influence of the specific geochemical environment at each site. The surface-coating materials formed during the ex-situ treatment reduced the effectiveness of the  $\text{Fe}^0$  medium.