

USE OF NANO-SCALE ZERO-VALENT IRON FOR GROUNDWATER REMEDIATION

*Christian Macé, Florin Gheorghiu; Michael Pupeza; Wei-xian Zhang
GOLDER ASSOCIATES, 1951 Old Cuthbert Road, 08034 Cherry Hill, NJ, USA*

Zero-valent iron has been used to remediate many organic contaminants, which can be completely reduced to non-toxic compounds such as ethene and ethane. Nano-scale zero-valent iron (NZVI) particles have been shown to be more reactive and extremely effective by virtue of their increased surface area compared to granular coarser iron particles and the ability to distribute the particles directly into contaminant plumes.

Initially, Golder Associates implemented this technology at a pharmaceutical facility in Research Triangle Park, North Carolina. The results of this application showed rapid treatment of chlorinated solvents to below drinking water standards. Golder Associates has since conducted numerous in-situ pilot tests in fractured bedrock and porous media aquifers. Results have demonstrated the ability to rapidly reduce contaminant mass while concurrently conditioning the aquifers for more effective bioremediation. The rapid reaction rate and small particle size facilitates expeditious primary treatment in source areas and dissolved plumes, thereby substantially shortening overall remediation timeframes for otherwise recalcitrant groundwater plumes. This presentation will provide a review of the theory behind zero-valent iron remediation, case studies, and the viability of nano-scale zero-valent iron application to expedite redevelopment and reuse of Brownfields sites.

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