School of Civil and Environmental Engineering

State-of-Art Iron-based *In-situ* Technologies for the Clean-up of Contaminated Soils

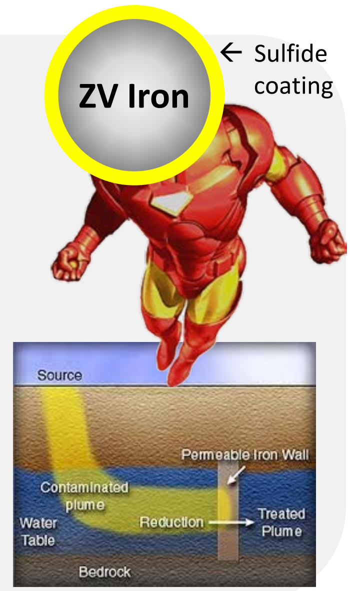
WHAT WE DO

The School of Civil & Environmental Engineering, UNSW, has years of experience in investigating the viability of the latest *in-situ* technologies involving iron in relation to its ability to **1.** reductively degrade organic pollutants or **2.** immobilize heavy metal and nuclear contaminants. Due to our experience our team has the necessary skills and tools to investigate and perfect such technologies. We also continually review the latest scientific literature in this area and are therefore well-informed of the latest technologies. The major areas we are involved in are described below.

1. Zero Valent Iron (ZVI) Technologies - Sulfidized nZVI

Target Application: Soils/sediment contaminated with chlorinated pollutants

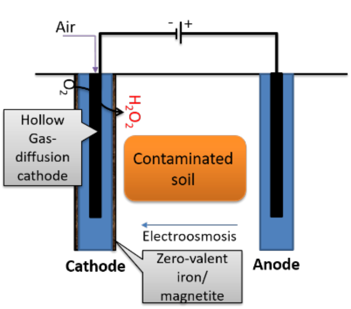
Principles: Zero valent iron (ZVI) readily undergoes oxidation due to its high electrochemical reactivity, in turn reducing contaminants rendering them less toxic and easier to degrade. Nanoparticulate (nZVI) is particularly reactive due to its large reactive surface area. Overall, ZVI technologies are attractive as they eventually transform into benign species which can be found naturally in soils. They can also clean-up soils *in situ,* dispensing with the need for large-scale excavation. The latest technological advance in this area involves sulfidization of nZVI, which, according to lab tests, greatly improves its selectivity towards target contaminants with extending the lifetime of nZVI. To date, however, this technology has only been tested on a few pollutants, and has not been tested under field-like conditions. Our team is well-positioned to test the suitability of this technology out for your contaminated site.



2. ZVI-mediated Electrokinetic Technologies

Application: Soils contaminated with metal and/or organics

Principles: Produced *in-situ*, electrochemically, H_2O_2 reacts with ZVI/magnetite to induce Fenton reactions which produce powerful free radicals species that can enhance the degradation of organic contaminants. The oxide layer which forms on ZVI also aids in the adsorption of heavy metals.



3. Reactive Clay Barriers

Application: Uranium-contaminated sites

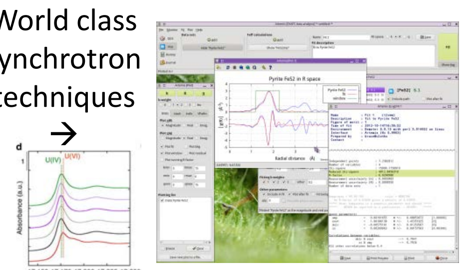
Principles: Smectite clays are often used to prevent groundwater movement. What's new, however, is that the presence of iron in these clays can facilitate the reduction of redox-active radionuclides, such as uranium, making them less mobile. This is important should a breach in the barrier form.

OUR TOOLS

State-of-art analytical instruments →

Dedicated radiation laboratory →

World class synchrotron techniques →



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