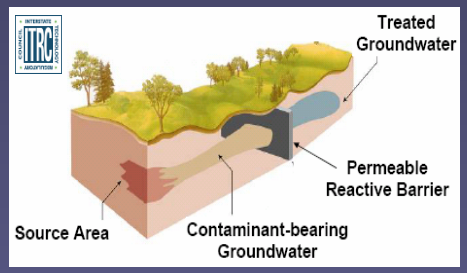
In Situ Treatment of Hexavalent Chromium (Treatment While in the Ground)

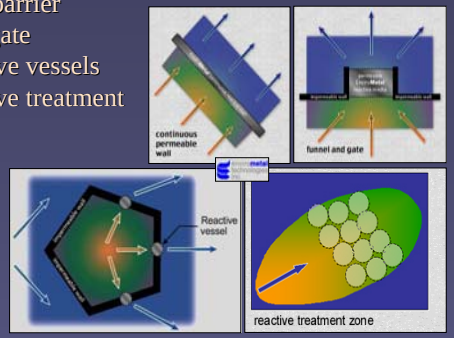
Permeable Reactive Barrier (PRB) Definition

- A continuous, in situ permeable treatment zone that reduces hexavalent chromium (which is highly mobile) to trivalent chromium (which is much less toxic and tends to be insoluble)



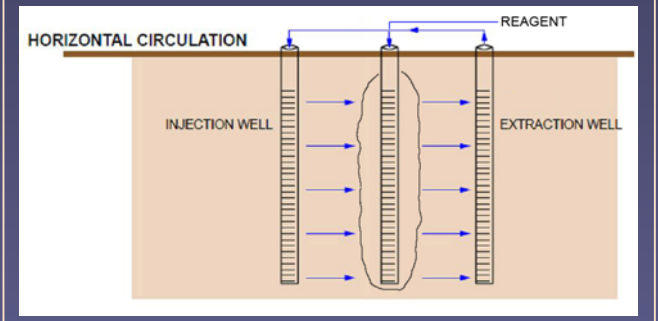
Common PRB Configurations

- Continuous barrier
- Funnel and gate
- In situ reactive vessels
- In situ reactive treatment zones

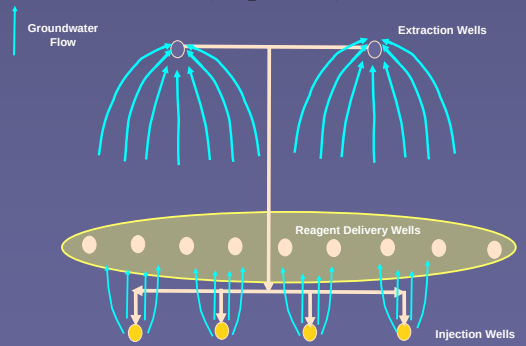


Groundwater Circulation Wells for Construction of Reactive Zones (Cross Section View)

- Groundwater injection wells can be used to create an in situ treatment zone



(Top View)



Common PRB Construction Methods

- Excavation (slurry-filled trench)
- Continuous trenching
- Caissons or sheet piles
- Vertical hydrofracturing
- Injection wells
- Jetting
- Soil mixing


Courtesy of Dewind Dewatering
Continuous Trenching


Slurry Filled Trench


Sheet Piles

Substrates and Reductants Commonly Used in PRBs

- Organic substrates
  - soluble substrates (e.g. lactate, molasses)
  - slow-release substrates (e.g., HRC® (Hydrogen Release Compound), vegetable oil, emulsified oils)
  - solid substrates (e.g., mulch, chitin)
- Inorganic reductants such as di-thionite and calcium polysulfide
- Zero valent iron may be injected or emplaced to directly reduce Cr(VI)

CH2MHILL