ENVIRONMENTAL TREATMENT:

Permeable Reactive Barriers

Shaw Air Force Base, S.C.

A *permeable reactive barrier* is a wall built below ground to clean up polluted groundwater. This type of barrier has been installed at dozens of sites in the United States and Canada.

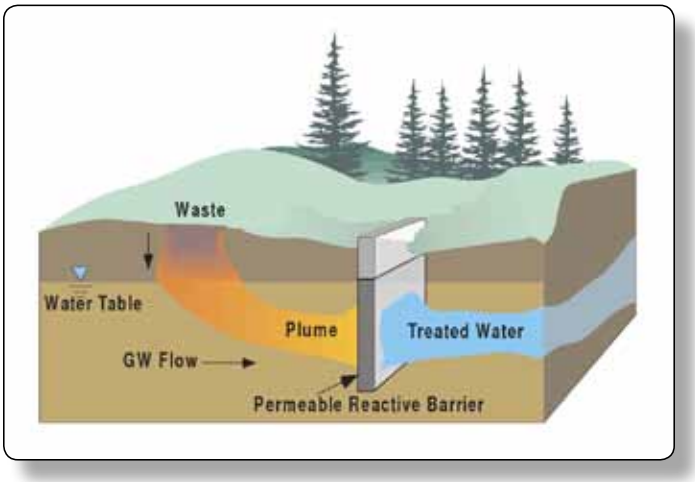
HOW DO THEY WORK?

The wall is permeable, which means it has tiny holes that allow groundwater to flow through it. Reactive materials in the wall, such as iron filings, trap harmful chemicals or change the chemicals into harmless ones. Clean groundwater flows out the other side of the wall.

HOW ARE THEY INSTALLED?

A PRB is built by digging a long, narrow trench in the path of the polluted groundwater. Some soil, which may be polluted, must be removed when digging the trench. The Air Force makes sure that the polluted soils are handled safely. If the soil is polluted, it may be cleaned using another cleanup method. Or the soil is disposed of properly in a landfill.

Once dug, the trench is filled with a reactive material that can clean up the harmful chemicals. At Shaw, iron fillings are used. The reactive materials may be mixed with sand to make it easier for water to flow through the wall, rather than around it. At some sites, the wall is part of a funnel that directs the polluted groundwater to the reactive part of the wall. The filled trench or funnel is covered with soil, so it usually cannot be seen above ground.



Conceptual model of a permeable reactive barrier with groundwater flow (PRB). As groundwater with contaminants passes through the permeable barrier, iron fillings in the barrier change the chemicals into harmless ones. Significantly cleaner groundwater flows out the other side of the wall. Since groundwater is always flowing through the plume and the barrier, plume concentrations are diminished over time. Treated water is tested to ensure it meets regulatory standards for cleanup.

WHAT ARE THE BENEFITS?

Barriers work best at sites with loose, sandy soil and a steady flow of groundwater. Since there is no need to pump polluted groundwater above ground, PRBs can clean sites less expensively than other methods. Very little waste needs to be disposed of in a landfill, which also saves money. There are no parts to break, and there is no equipment above ground so the property can be used while it is being cleaned up. There are no energy costs to operate a PRB because it works with the natural flow of groundwater.

PRBs have a good safety record. Once built, they have no moving parts, equipment, or noise. The reactive materials placed in the PRB trench are not harmful to the groundwater or to people. The polluted groundwater is cleaned underground so cleanup workers can avoid contact with it.

WHERE ARE PRBs USED AT SHAW?

The Air Force is utilizing a PRB with iron filings to clean trichloroethane, trichloroethylene, vinyl chloride and benzene from groundwater at the former fire training area one. The Air Force tests groundwater at the site regularly to ensure the PRB is working.

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U.S. Environmental Protection Agency: **www.epa.gov**
South Carolina Department of Health & Environmental Control: **www.scdhec.gov**