

Technical Bulletin #40

Vibrating Beam Slurry Wall, Organoclay Containing Slurry, Repairs Leaking Landfill Liners

Leaking landfill liners cause the groundwater to be contaminated by various organic compounds and heavy metals. Groundwater below storage tanks and yards of chemical storage sites, at military bases and other sites, is often contaminated with plumes of DNAPL and other organic compounds. There are numerous methods available to treat such groundwater, such as the "pump and treat method", bioslurpers, in situ methods, and others. In many situations, if the contaminant plume has not progressed too far, a sorption barrier can be dug into the ground down to the nearest clay layer. Now the contaminants are held up by the sorption barrier, and will pile up near the barrier. The groundwater can be cleaned up by the above-mentioned methods. The ingredients of the sorption barrier can adsorb any contaminants that might invade the barrier.

A type of sorption barrier would be a slurry wall. Because a standard slurry wall is 3 feet wide, the sorption ingredients are too expensive due to the need for a large volume. A more suitable type slurry trench is the one constructed with the "vibrating beam" method, which is only 10 inches in diameter, and thus affordable.

The key slurry ingredients for effective sorption are organically modified clay, Type F fly ash, cement, and bentonite. The organically modified clay and, to a small degree, the fly ash, sorb the organics, and the bentonite traps heavy metals by ion exchange.

The slurry material, which the vibrated beam method encompasses, consists generally of either cement and bentonite, or IMPERMIX®, a combination of attapulgite clay and slag cement. Organoclays for the removal of organic compounds, and zeolites to extend the bentonites life can easily be included into the slurry mix. The addition of Organoclay and/or zeolite is well established in the soil and waste stabilization industry.

Utilizing a vibrated beam slurry wall, which is very economical, allows for the formation of a wall around an existing or abandoned landfill, and, if need be, for a second one farther away, i.e. two parallel slurry walls. Obviously, wells could be drilled between the two slurry walls, and a pump and treat system installed to maintain the integrity of the outer slurry wall. In situ methods could also be used, such as oxidation or biological methods, as in the case of large DNPL plumes.

VIBRATED BEAM TECHNOLOGY

Summary. One effective means of constructing an impervious barrier is the vibrated beam method. This method, in brief, involves the use of a fabricated steel beam, a vibrator, a pile driving crane, and a mixing plant. This method results in a 4-6" wide wall with depths up to and exceeding 100'. Over one hundred slurry walls have been installed using this method in the United States for both the private and public sector, including the Army Corps of Engineers. The need for the vibrated beam method continues to escalate due to its reduced health and safety considerations, ability to install corners, high level of quality control, minimal excavation (2' x 2' reservoir trench at surface), narrow working area, and ability to achieve depths greater than 100'.

Vertical barrier walls may be installed in the subsurface to control the horizontal flow of groundwater, either for dewatering or chemical containment purposes, and as in the case of sorption walls, to treat the horizontal flow of groundwater. Barrier walls should be built to minimize community disturbance and spoils and to maximize chemical compatibility and constructability. Several construction methods, such as the conventional slurry trench, the vibrated beam method, deep soil mixing, and jet grouting, are being used today. Unlike the other available methods, the vibrated beam method enables a narrow barrier wall to be constructed without subsurface material excavation and with reduced health and safety considerations. The vibrated beam method can be constructed vertically or at a batter to contain small streams and canals. The economical benefits of sorption walls may be the driving interest in this technology. A passive technology that requires almost no annual energy or labor input (other than for site monitoring) has obvious advantages over conventional groundwater "pump & treat" systems (ITRCWG 1997).

For lab tests using the micro column technique, see technical bulletin #38 on our website, or email us at biomin@aol.com.

For more information on Organoclays study Biomin's website www.biomininc.com. To contact the contractor for the vibrating beam method, see table 6.

1. Backhoe Slurry Trench
2. Clam Shell Slurry Trench
3. Vibrating Beam Slurry Trench
4. Footprint of Vibrating Beam Slurry Trench
5. Footprint of Vibrating Beam Slurry Trench
6. Vibrating Beam Slurry Trench Method