

Large scale *in-situ* bioremediation of BTEX

Problems:

- Underground tank farm
- In the past the underground tanks have been cleaned and filled with sand.
- Surface sealed with tanks infrastructure left in place
- Floating phase 1.5 m
- 10 000 µg benzene/litre, 80 000 µg toluene, ethylbenzene, xylenes/litre
- Hot spot area 10 800 tons of soil in the saturated zone, 4 500 tons in the unsaturated zone
- Very permeable gravel and sand
- Contamination at site boundary
- Sensitive targets at boundary such as private housing

Our Responses:

- Bioremediation feasibility study undertaken proving that the diffuse BTEX contamination can be degraded within the boundaries of the site after removing hot-spots with high ecotoxicity.
- Containment wells installed to prevent off-site groundwater migration
- Existing surface area sealed leaving the underground tanks and pipes in place
- Floating phase material removed with groundwater slurping
- Volatile sources reduced to non-toxic levels by soil vapour extraction
- Aerobic biodegradation implemented using biosparging / water infiltration / soil vapour extraction / biofiltration / on-line monitoring

Location: TF2, Germany

Initial cost estimates using standard technologies: 12 600 – 15 120 k US\$

Actual costs using *in-situ* bioremediation: 3 590 k US\$

Time for active *in-situ* remediation : 2,5 years