

## Soil Washing

The most effective permanent method of site clean up is by soil washing. Rather than attempt to immobilize the pollutant, it is completely removed and disposed of as desired.

OMNI manufactures two products that lend themselves to use in this field. OMNI-TRAP™ media, a patented ion exchange zeolite for the removal of multivalent heavy metal ions and SorbaSolv™ fibrous oil sorbent for the removal of waste insoluble organics.

In all cases, a site assessment must be made to determine the amount and types of contaminants. Where pollutant levels and mobilities are high, the use of a slurry cut off wall is highly recommended. The amounts and types of pollutants will determine procedures to be used. In cases of only heavy metal ion contamination, the use of an OMNI-TRAP™ alone will suffice. However, small amounts (up to 500 ppm) of water insoluble organics may also be removed by OMNI-TRAP™ media concurrently with the multivalent metal ions. Soils high in water insoluble organics (over 500 ppm) should be treated with SorbaSolv™ prior to metal ion removal. The methods of soil washing will vary depending on degree and type of contaminants, conditions, soil type and logistics involved. The wash water should be of a pH of no less than 3 nor higher than 5 to insure complete solubility of the metal ion. We have found the use of Hydrochloric acid to be the most efficient for pH adjustment. Little or no difference in various fresh water supplies was found for soil washing with the exception that hard water is slightly less efficient and may require more acidulation. If organics are also present, the addition of approximately 1% isopropyl alcohol will aid in separation.

The two most effective methods of soil washing are batch mixing with agitation such as a mortar type mixer and column elution. The use of a column is most effective, as recirculation of the wastewater will allow complete control of extraction. The major drawbacks of column washing are the very slow flow rates when dealing with soils having high amounts of fines and other materials that inhibit flow, and emptying

the washed soil from the column. Soils high in sand and gravel best lend themselves to this method. The effluent from the soil column or the liquid from batch washing is passed through an OMNI-TRAP™ filter and, if needed, through a SorbaSolv™ filter. In all cases, this water may be reused for further washings. Periodically test wash soils to determine EPA requirements for return to site.

Depending on conditions the most efficient use of OMNI-TRAP™ media is in a column type filter. This may be as simple as a swimming pool filter or a drum modified for filtration to more elaborate columns. Exhaustion of the OMNI-TRAP™ media will be noted by a distinct reduction of the flow rate due to the gelling and cross linking, a drop in pH below 6.6 and chemical analysis of the effluent. Dried OMNI-TRAP™ media usually meets TCLP requirements for delisting.

SorbaSolv™ may be used in two different ways to remove oils and other water insoluble organics from soil. For low ranges (up to 10,000 ppm) of organic, particularly where they are easily extracted, the SorbaSolv™ should be used as filter media. Where high concentrations and/or difficult extraction conditions (high clay and/or high humic soils) exist, a floatation method that has been developed is most efficient. A berm is built around the area to be treated sufficiently high enough to retain the amount of water to be used. SorbaSolv™ fiber is tilled into dampened (15%-25% moisture) soil at a rate of from 1:5 to 1:10 SorbaSolv™ to organic in as uniform manner as possible. Depending on the soil, allow a minimum of 48 hours for easily extracted types to 2 weeks for difficult soils while keeping the area moist during this time. The area is then flooded and, where possible, aerated to float the SorbaSolv™/organic mixture to the surface. It may be then skimmed off for disposal. Since the absorption of the organic depends on phase separation, the addition of small quantities of ammonium hydroxide and/or isopropyl alcohol often aids in complete absorption. These should be added with the SorbaSolv™ tilling.