

Disposal Issues

Upon the completion of a ORC Filter Sock application (usually about six months), disposal of the product will need to be addressed. Under most conditions, it will be possible to simply dispose of the ORC Filter Socks in conventional dumpsters designated for a Class III landfill.

By the time it is removed from its wells, the product will have formed a weakly-cemented magnesium hydroxide and sand matrix. This is essentially a solid block of Milk of Magnesia and sand in a 50:50 ratio. The MSDS on magnesium hydroxide, as prepared by Morton Thiokol (a major chemical company), is clear that magnesium hydroxide is non-toxic and in fact is classified GRAS (Generally Recognized as Safe) for consumption. This is of course substantiated by its use as an anti-acid.

MSDS disposal requirements simply state that it be disposed of in a container and does not further clarify those requirements; presumably this could be a plastic trash bag. As is indicative of any MSDS you are always instructed to contact local, state or federal EPA offices for a final decreed disposal method. Recent discussions with state and local agencies in several states have resulted in concurrence that non-hazardous disposal is acceptable.

Alternately, one may consider a hardened ORC and sand matrix to be a form of concrete - which it is, just as calcium hydroxide and sand has been from the time of the Romans. The dumping of concrete generally does not have to meet MSDS requirements for the individual components, such as calcium oxide and calcium silicate.

With regard to landfill requirements, TCLP measurements on the product show extractable pHs ranging from 8.2 to 10.8, averaging 9.5. Even considering the highest value of 10.8, this pH is significantly below a value of 12.5 which would classify it as a corrosive material in accordance with the Code of Federal Regulations. ORC meets the criteria, beyond the corrosivity standard, for being a non-hazardous waste in that it is non-ignitable, non-reactive, and non-toxic.

TCLP also resulted in measured magnesium concentrations from 180-1,500 mg/L in an active extraction test. In a non-advective situation, the magnesium levels are essentially unchanged since the ORC is virtually insoluble and elevated concentrations can only exist in the vicinity of the well. Actual field data from the University of Waterloo indicates the concentration of magnesium in the vicinity of the well only elevate to a few ppm above background concentrations.

The only remaining issue, relative to a Class III disposal, is whether or not the ORC Filter Socks have absorbed minor amounts of the target hydrocarbons during exposure to contaminated groundwater. This, however, is highly unlikely

since the surface of the sock would be in a very highly oxygenated zone where remediation is maximal. Even if a sock was dissipated of oxygen, unless the socks are placed in wells with free product, it is highly it would have hydrocarbon concentrations higher than those of groundwater in the well from which they are removed. These levels would generally be insignificant once the sock is intended for solid waste disposal where the actionable standards are much higher. Furthermore, it is clear that if the spent material was exposed to the air it would soon dissipate or be further remediated since it would retain moisture for a period. Spent product set on a tarp and exposed to air would most likely allow ND to be reached in a short period assuming hazardous compounds were present to start.

Should the disposal requirements become more rigorous than Class III, it is probably easiest to simply dispose of the spent filter socks in drums, in a similar manner as PPE used at the site, at a cost of approximately \$100 per 55 gallon drum. For each of the REGENESIS ORC Filter Sock products there are the following approximate unit disposal charges.

Filter Sock Size	Number / 55 Gallon Drum	Unit Disposal Cost
6-Inch Diameter	15 to 20	\$3.75 to \$5.00
4-Inch Diameter	45 to 60	\$1.25 to \$1.66
2-Inch Diameter	110 to 150	\$0.50 to \$0.66

In a typical scenario, 150 socks would be used in a barrier, and would be changed out twice a year. A total of 300 socks would therefore cost between \$150 and \$1500 per year for disposal depending on size, not including drum cost and labor for retrieval and handling.