



REGENESIS

Hydrogen Release Compound (HRC[®])

Installation Instructions

GENERAL GUIDELINES

The best method to deliver HRC into the subsurface is to inject the material through direct push rods using hydraulic equipment. This approach increases the spreading and mixing of HRC into the aquifer. This set of instructions is specific to direct push equipment.

RegenesiS has found that very few pumps can adequately deliver HRC to the subsurface. Although other pumps may inject HRC, we have developed the following instructions specifically for use with an R.E. RUPE Company Model ORC/HRC 9-1500 mixing and pumping machine.

Note: We have strong evidence that the recently developed Geoprobe GS-2000 pump can effectively deliver HRC to the subsurface.

The installation of HRC should span the entire vertical contaminated saturated thickness. If the vertical extent of HRC application is confined to a limited interval, then the HRC material should be placed across a vertical zone extending a minimum of 2 feet above and below the screened Interval of monitoring wells to be used to evaluate the performance of the bioremediation project.

MATERIAL OVERVIEW, HANDLING, AND SAFETY

HRC is shipped in 4.25-gallon buckets and each bucket has a gross weight of approximately 32 pounds (net weight of HRC is 30 pounds). At room temperature HRC is a sticky gel with a viscosity of approximately 20,000 centipoise (roughly equivalent to cold honey). The HRC material has a nominal density of 1.3 grams/cubic centimeter or approximately 10.8 pounds per gallon. The viscosity of HRC is temperature sensitive, significant changes in HRC's viscosity are observed with large changes in product temperature. It should be noted that the temperature/viscosity relationship is not linear.

For ease of installation, HRC should be stored in a warm, dry place that is protected from direct sunlight. It is common for stored HRC to settle somewhat in a container. Care should be taken to mix the HRC into a relatively uniform fluid prior to installation. Product uniformity is most easily achieved by pre-heating HRC before pouring it into the pump hopper. Care should be taken to scrape any separated material from the bottom of each bucket. Do not use any "rocky material" in the bottom of the bucket because it could potentially clog the check valves in the machine. Use the Rupe pump's mixing and recirculation features to homogenize the HRC. Pre-heating HRC makes it easier to pour and remix the separated material. Although HRC is manufactured as a food-grade

material that is safe to ingest, field personnel should take precautions while handling and applying HRC. Field personnel should use appropriate safety equipment, including eye protection. The low pH when dissolved in water and the products viscosity make eye protection mandatory. Gloves should be used as appropriate based on the exposure duration and field conditions. A Material Safety Data Sheet is provided with each shipment. Personnel who operate field equipment during the installation process should have appropriate training, supervision, and experience

For direct assistance or answers to any questions you may have regarding these instructions, contact Regenesi Technical Services at 949-366-8000.

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