

VeruSOLVE-HP™

Application Guidelines

Cleaning up the Environment for the Benefit of Clients and their communities



Green Technologies for the Environment

“Work for something because it is good, not just because it stands a chance of success”
- Vaclav Havel



VeruTEK Technologies, Inc.
Unit 59/148 Chesterville Road
Moorabbin Vic 3189 Australi
Phone +61 3 9555 3800
Fax +61 3 9555 2888
www.erraus.com.au

What is VeruSOLVE-HP™?

VeruTEK's® green chemistry platform provides innovative solutions to today's most challenging environmental cleanups. VeruSOLVE-HP™ is a stabilized surfactant/oxidant combination effective for surgical destruction of DNAPLs and source term wastes like MGP, creosote, and hydrocarbons. Clients apply VeruSOLVE-HP in-situ via injection, or ex-situ as a direct spray application.

Step 1: How to Order VeruSOLVE-HP™

VeruSOLVE-HP™, is typically delivered ready-to-inject in bulk volume tankers, totes, or drums. VeruSOVE is safe to handle and use, and not subject to regulatory reporting or DOT transportation restrictions or labeling. First step is to obtain a site survey form from VeruTEK -info@verutek.comor www.verutek.com- Complete one form for each site and return to VeruTEK. This will enable you to obtain the quantity and cost of VeruSOLVE-HP™ required for treatment at your site; custom to the type of waste, treatment area, and lithology.

Step 2: Select Your Applicator

Clients apply VeruSOLVE-HP in-situ through injection, or ex-situ as a direct spray-on application. Work with internal resources, or if applicable, identify qualified external applicators, to determine if in-situ or ex-situ application will be best suited for your site. Most any company experienced with Geoprobe® in-situ investigation and injection implementor, or remediation contractor, can successfully apply VeruSOLVE. VeruTEK has worked with numerous qualified and

VeruSOLVE-HP is available for direct purchase. VeruTEK provides multiple levels of support based on site specific needs from training to full scale implementation.

Applicators can choose from the following:

- VeruSOLVE-HP™ direct purchase
- VeruSOLVE-HP™ with technical support
- VeruSOLVE-HP™ with ServicePAK™ full project implementation

experienced companies across most states, and may be able to identify an applicator or consultant.

Step 3: How to Apply VeruSOLVE-HP™

Application equipment

For in-situ remediation of free phase, dissolved or DNAPL wastes, VeruSOLVE-HP™ is injected into the treatment zone through Geoprobe® rods or installed injection points using a chemically compatible pump. Both methods require an injection well head to monitor pressure and purge air from the injection line.

To treat ex-situ, a series of spray bars are assembled at the end of a power grader or pug mill. VeruSOLVE-HP is directly sprayed onto the loose contaminated material upon exit. Treated materials are piled in a controlled fashion and contaminant destruction occurs over one to several days depending on contaminant concentrations and desired cleanup levels. As with injection, a chemically compatible pump, hose, fittings and spray bars are necessary. When pumping or applying VeruSOLVE-HP with non-VeruTEK equipment, cross-check the wetted materials of your pumping equipment to ensure compatibility:

Compatible Materials	Viton, HDPE, SS, PVC, Nylon, and Polycarbonate
Incompatible Materials	Steel, cast iron, other metal alloys



Typical well head assemblies for delivery of VeruSOLVE-HP™

Optimizing Your In-situ application

How many injection points do I need?

Typically, it is recommended for small treatment areas to space out injection points approximately 10-15 feet apart equally throughout the treatment area.

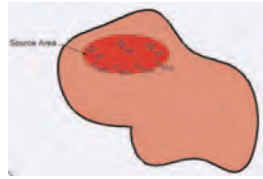
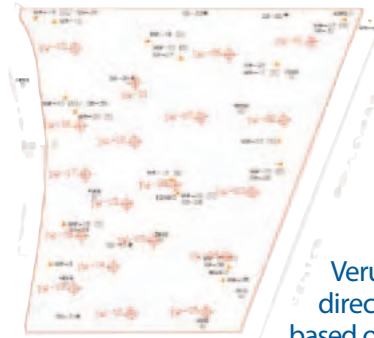
For larger areas, it is best to start in a known source area and monitor the initial injection of VeruSOLVE-HP™ to verify site specific in-situ transport properties. This will aid in determining the optimal injection point spacing, and injection operating parameters.

How do I construct the injection wells? Can I use existing wells?

Injection wells are generally constructed of the same material as a standard monitoring well. Injections can also be performed through existing monitoring wells or through direct push Geoprobe rods.

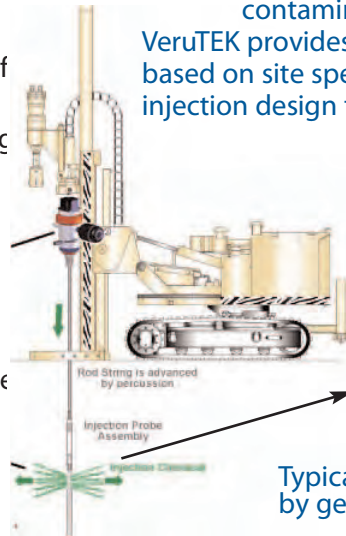
How many injection treatments?

Since VeruSOLVE-HP can successfully destroy DNAPL and free phase wastes, typically no repeat treatments are required for adequately characterized sites. Detailed monitoring of the injections is important to optimize the radius of influence of treatment laterally and at depth, as well as the progress of contaminant destruction. In many cases, areas of the site may have less waste than anticipated, or contaminant destruction occurs more rapidly - allowing injection points to be turned off ahead of schedule.



VeruSOLVE-HP is available for direct purchase. Quantities are based on client provided information including area of concern and contaminant concentrations.

VeruTEK provides multiple levels of support, based on site specific needs from training and injection design to full scale implementation.



Typical In-Situ application by geoprobe

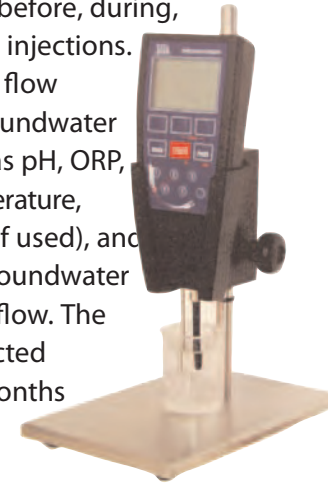


Typical Site set up.

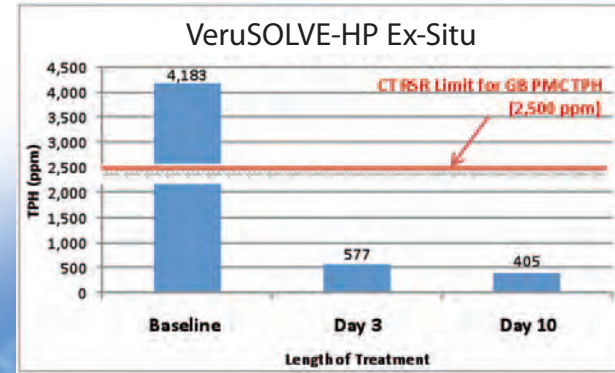


Monitoring?

Monitoring is conducted before, during, and after VeruSOLVE-HP™ injections. Using laboratory and low flow sampling equipment, groundwater quality parameters such as pH, ORP, conductivity, head, temperature, persulfate concentration (if used), and IFT are measured from groundwater and the injection system flow. The monitoring is also conducted periodically for several months following injections.



Typical Monitoring Equipment IFT Meter



VeruSOLVE-HP™ EX-Situ application successfully treats contaminant concentrations to below state standards.

For more information please call:
+61 3 9555 3800

Optimizing your Ex-situ application

Ex-situ can be an extremely quick and economical solution for on-site treatment, and is often used to treat fuel spills and hydrocarbons in soils. The key is to increase contact of the contaminant with VeruSOLVE-HP™, and this can reliably be done by minimizing the soil particle size (increasing exposed surface area) in a pug mill or power grader. Tumbler bars or screens may also be added to aid in mixing as the wetted soil leaves the equipment.



EX-Situ VeruSOLVE-HP can treat up to 400-800 ton a day. More economical and sustainable option to excavation and alternate remedial techniques. On average 25-50% less than dig and haul.