

# Has "IN SITU" Remediation Replaced "Activated Carbon PUMP & TREAT" in the Groundwater Market?

## Background and When to Use "Pump & Treat" or "In-Situ" Treatment

In-Situ treatment has not totally replaced Pump & Treat. According to the latest Fredonia survey, over the past 5 years the activated carbon industry has lost 50% of its market share to In-Situ groundwater treatment. The In-Situ vendors have done a tremendous marketing and sales job, to the point that on all remediation conferences, such as AEHS, National Groundwater, Battelle, and others, 100% of the technical papers and most of the vendor exhibits deal with In-Situ, and negligible papers and vendor exhibits from Pump & Treat or sorbents such as activated carbon, Organoclay being the rare exception in that its market size has grown. With good reason, the In-Situ methods which deal with ozone, microbial injection, oxygen, hydrogen, calcium peroxide and potassium permanganate injections, work much quicker (on average 5 to 10 years vs. 20-30 for Pump & Treat), and are consequently cheaper, when performed properly. However, each groundwater and soil remediation! project is unique in terms of physical and chemical conditions and in terms of response to remediation technologies. This is an attempt to provide some guidelines as to when In-Situ or when Pump & Treat ought to be used.

### Typically, issues which drive Pump & Treat remediation are:

- A highly porous strata which causes relatively fast flow. There is not enough time for the chemical biological reactions, to take place. This is important when the plume extends through several drinking water wells. There are exceptions to this rule, which is why a thorough study is important.
- In fractured rock the plume may spread much faster than in a glacial till, and often no natural attenuation takes place.
- Proximity to a receptor site such as drinking water supply. The word is "CONTAINMENT" and P&T is the only way to assure containment.
- If sheen lies on top of the water table, the groundwater needs to be pumped out. Then you can keep pumping and cleaning the

water with an Oilsorb/carbon system, and re-inject it up stream. Oilsorb protects the carbon against oil plugging. Care must be taken not to smear the sediments with contaminants while lowering the water table. On the other hand, by lowering the water table the vadose zone can be expanded, and vapor extraction made more effective.

- Generally high and diverse concentration of contaminants demand that the aquifer is first pumped out and treated with an Oilsorb/carbon system. After some 6 months to a year, when the concentration is stabilized and pockets of contaminants are removed, In-Situ can replace the P&T.
- If the contaminant concentration is higher than 100 ppm, build an activated sludge plant. Then follow with an Oilsorb/carbon system, followed by In-Situ treatment. If it is less than 100 ppm, down to about 20 ppm, use P&T, including an Oilsorb/carbon system, followed by In-Situ. Do not use In-Situ biology above about 50 ppm contaminants, because the created biomass will plug up the aquifer.

Factors which can drive up the cost of In-Situ are: proximity of injection wells.

How close a spacing from one injection point to the next is enough?

How do you know when you have average injection well coverage?

Source removal is very important, for both methods.

There are still many sites which use Pump & Treat with granular activated carbon. In order to keep the costs down, Organoclay must be used as a pre-polisher, because it removes oil and other fuels at as much as 7 times the efficiency of GAC. Organoclay provides the activated carbon industry a way to lower its costs.

The remedial option that is selected should reflect the client's objectives, i.e. control vs. clean up, the client's risk tolerance, and the site specific parameters that affect the effectiveness of the remediation if you choose.

But the main advantage the carbon industry has is: IT SELLS RELIABILITY. When you install a Pump & Treat system with Organoclay/carbon as polishers, you measure the effectiveness of the

treatment instantaneously. The In-Situ methods have not been in place long enough to reliably tell that an aquifer is clean, because pockets of contaminants can be hidden somewhere in a cranny and dislodge. This is particularly important with the new remediation contracts which are becoming popular, called "guaranteed fixed price remediation with insurance". This contract means that the contractor guarantees to clean up a site at a fixed price. He covers himself with insurance in case unforeseen circumstances arise. The Pump & Treat system is reliable for this new business method, In-Situ is not. The bottom line is: The activated carbon industry is selling "RELIABILITY".

**Typically, issues which drive In-Situ remediation are:**

- Nature and extent of DNAPL and/or LNAPL.
- Current site use.
- Ability to isolate/contain the COC's on/in the site.
- Available utilities and working room on the site.
- Permeability, porosity, and transmissivity of both the vadose zone and the saturated zone.
- Sales pitch of low cost and minimal disruption of clients business.

Further useful guidelines for remediation are found in the Biomin Inc. Technical Bulletin # 12, [Remediation Principles](#), on our web site. The key for the proper decision is that the consultant generates a thorough understanding of the hydrogeology and site condition. That is not the place to save money and take short cuts.

**Biomin Short Course**

George Alther of Biomin Inc. will present a three hour workshop on October 18 on the use of organoclay in conjunction with activated carbon and other organoclay applications. This workshop will be a part of the 18th International Activated Carbon Conference & Courses program in Pittsburgh, PA.

Call BIOMIN, Inc. for further information.

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