

RemBind: Immobilising Soil Contaminants

1. What is RemBind?

RemBind is a proprietary mix of activated carbon, aluminum hydroxide (amorphous) and other adsorption agents. These create a large internal surface area with mixed charges that bind chemical contaminants via ionic bonding, Van der Waals forces (adsorption) and other physical and chemical interactions. This binding reduces the leachability of the contaminants, mitigating effects on health and the environment.

2. What contaminants can RemBind immobilise?

In theory, RemBind will immobilise any organic contaminant including PCBs, PAHs, TPH, PCP, PFOS and PFC's (perfluorinated compounds) etc. It will also immobilise amphoteric metals including chromium and arsenic. It binds certain shorter chain organic molecules with a higher affinity than activated carbon (e.g. 6:2 FtS, PTBS).

3. How much product do I need to add? How do I know it will work for my soil?

Ziltek recommends running a simple bench-scale trial to determine the type and amount of RemBind required for your situation. Ziltek can undertake the trials (if you send us 5-10 kg of soil) or you can run them yourself using an easy-to-follow protocol. Typically, addition rates of 2% to 10% (w/w) are adequate for most situations. Trials can be completed in around 2 weeks.

4. Which grade of RemBind product is right for me?

The product is available in two grades: RemBind (standard) and RemBind Plus. RemBind is adequate for most applications, particularly for PAHs and TPHs. For contaminants with relatively low regulatory threshold values like PFCs, RemBind Plus is more suitable because it has a stronger binding capacity. Simple bench-scale trials will help to determine the right product for your situation (see answer 3 above).

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5. How do I add the product in the field?

RemBind is very simple to use. You basically add the product to the soil at the pre-determined addition rate and mix thoroughly. Then add water to 40% moisture content (apple crumble consistency) and leave to fix for 48 hours before collecting validation samples. Purpose-built soil blending equipment (e.g. pug mill) can be used to process 500 tonnes of soil per day, but a loader or backhoe can also be used for smaller volumes or budgets.

6. What is the cost?

Price on application, varies with volume and location. As a guide, the reagent cost is typically around \$15 to \$75 per tonne of soil depending on addition rates and product grade.

7. What is the availability of the product?

The product is available in 1m³ bulk bags and is generally available within 14 days from order depending on country location.

8. Why wouldn't I use activated carbon?

While activated carbon will bind a range of organic contaminants, it is relatively expensive and does not bind some shorter chain compounds with the same affinity as RemBind. These smaller compounds tend to be important from a regulatory perspective due to their high mobility (e.g. perfluorinated compounds PTBS, 6:2 FtS).

9. Has it been validated? Are there credible case studies?

Yes. RemBind has been used for many projects to treat PAHs, TPH, and PFCs on a large scale and at bench scale. It was used to treat 15,000 m³ of PAH impacted soil on Sydney harbour, Australia at an addition rate of 5%. This soil was reused onsite saving significant transport and disposal costs.

Another PAH project won a national award for environmental excellence in South Australia, treating 2,000 tonnes of soil from a manufactured gas plant for safe landfill disposal. At bench-scale, PFC impacted soil has been treated with RemBind to reduce leachability to <0.02 ug/L, well below the Minnesota Department of Health drinking water guideline of 0.3 ug/L. Project referees are available on request.

10. Has it got regulatory acceptance?

All full-scale projects completed to date have had specific regulatory approvals.

12. Can you leave treated soil on site?

Yes, depending on the jurisdiction and intended site use. In Sydney, Australia 15,000 m³ of treated soil was reused at an industrial site as part of a redevelopment.

13. Does the aluminum content affect reuse options?

The aluminium content of treated soil will generally be less than 1%. Aluminium is not considered a toxic substance at these levels. Some jurisdictions will have regulatory thresholds for aluminium for contaminated sites but these are relatively high.

14. What if I have other inorganic co-contaminants in my soil such as heavy metals?

Specific amendments can be added to RemBind to tailor a solution for most situations. For example, to treat lead co-contaminants, a phosphate-based amendment can be added to RemBind by the manufacturer to facilitate a single-step addition rate in the field. Contact Ziltek for your specific treatment requirements.

15. Does it also treat water?

Yes, RemBind also effectively treats contaminants in water by removing them from the water. It is particularly effective in removing PFC compounds from waste water and groundwater with trial results available from independent studies conducted in Germany. It can potentially be used in pump-and-treat systems, bed filters, slurry reactors and permeable reactive barriers.

16. After water treatment, what do you do with the spent RemBind?

It can be discarded safely as immobilised waste or can be regenerated for reuse through a proprietary washing process. Contact Ziltek for further information.

17. RemBind doesn't actually destroy the contaminants, what are the implications?

RemBind immobilises contaminants in soil with proven long term stability using the most rigorous test available worldwide (US EPA method 1320). Immobilisation is a very cost-effective and immediate solution. Other treatment technologies are expensive and time consuming and have variable efficacy. For example, for PFOS contaminants, incineration temperatures of >1,100°C are required to destroy the contaminant – this is an extremely expensive process and is not suitable for small volumes for soil.