

Offsite Immobilisation and Disposal of PFAS Impacted Soil in New Zealand

Background

A site in Christchurch, New Zealand required 250 tonnes of PFAS impacted soil to be disposed offsite, however the total PFAS levels in the soil exceeded landfill acceptance criteria.

Enviro NZ was engaged by the client to provide a solution for the stockpiled soil. An innovative approach was proposed that involved reducing the leachability of PFAS using the commercial sorbent RemBind to allow disposal to landfill based on reduced leachability.

A landfill was identified that could accept the soil for disposal if it met the following PFAS leachability criteria: <0.01 µg/L for PFOS, PFOA and PFHxS and <0.50 µg/L for the sum of 31 PFAS analytes, as measured by the Toxicity Characterisation Leaching Procedure (TCLP) at pH 7.

Table 1: Total PFAS levels in stockpiled soil

PFAS Concentration (µg/kg)	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
PFHxS	4.4	20	18	94	46	48
PFOS	10	350	190	220	1,400	1,000
PFOA	<10	3.5	5	13	18	9.1

Methodology

PFAS impacted soil was blended with 2% RemBind using a mixer bucket with a spinning blade on the inside and an exit chute with a screen. This ensured a thorough mix and good surface area contact between the soil and sorbent. Water was added during mixing to achieve a final moisture content of around 5%; this assisted the binding process and dust control. 12 treated soil samples were analysed for PFAS leachability using the TCLP procedure at pH 7.



Figure 1: Adding RemBind to the soil in a bucket mixer

Results and Discussion

Table 1 shows that the total levels of PFOS ranged between 10 and 1,400 µg/kg in the untreated soil. In treated soil, the leachability of PFOS, PFHxS, PFOA and sum of PFAS (31 analytes) were all reduced to the laboratory Level of Detection (LOD) for all 12 samples analysed (Table 2). Based on these results, treated soil was accepted for landfill disposal.

Table 2: PFAS concentrations in soil leachates following immobilisation using RemBind

Sample ID	PFOS (µg/L)	PFOA (µg/L)	PFHxS (µg/L)	Sum of PFASs (n=31) (µg/L)
137	<0.01	<0.01	<0.01	<0.50
138	<0.01	<0.01	<0.01	<0.50
139	<0.01	<0.01	<0.01	<0.50
140	<0.01	<0.01	<0.01	<0.50
141	<0.01	<0.01	<0.01	<0.50
142	<0.01	<0.01	<0.01	<0.50
143	<0.01	<0.01	<0.01	<0.50
144	<0.01	<0.01	<0.01	<0.50
145	<0.01	<0.01	<0.01	<0.50
146	<0.01	<0.01	<0.01	<0.50
147	<0.01	<0.01	<0.01	<0.50
148	<0.01	<0.01	<0.01	<0.50

Conclusions

The innovative approach used by Enviro NZ provided a successful solution for the client, allowing the PFAS contaminated soil to be removed so the site could be repurposed with no ongoing PFAS risk. The offsite treatment of the soil using the commercial sorbent RemBind allowed the soil to be accepted for safe landfill disposal based on reduced leachability, paving the way for the offsite treatment and disposal of PFAS impacted soils in New Zealand.