PFAS Immobilization at an Electroplating Site in New Zealand

Introduction

Built in the 1980's, a foundry and electroplating facility located in New Plymouth, New Zealand, had been using a mist suppressant in its chromium bath which contained Poly- and Perfluoroalkyl Substances (PFAS). The objective of the remediation of the PFAS contaminated soil was to stabilise the PFAS in the soil for on- or off-site disposal.

The PFAS contamination was present to a depth of approximately 3 metres at the locations of the former chromium bath and trade waste interceptor. The source of the PFAS was the demisting additive used in the chromium bath which contained the heat resistant surfactant Perfluorooctanesulfonic acid (PFOS).

Bench testing of the effectiveness of stabilisation with the PFAS adsorbent RemBind, was undertaken by ChemWaste. Tests were carried out with 1%, 2%, 4% and 8% RemBind. Even at the 1% and 2% dosage, RemBind reduced the concentration of PFAS in the leachate to non-detect (<0.01 µg/L).

Materials and Methods

The contaminated soil was blended and homogenised by rotary hoe prior to application of RemBind. Blending of the RemBind into the soil was also carried out using a conventional rotary hoe. Soil samples were collected before and after treatment.

The soil samples were analysed for total PFAS and Australian Standard Leaching Procedure (ASLP) tests (Australian Standard AS4439). The analyses were conducted using pH 5 leaching fluid and deionised water, representing "worst case" leaching conditions, to simulate conditions for landfill and on-site encapsulation. All PFAS analyses were carried out by Eurofins Environmental Testing Australia Pty Ltd in Brisbane, QLD, Australia.

Outcomes

Based on bench scale results, 300 tonnes of soil contaminated with PFAS was treated with RemBind. Due to operational constraints the blending was carried out in two stages. The first stage involved blending 1% RemBind into the soil and the second stage involved mixing a further 0.7% RemBind into the soil.

The 300 tonnes of vulcanic ash soil contaminated with 58 mg/kg PFOS was successfully treated on-site with RemBind. The concentration of PFOS in the leachate of the untreated soil was on average 0.55 µg/L. After stabilisation with 1 % RemBind, the concentration in the leachate dropped to below 0.01 µg/L. The addition of a further 0.7 % RemBind did not further reduce the PFAS concentration in the leachate.

RemBind Dosage	PFOS Leachate µg/L		
	South Pile	Middle Pile	North Pile
0%	0.61	0.56	0.47
1%	<0.01	<0.01	<0.01
1.7%	<0.01	<0.01	<0.01

Conclusions

On-site stabilisation of PFAS compounds in soil was successfully achieved with RemBind, which was applied using a conventional rotary hoe. The concentration of total PFAS compounds in the leachate following treatment was < 0.01 µg/L. On-site treatment and reuse is more sustainable and more cost-effective than transporting the soil to a landfill.

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