Case Study

Immobilisation and On-site Reuse of Soils Contaminated with Arsenic and Chromium - A Circular Approach

Background

A former wood treatment plant near Adelaide, South Australia, was being upgraded for commercial use when it was found to have arsenic and chromium levels exceeding state landfill guidelines.

The site owner evaluated various management options and chose immobilisation followed by on-site reuse of treated soil as the most cost-effective and sustainable solution, aligning with Circular Economy principles.

Landfill disposal was deemed expensive and unsustainable, especially given the shallow groundwater, which made on-site reuse without immobilisation environmentally unacceptable due to the risk of contaminant leaching.

Methodology

Soil samples were collected and subjected to treatability testing using 1-5% by weight of RemBind® 100 and RemBind® 400. Upon successful lab results, 1,600 tonnes of soil treated on-site with 5% RemBind® 100 and 5% RemBind® 400. Validation samples confirmed treatment efficacy through ASLP analysis.

Conclusions

This project demonstrated that immobilisation with RemBind® 100 and RemBind® 400 provides a cost-effective and sustainable alternative to landfill for soil contaminated with chromium and arsenic, and is consistent with a Circular Economy approach, including the avoidance of landfill disposal and the beneficial reuse of an industrial by-product.

Figure 1: Approval was granted to place treated soil in an onsite lined repository consistent with a sustainable circular economy approach

Figure 2: Aerial view of Chromium and Arsenic Contaminated Soil being Immobilised with RemBind®

Results and Discussion

Bench-scale testing revealed that a 5% addition of RemBind® 100 reduced arsenic leachability by 81% (from 4.25 mg/L to 0.8 mg/L) and a 5% addition of RemBind® 400 reduced chromium leachability by 95% (from 0.75 mg/L to 0.04 mg/L).

Validation samples from full-scale treatment showed a reduction of arsenic leachability by 87% and chromium leachability by over 99%, leading to approval for soil reuse under a paved area.

This approach was sustainable and cost-effective, avoiding landfill disposal while maintaining a low carbon footprint compared to traditional remediation methods.

Table 1: Reductions in Chromium and Arsenic leachability following Treatment with RemBind® and RemBind® 400

Test	Metal	Soil Leachate Concentrations using ASLP Method @ pH 5		
		Untreated Soil	Treated Soil (5% RemBind® 5% 400)	% Reduction
Bench-Scale	Chromium	0.75 mg/L	0.04 mg/L	95%
	Arsenic	4.25 mg/L	0.8 mg/L	81%
Infield Validation	Chromium	0.75 mg/L	<0.0075 mg/L	>99%
	Arsenic	4.25 mg/L	0.55 mg/L	87%

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