



## A COMMERCIAL APPLICATION OF VIROSOIL™ TECHNOLOGY

### CASE STUDY: WESTROCK DEVELOPMENTS, AUSTRALIA

*“Virotec first performed laboratory test work and a small on-site trial... after highly successful results, Virotec were contracted to remediate approximately 2,700 meters cubed of contaminated soil. The ViroSoil™ Technology process successfully immobilised the heavy metals, allowing for safe and economic disposal into landfill.”*



*The contaminated site treated with ViroSoil™ Technology was in Townsville, Australia.*

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**PROBLEM**

Westrock Developments, a large property development company, sought to find an economic solution to the remediation of an old contaminated industrial site. Due to the highly sought after location of the contaminated site on the Ross River, Townsville, there were substantial financial drivers for Westrock Developments to re-develop the site.

The contaminated site, in an industrial area, could not be simply excavated and transferred directly to local landfill due to high leachable heavy metal loads, predominantly lead. Accordingly, a suitable economic fixation method was required for treatment and disposal of about 2,700 cubic meters of soil to Townsville City Council's landfill.



*The property on the Ross River, Townsville.*

**VIROTEC TOTAL SOLUTION**

Virotec's ViroSoil™ Technology solution to this problem included the design, engineering and application of ViroBind™ reagent to treat and remediate the contaminated soil. ViroSoil™ Technology successfully immobilized the heavy metals contained in the contaminated soil; such that it would pass all standard leaching tests and could be safely disposed to landfill.

The major advantages of using ViroSoil™ Technology for soil remediation are as follows:

- > Immobilisation of heavy metals to required levels.
- > Minimal bulking factor.
- > In-situ treatment.
- > High pH buffering capacity.

**BACKGROUND**

Westrock Developments are a large property development company based in Melbourne, Victoria. Westrock Developments are involved in civil contracting, both in Australia and overseas, and have been in the property development business for over 30 years.

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*Mixing ViroBind™ reagent with contaminated soil at the Ross River site using an excavator.*

Westrock Developments manage the remediation and development of many sites and this includes the Ross River site in Townsville, Queensland. This site was an old industrial site previously occupied by a cannery. As a result of over 20 years of operation, there was substantial soil contamination including high concentrations of copper, lead and zinc.

The property comprises an area of approximately four hectares. It is bound by the Ross River and has enormous economic potential for re-development.

It was the desire of Westrock Developments to remove the contaminated soil from the site to the local Townsville Council landfill. However, the limits imposed at the landfill for TCLP metal concentrations were significantly lower than the values measured in the contaminated soil. As a result, there was a need for an economic fixation method that could be applied in-situ.

The remediation work performed by Virotec followed three previous environmental investigations by Douglas Partners, a consultancy firm hired to determine the scope and level of contamination at the site.



*ViroBind™ reagent being mixed into contaminated soil.*

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*Left: Blending ViroBind™ reagent into contaminated soil using rotary mixer.  
Right: Stockpile of ViroBind™ reagent prior to blending with contaminated soil.*

### TREATMENT METHODS

The contaminated soil was treated *in situ* by a variety of mechanical mixing methods. During the initial environmental investigations, samples were taken from the natural material underlying the contaminated soil layer. The samples showed metal concentrations (including lead) to be below threshold levels, an indication that there has been minimal migration of metals to the underlying soil. Consequently, only the top 500mm of soil was treated using ViroSoil™ Technology.

The total volume of soil treated for this project was 2,700 cubic meters with a corresponding surface area of about 5,400 square meters. A comprehensive laboratory scale treatment was performed by Virotec to confirm blend and addition rates of ViroBind™ reagent prior to full-scale treatment.

### RESULTS

Table 1 presents the concentrations of various heavy metals in the contaminated soil. These are presented to characterise the type of soil contamination although under Queensland EPA regulations, the requirement for disposal to landfill is based upon leachable metal levels only.

Component	Value (mg/L)
Copper	1,800
Lead	3,300
Zinc	920

Table 1 – Metal Concentrations in Soil Prior to ViroBind™ Reagent Addition.

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The results shown in Table 2 demonstrate that soil treated using ViroBind™ reagent was well below the limits set for landfill acceptance. The results shown in Table 2 are averages for approximately 54 separate tests that were performed on the treated soil. Soil was sampled and analysed for each 50 cubic meters treated by ViroSoil™ Technology.

Component	Contaminated Soil TCLP Metals (mg/L)	Treated Soil using ViroSoil™ Technology TCLP Metals (mg/L)	Limit for Landfill Acceptance TCLP Metals (mg/L)
<i>pH</i>	<i>5.9</i>	<i>9.2</i>	<i>6 - 10</i>
<i>Copper</i>	<i>0.24</i>	<i>0.01</i>	<i>100</i>
<i>Lead</i>	<i>10.0</i>	<i>0.04</i>	<i>5</i>
<i>Zinc</i>	<i>18</i>	<i>0.02</i>	<i>500</i>

**Table 2 – Treated Soil Quality After Application of ViroSoil™ Technology**

The treated soil was sampled by a third party auditor, Douglas Partners environmental consultancy, and analysed by SGS, a NATA certified laboratory.

### CONCLUSION

ViroSoil™ Technology has the ability to dramatically reduce the leachable metal concentrations in the soil, allowing for acceptance into landfill. ViroSoil™ Technology, using ViroBind™ reagent, has proven to be applicable for the fixation of heavy metals in contaminated soil.

ViroBind™ reagent is non toxic and environmentally safe.



**Treated soil being transferred offsite to landfill.**

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## TESTIMONIAL

*“Virotec were contracted by Westrock Developments Pty Ltd to remediate an old industrial site at Townsville, Queensland. The site was contaminated with numerous heavy metals, and was particularly high in lead.*

*Virotec first performed laboratory test work and a small on-site trial to prove the efficacy of the ViroBind™ reagent. After highly successful results, Virotec were contracted to remediate approximately 2,700 meters cubed of contaminated soil. The ViroSoil™ Technology process successfully immobilised the heavy metals, allowing for safe and economic disposal into landfill.*

*Virotec staff were keen to co-operate with Westrock staff during the project and followed all safety and environmental procedures whilst on site.*

*I have no hesitation in recommending Virotec for any soil remediation project and look forward to working with Virotec in the future on other similar projects.”*

**JOHN DELANY**  
**Director**  
**Westrock Developments**