



A COMMERCIAL APPLICATION OF VIROFLOW™ TECHNOLOGY

CASE STUDY: PILK'S PINE, LOWANNA, NSW CCA - CONTAMINATED SOIL, LIQUID AND SLUDGE TREATMENT AND DISPOSAL

“For all types of contaminated materials at this site, ViroFlow™ Technology provided an effective and economic solution for contaminant control and site remediation.”



*Dosing of ViroBond™ reagent into leachate pool (left).
Treated soil after ViroFlow™ Treatment (above).*

>>> CASE STUDY: PILK'S PINE

PROBLEM

Virotec was contracted by Pilk's Pine to implement a total site remediation using ViroFlow™ Technology to treat and safely dispose of contaminated soil and sludge as well as treating a large leachate pond containing high concentrations of copper, chromium and arsenic. If the site was left as it was the company was facing probable prosecution by the NSW EPA.

VIROTEC TOTAL SOLUTION

Virotec used ViroFlow™ Technology to treat and safely dispose of a stockpile of contaminated soil. The key objective was to immobilise the solid waste containing copper, chromium and arsenic. The process was performed in accordance with New South Wales EPA guidelines and under an authorisation granted to Virotec by Richmond Valley Council for disposal.



A portion of the untreated CCA solid waste prior to treatment



>>> CASE STUDY: PILK'S PINE

In response to a request from Pilks Pine, Virotec Global Solutions also used ViroFlow™ Technology to treat the water in a 1,000,000 L leachate pond, after adding all of the contaminated water from a nearby pit (2,000 L). The treatment was designed to immediately lower copper, chromium and arsenic (CCA) concentrations to below NSW EPA treatment targets; and to improve overall water clarity. The affected pond had CCA loads that exceeded discharge limits and there was a need to minimise environmental risk. The sludge in the bottom of the pond was also contaminated and needed to be isolated.



Water contained in the pit shown above was also treated using ViroFlow™ Technology



Water testing of the leachate pond prior to implementing ViroFlow™ Technology

BACKGROUND

The treatment of logs with CCA begins with a steaming process that opens the cells in the timber. Once opened, these cells stay open, allowing more effective impregnation by the CCA solution. Copper and arsenic in the wood treating solutions protect the timber from insect and fungal degradation and the chromium chemically seals the copper and arsenic into the timber.

Pilks Pine, in Lowanna just outside Coffs Harbour, New South Wales, is a timber company that produces CCA treated timber for the local market. The company was facing possible prosecution by the NSW EPA as a result of an accidental CCA spill on site and wanted to remediate the site and reduce the risk to the surrounding environment.

TREATMENT METHODS

The ViroFlow™ Technology treatment designed for the contaminated soil and sludge comprised of a ViroBond™ reagent addition as detailed below. The Virotec Total Solution includes bench-scale testing before any on site treatment and ensures that each solids treatment application provides a custom-designed solution that meets all regulatory limits.

Virotec's proprietary ViroBond™ reagent is used for the treatment and immobilisation of copper, chromium and arsenic. ViroBond™ reagent was mixed with the solid waste on an impermeable clay-lined surface, using earth-moving equipment. The total volume treated was about 60 m³.

Treatment of the leachate pond water involved the use of two ViroBond™ reagents; ViroBond™ Reagent Part A and ViroBond™ Reagent Part B.

>>> CASE STUDY: PILK'S PINE



Treatment was applied using a loader

ViroBond™ Reagent Part B is Virotec's proprietary reagent for the treatment of copper, chromium and arsenic and it effectively adsorbs and binds copper, chromium and arsenic in a mineralised form that is highly resistant to leaching. ViroBond™ Reagent Part A compliments Part B and is necessary for effective coagulation of any solid precipitates in the leachate pond; it is also an aggressive treatment for the removal of organic matter.

The ViroBond™ reagent was premixed in a mixing vessel and subsequently sprayed over the surface of the pond. The spent reagent was then allowed to settle and form a blanket over the bottom of the pond, where metals were permanently trapped.



Dosing of ViroBond™ reagent into leachate pond, suspended heavy metals rapidly settle to the bottom following treatment

>>> CASE STUDY: PILK'S PINE

RESULTS

The results of the solid waste treatment are shown in Table 1, together with the NSW EPA criteria for disposal as ordinary landfill. Meeting the TCLP (Toxicity Characteristic Leaching Procedure, US EPA) criteria is essential if the treated waste material is to be disposed of as ordinary (environmentally benign) landfill.

TABLE 1: ANALYSIS OF TREATED SOLID WASTE

	Total Concentration (mg/kg)		Total TCLP (mg/L)	
	After ViroFlow™ Technology Treatment	NSW EPA Solid Waste Limit	After ViroFlow™ Technology Treatment	NSW EPA Solid Waste Limit
Copper	806 714 829 1060	No limit set	0.08 0.06 0.06 0.06	No limit set
Chromium (VI)	1.5 1.3 1.7 1.5	1900	<0.05 <0.05 <0.05 <0.05	5
Arsenic	278 286 317 441	500	<0.5 <0.5 <0.5 <0.5	5

For the treated pond water, potential contaminant concentration limits imposed by the Australian and New Zealand Environment and Conservation Council (ANZECC) 2000 guidelines must be met before water can be released to the environment without restriction.

After treatment with ViroFlow™ Technology, a total of four samples were taken from the leachate pond at regularly spaced intervals and sent to a NATA certified laboratory for trace element analysis. The results of these analyses are shown in Table 2.

After treatment with ViroFlow™ Technology, a total of four sludge samples were also taken, at regular spaced intervals, from the top layer of sediment in the leachate pond and sent to a NATA certified laboratory for trace element analysis. The results are shown in Table 3.

>>> CASE STUDY: PILK'S PINE

TABLE 2: LEACHATE POND CCA ANALYSIS

Analyte	Before Treatment	After Treatment	Treatment Target
Copper (mg/L)	0.08	0.01 0.01 0.01 0.01	0.002
Chromium (mg/L)	0.623	<0.005 <0.005 <0.005 <0.005	0.002
Arsenic (mg/L)	0.54	<0.001 <0.001 <0.001 <0.001	0.05
pH	6.92	7.60 7.54 7.50 7.43	6.5 – 8.5

Note: (1) The treatment targets are the ANZECC (2000) guideline limits for discharge to natural waters. (2) The leachate pond has a capacity of 1,000,000 L.

TABLE 3: TOP LAYER OF SEDIMENT FROM THE LEACHATE POND, AFTER TREATMENT WITH VIROFLOW™ TECHNOLOGY

Analyte	Total Concentration		TCLP Concentration	
	Sediment Sample (mg/kg)	EPA INERT Waste Classification Limit (mg/kg)	Sediment Sample (mg/L)	EPA INERT Waste Classification Limit (mg/L)
Copper	-	No limit set	-	No limit set
Chromium	92 130 63 110	1900	<0.01 <0.01 <0.01 <0.01	0.5
Arsenic	0.19 0.20 0.20 0.21	500	<0.01 <0.01 <0.01 <0.01	0.5

>>> CASE STUDY: PILK'S PINE



Treated CCA stockpile after ViroFlow™ Treatment

CONCLUSION

ViroFlow™ Technology successfully treated all the CCA contaminated solids to a sufficiently high standard that they met the New South Wales EPA criteria for disposal of liquid and non-liquid waste in landfill.

ViroFlow™ Technology was also successful in lowering copper, chromium and arsenic concentrations in the leachate pond water to below ANZECC 2000 targets for discharge to the environment and improving general water quality in the leachate pond.

Contaminant concentration analyses showed that the sediment layer and precipitated blanket at the bottom of the leachate pond is classified as INERT under NSW EPA Guidelines for Assessment, Classification and Management of Liquid and Non-Liquid Wastes.

For all types of contaminated materials at this site, ViroFlow™ Technology provided an effective and economic solution for contaminant control and site remediation.