

A COMMERCIAL APPLICATION OF VIROFLOW™ TECHNOLOGY

CASE STUDY: CUSTOM CHROME

“ElectroBind™ reagent provided a highly effective solution, both economically and environmentally, for immobilising metal contaminants in the solid electroplating waste so that they could not become an environmental hazard.”



Custom Chrome
Shopfront (left)



>>> CASE STUDY: CUSTOM CHROME

PROBLEM

Custom Chrome, in Queensland, Australia, operates a small to medium scale electroplating business and was faced with a serious environmental hazard resulting from the storage of its solid waste. The waste had been stored outside in drums and some of these drums had ruptured allowing the contaminated contents to leak, via the drainage system, into storm water runoff resulting in contamination of a nearby river system. The company was being prosecuted by the Gold Coast City Council and was ordered to remediate the problem immediately.



Electroplating waste leaching out of containers directly into storm water drains and ending up in the river system causing contamination of aquatic ecosystems.

VIROTEC TOTAL SOLUTION

Virotec was commissioned by Custom Chrome to treat the solid waste from its electroplating plant using ViroFlow™ Technology, a total solution service that includes reagents, technical support, treatment outcome validation and liaison with regulatory authorities. ViroFlow™ Technology was implemented with the following outcomes:

- > A substantial reduction in heavy metal concentrations in solid waste resulting in full compliance with Queensland EPA solid waste disposal limits. All metals are now consistently below the required thresholds prior to disposal to landfill.
- > Removal and re-capping of the contaminated soil areas.
- > Potential for re-classification of solid as a non-hazardous residue, providing further cost savings.

>>> CASE STUDY: CUSTOM CHROME

BACKGROUND

Electroplating is a process that coats surfaces for a wide range of common applications, including automobile, motorcycle, truck and bus parts, boat fixtures, bathroom and kitchen fittings, toys and many other applications. Electroplating is widely used because of its versatility and because the plated surfaces are resistant to wear and corrosion. Custom Chrome's primary business involved chrome plating automotive parts.

In the electroplating process a thin layer of metal is deposited onto a base metal or other conductive material to enhance or change the appearance of the surface, and to provide protection from corrosion (e.g. rust protection). Some of the benefits of electroplating include: increased durability, corrosion resistance, increased conductivity; chrome, nickel and silver plating can produce a mirror-like finish.



Electroplating Plant

Wastes from the electroplating process commonly contain high concentrations of metals such as chromium and nickel that can be highly hazardous to humans and to the environment if not managed effectively.

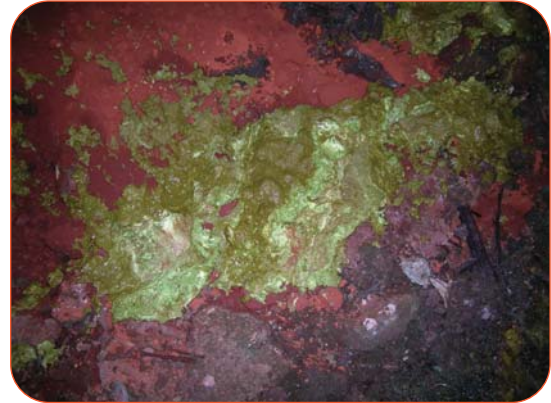
Custom Chrome contacted Virotec Global Solutions to treat the solid waste produced during ongoing electroplating operations.

Previous work by Virotec had shown that ViroFlow™ Technology has a remarkable ability to remove heavy metals (including copper, zinc, tin, iron, nickel and chromium) from electroplating industry process waste. At the time, Custom Chrome was being prosecuted by the Gold Coast City Council for failing to contain this environmentally hazardous waste effectively, and was ordered to remediate the problem immediately or risk facing a much higher fine.

>>> CASE STUDY: CUSTOM CHROME



Electroplating waste leaking from containment drums into the soil from which it could be transported to nearby ecosystems during future rainfall events.



Electroplating solid waste before complete mixing with ElectroBind™ reagent.

TREATMENT METHODS

ViroFlow™ Technology was implemented to treat the solid electroplating waste using ElectroBind™ reagent, which was mixed in with the solid waste using a Bobcat.

About 20 tonnes of waste were successfully treated using the ElectroBind™ reagent and the treated waste was then analysed to determine the leachable metal concentrations. The results achieved by using ElectroBind™ reagent to treat the contaminated solid waste are presented in Table 1.



ElectroBind™ reagent was mixed with the solid electroplating waste with a Bobcat.

>>> CASE STUDY: CUSTOM CHROME

RESULTS

The results show that the leachable concentrations of all metals in the waste were reduced to well below the limits for double lined landfill; for most elements the metal concentrations in leachates were reduced to about one hundred times below the allowable limit for landfill disposal. Immediately following treatment, the company was able to dispose of their waste to landfill safely and economically.

TABLE 1: CONCENTRATIONS OF METALS AFTER ELECTROBIND™ REAGENT ADDITION

Contaminants	Treated waste results (mg/kg)	Duplicate treated waste results (mg/kg)	TCLP contaminant thresholds for double lined landfills (mg/L)
<i>Antimony</i>	<i><0.002</i>	<i><0.002</i>	<i>5</i>
<i>Arsenic</i>	<i><0.001</i>	<i><0.001</i>	<i>5</i>
<i>Barium</i>	<i><0.005</i>	<i><0.005</i>	<i>100</i>
<i>Cadmium</i>	<i>0.008</i>	<i>0.002</i>	<i>0.5</i>
<i>Chromium</i>	<i>0.02</i>	<i>0.02</i>	<i>5</i>
<i>Cobalt</i>	<i><0.02</i>	<i>0.02</i>	<i>5</i>
<i>Copper</i>	<i>0.04</i>	<i>0.27</i>	<i>100</i>
<i>Lead</i>	<i>0.008</i>	<i>0.013</i>	<i>5</i>
<i>Mercury</i>	<i>0.001</i>	<i>0.001</i>	<i>0.1</i>
<i>Molybdenum</i>	<i><0.01</i>	<i><0.01</i>	<i>5</i>
<i>Nickel</i>	<i>1.3</i>	<i>3.2</i>	<i>5</i>
<i>Selenium</i>	<i>0.01</i>	<i>0.01</i>	<i>1</i>
<i>Silver</i>	<i><0.002</i>	<i><0.002</i>	<i>5</i>
<i>Thallium</i>	<i><0.001</i>	<i><0.001</i>	<i>1</i>
<i>Tin</i>	<i><0.05</i>	<i><0.05</i>	<i>3</i>
<i>Vanadium</i>	<i>0.04</i>	<i>0.04</i>	<i>5</i>
<i>Zinc</i>	<i>0.83</i>	<i>1.1</i>	<i>100</i>

>>> CASE STUDY: CUSTOM CHROME

CONCLUSION

After treatment with ViroFlow™ Technology using ElectroBind™ reagent, the concentrations of metals that could be leached from the solid waste using the standard TCLP leaching test were well below the EPA's allowable limits for disposal to landfill and for many elements were below detection limits.

ElectroBind™ reagent provided a highly effective solution, both economically and environmentally, for immobilising metal contaminants in the solid electroplating waste so that they could not become an environmental hazard. The solution is quick and the results are permanent.



Electroplating waste treated with ElectroBind™ reagent and ready to be disposed to landfill.