



A COMMERCIAL APPLICATION OF VIROFLOW™ TECHNOLOGY

CASE STUDY: LARGE CCA TREATMENT PLANT

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Above: One of the leachate ponds with heavy metal concentrations which were successfully treated with ViroFlow™ Technology.

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PROBLEM

A large-scale CCA treatment plant was experiencing difficulties maintaining compliance with discharge limits. As part of their environmental licence, discharge limits imposed by the EPA must be met before any water can be released from the site. In line with their corporate environmental objectives, there was a need for corrective action, continual improvement and long-term management of the leachate ponds.

The company had been searching for a cost-effective technology capable of treating the copper, chrome, and arsenate (CCA) contaminated water in the leachate ponds. The key objective was to treat the water in the leachate ponds to immediately reduce CCA concentrations to below discharge limits; and improve overall water clarity.



Figure 1 – Air-dried treated logs.

VIROTEC TOTAL SOLUTION

The solution involved the adoption of Virotec's ViroFlow™ Technology using proprietary Viro-Bond™ reagent. The ViroFlow™ Technology application involved a custom designed treatment that was applied in two separate stages. The implementation of ViroFlow™ Technology achieved the following outcomes:

- > Elimination of a major environmental hazard, and a potential environmental incident.
- > Treated water was released with copper, chromium and arsenic concentrations that were well below EPA Guideline limits.
- > Fast mobilisation and treatment time.
- > Customer satisfaction.

The ViroFlow™ Technology comprised the following elements:

- > Initial full analysis and characterisation of the water;
- > Chemical treatment of the contaminated water to remove CCA and improve water clarity;
- > Validation of treated water quality;
- > Ongoing technical support; and
- > Liaison with regulatory authorities.

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Figure 2 - The treated timber storage.

BACKGROUND

At this large-scale CCA treatment site (approximately 16 ha), pine logs are debarked, steamed and treated, to produce preserved timber logs. About 20,000 cubic metres are treated at the plant per year.

Treatment of the logs begins with a steaming process that opens the cells in the timber. Once opened, these cells stay open, allowing a more effective impregnation. The chemical treatment used is known as CCA. Copper and arsenic protect the timber from insect and fungal degradation, and chromium is used to chemically seal the copper and arsenic into the timber. The amount of CCA used at the plant is approximately 105 tonnes per year.

After treatment, the logs are stored in a holding bay, where they are air-dried. During the warmer months the minimum holding time is five days, whereas the minimum holding time in the colder months is 12 days. Water containing CCA often seeps from the logs as they are drying. The leachate is contaminated with copper, chromium and arsenic and when it rains, it is washed into collection ponds at the back of the site.

As a result, water in the ponds is often contaminated with arsenic, chromium and copper and is not suitable to release into the environment. Prescribed water quality standards imposed by EPA must be met before the water can be released.



Figure 3 - The stormwater drain leading from the timber storage area to leachate pond.

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Figures 4 & 5 - Leachate ponds at the facility.

TREATMENT METHODS

The ViroFlow™ Technology treatment involved a two-stage chemical addition as detailed below. Each pond was subject to a slightly different chemical dosing regime to optimise effectiveness. The Virotec treatment ensured that each pond had a treatment that was custom-designed to produce high quality water that met or surpassed all discharge requirements as economically as possible. The treatment was planned using 20 litre samples sent to Virotec's laboratory.

> **Stage 1 – ViroBond™ Reagent Part A Treatment**

ViroBond™ Reagent Part A is Virotec's proprietary reagent effectively adsorbs and binds copper, chrome and arsenic from the leachate ponds.

ViroBond™ Reagent Part A was premixed in a mixing vessel (see Figure 6) and subsequently sprayed over the surface of the ponds. The spent reagent was allowed to settle and form a blanket over the bottom of the ponds, where metals were permanently trapped. The pond pH was increased to 9.0 after addition of ViroBond™ Reagent Part A.



Figure 6 - Pre-mixing of ViroBond™ Reagent Part A™.

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> Stage 2 – ViroBond™ Reagent Part B Treatment

ViroBond™ Reagent Part B complimented Part A and was necessary for effective coagulation of fine suspended particles in the leachate pond. ViroBond™ Reagent Part B was also an aggressive treatment for the removal of organic matter in the water. After application, the pond pH was reduced to 3.5. Minor post-treatment pH adjustment ensured the water met all discharge requirements.

RESULTS

After treatment with ViroFlow™ Technology, copper, chromium and arsenic concentrations were dramatically reduced in both leachate ponds. Treatment results are summarised in Tables 1 and 2.

TABLE 1: LEACHATE POND NO.1 – POND CAPACITY: 300,000 L

Analyte	Before Treatment	After Treatment	Discharge Limit
pH	6.5	7.8	6.5 - 8.5
Copper (mg/L)	0.076	0.01	1.0
Chromium (mg/L)	0.096	0.015	0.5
Arsenic (mg/L)	0.091	0.029	0.05

TABLE 2: LEACHATE POND NO.2 – POND CAPACITY: 500,000 L

Analyte	Before Treatment	After Treatment	Discharge Limit
pH	6.8	7.9	6.5 - 8.5
Copper (mg/L)	0.142	0.01	1.0
Chromium (mg/L)	0.498	0.06	0.5
Arsenic (mg/L)	0.124	0.009	0.05

All analyses were performed by a Government operated laboratory with NATA certification.

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The figure below show the visual appearance of the leachate pond No. 1 post treatment. It was noticed that there was a substantial improvement in water clarity and odour.



Figure 7 – Pond No.1 after Treatment.

CONCLUSION

Treatment using ViroFlow™ Technology treatment successfully in reduced copper, chrome and arsenic concentrations to well below discharge requirements and substantially improved general water quality and odour in the leachate ponds.

ViroFlow™ Technology has proven to be cost-effective for the treatment of CCA contaminated leachate ponds.

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TESTIMONIAL

“Our company commenced association with Virotec Global Solutions back in February 2002. I happened to see where Virotec had successfully treated cyanide contaminated water in Romania and upon realisation that this cyanide contaminated water also contains arsenic, I began to consider how this treatment could benefit our company. After several discussions with Virotec it became apparent that ViroMine™ Technology, used with great success in Romania, could be modified and applied to our site.

Our site is a Timber preservation facility and has been in operation since the late 1950’s. We are continually on the look out for environmental improvements and with our commitment to adherence to the stringent limits placed on our plant as far as water emission quality goes, the opportunity to improve water quality was seen as beneficial to all parties.

After several samples were extracted from our two settling ponds and sent to Virotec’s laboratory for test work, Virotec visited our site and successfully treated both of our settling ponds with ViroFlow™ Technology with outstanding results. Levels of metals in these ponds were reduced dramatically and well below our licence limits. Further monitoring of these ponds is now being conducted to explore the length of time each treatment will be effective.

Throughout this whole process Virotec personnel have remained diligent, totally professional and committed to the cause both whilst on site and off. I would have no hesitation in recommending Virotec to any other company either with environmental problems or a commitment to improving current practices.”

**Operations Manager
Large CCA Treatment Plant**