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Chief Commercial Officer  
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Bauxsol Technology

Industrial Waste Water  
Treatment





We develop, manufacture, distribute, apply and license market-driven environmental products and services for water, soils and sewage effluent



- Company started on ASX 1999 as Tin Australia
- Restructured and changed name to Virotec February 2000, same time as platform technology patents filed
- Listed on AIM in July 2001
- Currently has 50 employees, over 20 scientists and operates in USA, Europe, Australia and Asia
- Now offering a global product portfolio of solutions to environmental problems



## BACKGROUND

In 1999, the company owned a **35 acre** tailings dam that threatened to break its banks and spill toxic water into a large Australian drinking water catchment

## CHALLENGE:

**Acid Mine Drainage** water laden with heavy metals - No known remedy or treatment available.

## SOLUTION:

Apply new technology developed by researchers from **Southern Cross University** in a 'world first' in situ treatment

## RESULTS:

In excess of **1.5 billion litres** of toxic water was treated to stringent **ANZECC** requirements for **aquatic ecosystems** protection and millions of litres were then discharged into local waterways without a permit.



## ALUMINA REFINERIES

Est. **50 - 80 million metric tons** of caustic 'red mud' material produced globally every year and stored in waste ponds throughout the world



## BASECON<sup>®</sup> TECHNOLOGY

World first 'Neutralization & Conversion' technology for converting millions of tonnes of caustic waste - past & future – into a benign neutralized material - **BAUXSOL<sup>®</sup>**



## BAUXSOL<sup>®</sup> TECHNOLOGY

World first platform technology using the benign neutralized material – **BAUXSOL<sup>®</sup>** - as a raw material in a diverse & multiple range of patented products for industrial and environmental applications

# Bauxsol Technology



- Dry red solid containing a cocktail of minerals
- Supplied as a slurry in a 40% solution
- Material has a typical pH 8.6
- Fine particles of an average size 10 microns across
- Large surface area to mass ratio
- High charge to mass ratio
- Large acid neutralizing capacity about 2.5 – 7.5 moles / Kg
- High trace metal trapping capacity of 1000 milliequivalents / Kg
- Also has high capacity to trap Phosphate and other chemical species



# VIROFLOW

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cleaner systems....naturally

ViroFlow division formed to ensure application Bauxsol® Technology was optimized for improved cost & environmental efficiencies in the treatment of industrial waste waters



# VIROFLOW

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cleaner systems....naturally

- Tannery Effluent
- Electroplating Factory effluent
- Cobalt Rich waste water from plastic manufacturing
- Mercury metal trapping from ground water old industrial site and pulp and paper mills
- Proposed treatment of lead in ground water from old industrial site and Arsenic trapping from polluted ground water.



# TANNERIES

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Main problems facing tanneries today

- Cost of production, competing with the old Eastern block countries
- Increasingly stringent regulation limits for waste water standards
- Toxic Cr(III) rich waste water and solid waste
- Odour production



# TANNERIES

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Solutions achieved by use  
of ViroChrome product

- Stripping out of over 99% of Cr(III) present in the waste water
- Locking up of the metals present in the waste solids produced by the process
- Reduction in odour
- Reclassification of solids for disposal
- Neutralisation of any acidity in waste water



# TANNERIES

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Science of ViroChrome  
reagent

- Initial adsorption on to the surface of the reagent by the trivalent (CrIII) ions present
- Attracted by the high charge to mass ratio of the reagent and its heterogeneous mineral surfaces
- The readily soluble alkaline minerals present then supply the hydroxides, carbonates and hydroxy carbonate groups needed to form insoluble precipitates of the metal

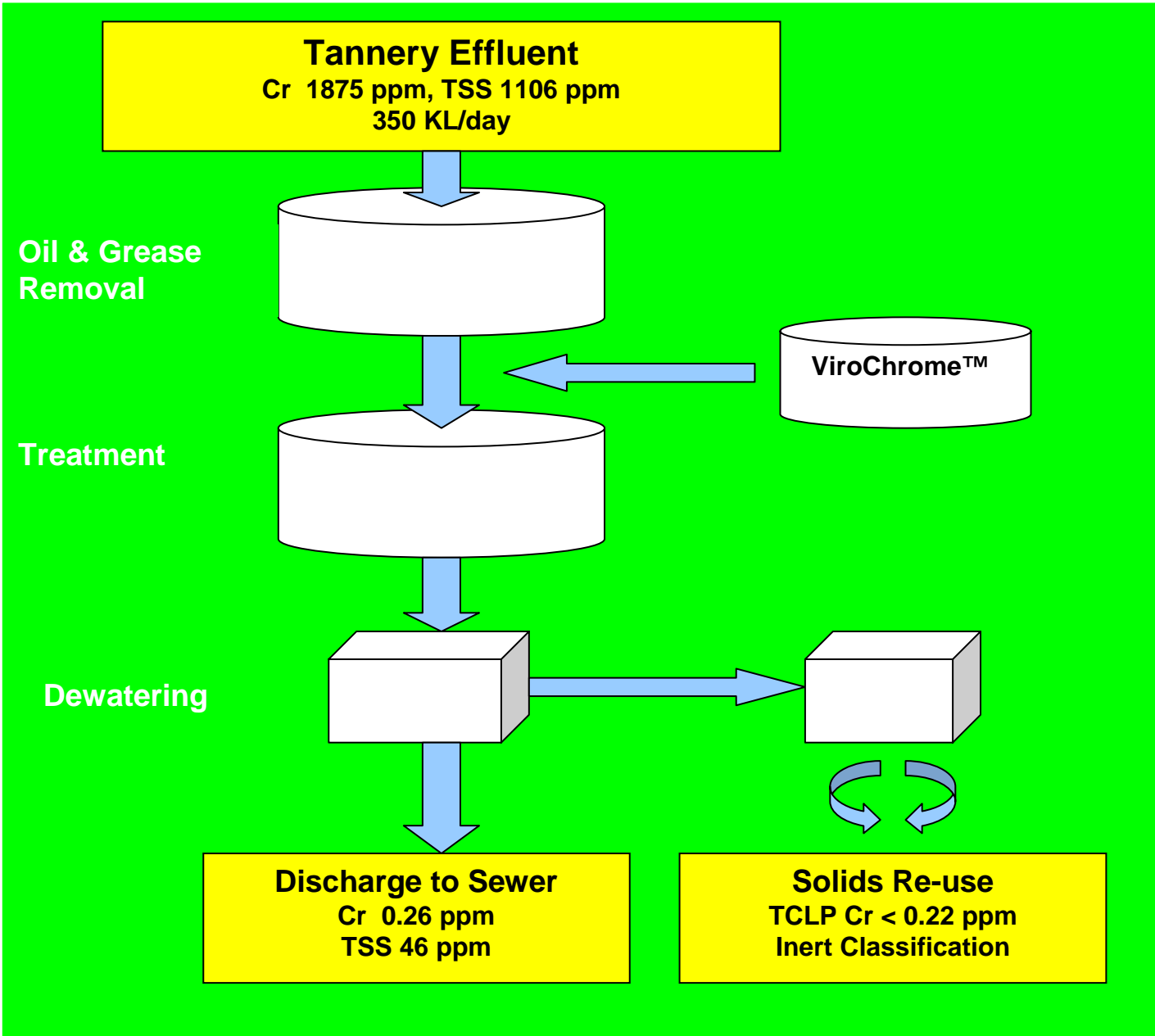
# Case Study



- Large scale tannery with following problems
  - Non compliance with Local Water Authority trade waste standards
  - High volume of unstable, hazardous sludge
  - Significant odour problems
- The results achieved after ViroFlow implementation
  - Compliance with Local Water Authority Standards
  - Potential water re-use due to improved effluent quality
  - Significant landfill cost savings due to sludge reclassification
  - Potential for solids re-use (TCLP <0.22 ppm / Inert Classification)
  - Comprehensive metal ion removal ( CrIII at 0.26ppm & TSS 46 ppm)



<i>Technical Data</i>		Existing Technology	ViroFlow™ Technology
	<i>Influent</i>	<i>Effluent</i>	<i>Effluent</i>
Waste water volume (KL/month)	7,000		
pH	6.3	6.6	8.4
Chromium III (ppm)	15.0 - 20.0	7.00 - 12.51	0.26
Biological Oxygen Demand (ppm)	1,163	717	864
Total Suspended Solids (ppm)	1,106	70.0	46.0
Total Phosphorus (ppm)	5.6	0.75	0.55
Odour	High	Medium	Zero
Sludge Volume (T/month)		464	
TCLP Chromium III (ppm)		>20.0	0.22
Sludge Waste Classification		Hazardous	Inert





## TANNERIES

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### Implementation of solution

- Reagent added to the effluent pipeline after fat, oil and grease removal (ideal but not essential)
- Machinery needed was slurry pump to add the reagent and storage tank to hold and mix the reagent prior to addition
- All settling and separation was carried out using the in situ tanks and plant machinery adapted for use with Viroflow solution



# Electroplating Industry

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Problem areas in  
electroplating process

- Waste water characterised by high levels of Zinc, Chrome III, Iron and others
- Current treatment methods produce large volumes of difficult to handle sludge
- This is unstable and costly to dispose of as it



# Electroplating Industry

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Advantages of using  
ElectroBind technology

- Significant reduction in heavy metals in the effluent waters
- Reduction in sludge volumes
- pH buffering capacity
- Increased settling times, resulting in increased water quality
- Decreased scaling rates in plant machinery, resulting in more efficient

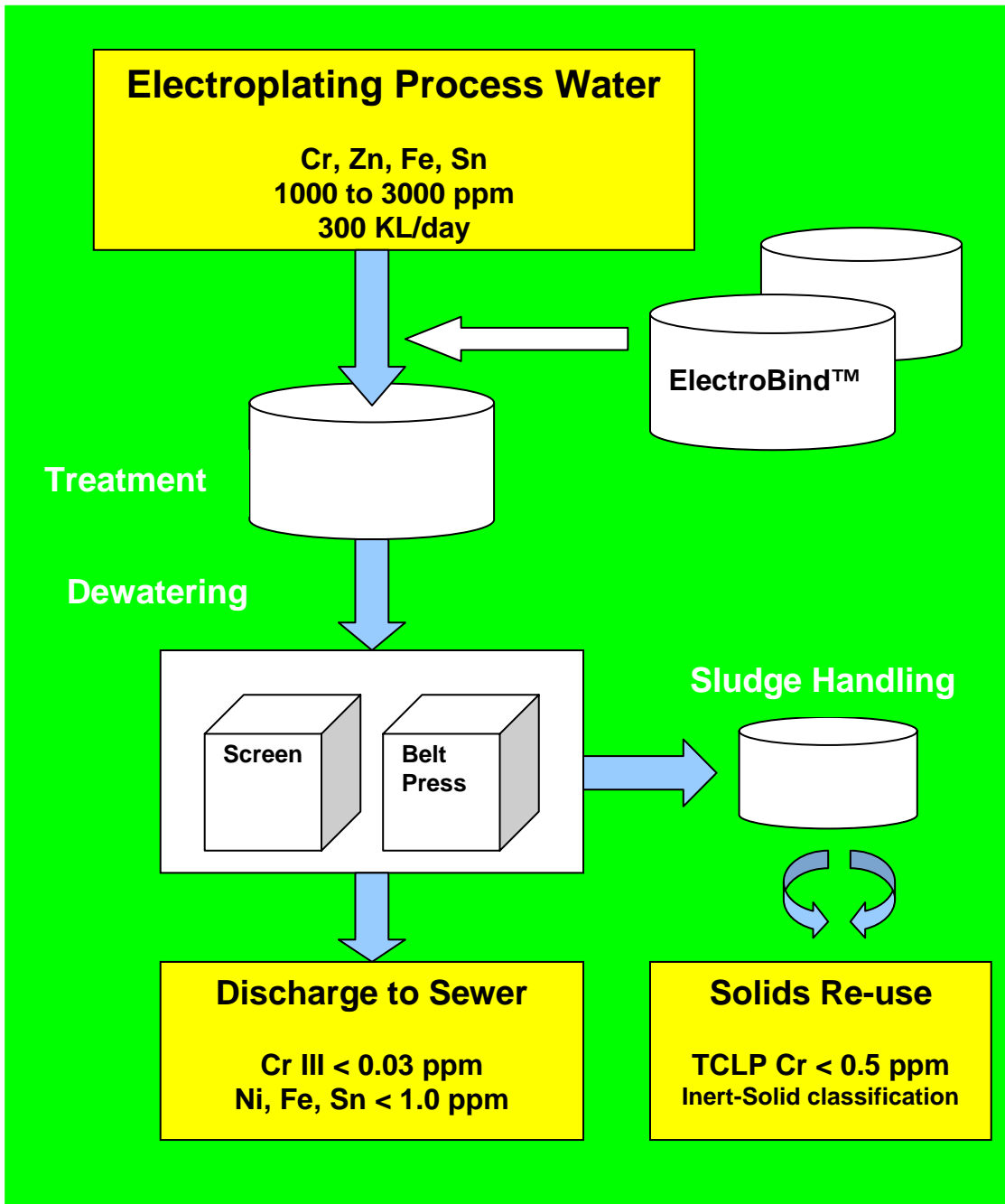
# Case Study



- Electroplating plant producing 4,500 KL/month of waste water
  - Large amount of plant down time for de-scaling work on dewatering screens
  - Non compliance to trade waste water standards
  - High volumes of unstable hazardous sludge
- The results achieved after ViroFlow implementation
  - Significant savings on production due to decreased down time
  - Compliance with trade waste water standards(all metals <10ppm)
  - 50% reduction in sludge volumes, more stable cheaper landfill costs
  - Saving on plant upgrades to increased waste volume handling
  - Potential water re-use due to enhanced treated water quality



<b>Technical Data</b>		<b>Existing Technology</b>	<b>ViroFlow™ Technology</b>
	<i>Influent</i>	<i>Effluent</i>	<i>Effluent</i>
Waste water Volume (KL/month)	4,500		
pH	3.6 - 4.5	6.5 - 7.5	6.5 - 7.5
Chromium III (ppm)	3,000	5.0 - 50.0	0.03
Iron (ppm)	1,550	5.0 - 50.0	0.12
Tin (ppm)	2,800	5.0 - 50.0	0.74
Zinc (ppm)	2,790	5.0 - 50.0	0.23
Sludge Volume (T/month)		16.8	8.4
Sludge Waste Classification (NSW EPA)		Hazardous	Inert





# Electroplating Industry

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Ease of implementation

- Pumping equipment required for the physical addition of the reagents
- Holding tanks for the reagents for mixing and storage prior to addition
- All other in situ plant and equipment used for the settling and separation stages



## Other ViroFlow Applications

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Same Scientific process involved

Same in pipe addition and settling process employed

- Treatment of a Cobalt rich water effluent from a PET (polyethelene terephthalate) factory for large petrochemical company from testing to plant set up, on the continent
- Treatment of mercury polluted ground water and effluent water for a large pulp and paper industry participant in South East Asia



## Proposed Applications of Viroflow technology

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The future for R&D into  
further applications of the  
science

- Arsenic polluted ground water in the USA and Central Asia
- Lead pollution from old industrial sites
- Any acidic waste industrial waste water
- Any waste water with high trace metal content
- Application of technology using floatation cells for treatment



## BAUXSOL® TECHNOLOGY

ENVIRONMENTAL  
REMEDiation



VIROBIND  
SOLUTIONS

**'End of Pipe'  
treatment of  
contaminated  
water and soils**

WATER &  
PROCESSING



VIROFLOW  
SYSTEMS

**'Systems  
Integrated'  
water and  
industrial  
products**

SEWAGE  
TREATMENT



VIROSEWAGE  
TREATMENT

**'Systems  
Integrated'  
sewage  
treatment  
products**

NEW BUSINESS  
DEVELOPMENT



NEW BUSINESS  
DIVISION

**Various new  
products under  
development**



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