



## **Danron Enterprises Electro-Coagulation Treatment (ECT) System Technology Fact Sheet for Danron Enterprises Electro-Coagulation Treatment (ECT) System**

### **Performance Claim**

The mobile electro-coagulation treatment system (ECT) comprised of five (5) electrolytic cells in parallel preceded by screening, flow equalization and pH control and followed by de-gassing, flocculation via mechanical agitation, and clarifying was applied to industrial chromium bearing rinse water. The mobile electro-coagulation treatment system was operated using the procedures specified in the ECT user manual (Version #1 dated February 6, 2006), and was applied to industrial chromium bearing rinse water under the following operating conditions:

- Flow rate ranging from 7 to 22 L/min total;
- Total chromium ranging from 60 mg/L to 165 mg/L;
- pH ranging from pH5 to pH7;
- Temperature of 25 degrees Celsius;
- Surface area of anode 1555 in<sup>2</sup>;
- Schedule 40 A53 grade B steel anode and ¼" diameter T316L helical stainless steel cathode;
- Power consumption ranging from 9 to 15 kWh; and
- A residence time ranging from 65 to 205 seconds.

During the trials a removal of at least 99% in total chromium at a 95% level of confidence was achieved.

The mobile electro-coagulation treatment system (ECT) comprised of five (5) electrolytic cells in parallel preceded by screening and flow equalization and followed by de-gassing, flocculation via mechanical agitation and clarifying was applied to mine tailing waters containing As<sup>+3</sup> and As<sup>+5</sup>. The mobile electro-coagulation treatment system was operated using the procedures specified in the ECT user manual (Version #1 dated February 6, 2006), and was applied to industrial arsenic bearing rinse water under the following operating conditions:

- Flow rate of 85 L/min;
- As<sup>+3</sup> concentration ranging from 42 µg/L to 47 µg/L;
- As<sup>+5</sup> concentration ranging from 305 µg/L to 353 µg/L;
- pH ranging from pH7 to pH8;
- Temperature of 18 degrees Celsius;
- Surface area of anode 1555 in<sup>2</sup>;
- Schedule 40 A53 grade B steel anode and ¼" diameter T316L helical stainless steel cathode;
- Power consumption of 15.6 kWh; and
- A residence time of 16.9 seconds.

During the trials a removal of at least 96% in As<sup>+3</sup> and As<sup>+5</sup> at a 95% level of confidence was achieved.

### **Technology Application**

The mobile electro-coagulation treatment system (ECT) can be applied to industrial chromium bearing rinse water as well as to industrial arsenic bearing rinse water.



## Performance Conditions

The performance conditions are specific to the sites of interest. The various parameters needed for removal of contaminants in wastewater are decided on a case by case basis. Danron will determine the optimal operating parameters to be used for each specific wastewater situation. This is accomplished by a laboratory bench scale test on the wastewater, and will provide the discharge pH or oxidation reduction potential (ORP), required amperage, required polarity reversal time, flow rate, polymer concentration and dosage.

## Technology Description

The mobile electro-coagulation treatment system (ECT) is a wastewater treatment system developed by Danron Mechanical that can be transported to different site locations to treat contaminated waters. The ECT system uses electricity as means to erode a working steel electrode. The electrical energy and the electrode erosion are capable of changing the physical characteristics of the contaminated water by the electrolysis effect. The electrode erosion provides iron ( $\text{Fe}^{+2}$  or  $\text{Fe}^{+3}$ ) ions in solution, which can in turn chemically change the oxidation state of arsenic and chromium. Oxidation in the electrolytic system produces an iron hydroxide complex which remains in the aqueous stream as a gelatinous suspension which removes chromium or arsenic in the wastewater either by complexation or electrostatic attraction followed by coagulation. The cathode separates the water molecules into hydrogen gas and hydroxide ions. Iron is reduced to its elemental state.

## Verification

Verification was based in part on Herrera Water Solutions Consulting Services Final Reports covering trial runs at Goldcorp Mine in Red Lake for Arsenic and Commercial Plating in Winnipeg for Chromium. Verification was completed by Geomatrix Consultants and Engineers Inc.

## What is the ETV Program?

The Environmental Technology Verification (ETV) Program is a joint Environment Canada - Industry Canada initiative delivered by ETV Canada. The ETV Program is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

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