

Science Spotlight:

ELECTROCOAGULATION

Electrocoagulation is a method of removing heavy metals from water. It is a relatively new technology that is being tested at the Nelson Tunnel Superfund Site.

“Electro” refers to applying an electrical charge to water. “Coagulation” refers to the process of dissolved or suspended metals in water forming a heavy sludge that will settle to the bottom of the tank with cleaned water at the top.

Electrocoagulation works almost like a battery. Two aluminum plates are submerged in water and an electric current is passed between the plates.

One plate is positively charged, the “cathode,” and the other is negatively charged, the “anode.” The anode slowly dissolves into the water and causes suspended particles to group together into heavier groups. The grouped material will settle out faster than individual particles in the water. The strength of the electrical current can be increased to dissolve more of the anode into the water, increasing the “dose.”

We can use electrocoagulation to remove things like zinc, cadmium, and manganese that are present in the water flowing out of the adit at the Superfund site.

Electrocoagulation testing at Nelson Tunnel occurred in August of 2024. The study occurred over 15 days and the EPA tested out two different current strengths to determine the optimal electrocoagulation dose for removal of metals from the water. In the tests, the EPA found that electrocoagulation was very effective at removing metals from the adit discharge. With a high dose, over 85% of cadmium and 98% of zinc was removed from the adit discharge. About 72% of manganese was removed with the high dose.

| Metal | Average Concentration Before EC (mg/L) | Average Concentration After EC (mg/L) | Percentage Removed in Test |
|-----------|--|---------------------------------------|----------------------------|
| Zinc | 35.3 | 0.66 | 98% |
| Cadmium | 0.092 | 0.013 | 85% |
| Manganese | 16.23 | 4.55 | 72% |

