ELECTROCOAGULATION:

Removal of Low Levels of Radionuclides Uranium, Plutonium, and Americium in Wastewater

system-design & install-support

United States Environmental Protection Agency

GENERAL ENVIRONMENTAL CORPORATION; CURE ELECTROCOAGULATION TECHNOLOGY: INNOVATIVE TECHNOLOGY EVALUATION REPORT

ELECTROCOAGULATION
Powell Water IP and Equipment, Application Concept Design, Engineering and Field Support

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ABSTRACT

CURE Electrocoagulation Technology

General Environmental Corporation

Innovative Technology Evaluation Reports

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The CURE electrocoagulation system was evaluated for removal of low levels of the radionuclides uranium, plutonium, and americium as well as other contaminants in wastewater. Economic data from the Superfund Innovative Technology Evaluation (SITE) demonstration are also presented, and the technology is compared to the nine criteria that the U. S. Environmental Protection Agency (EPA) uses to select remedial alternatives for Superfund sites.

The CURE electrocoagulation technology was developed by General Environmental Corporation, Inc. (GEC), of Denver, Colorado. The technology induces the coagulation and precipitation of contaminants by a direct-current electrolytic process followed by settling with or without the addition of coagulation-inducing chemicals. Treated water is discharged from the system for reuse, disposal, or reinjection. Concentrated contaminants in the form of sludge are placed in drums for disposal or reclamation.

The CURE technology was demonstrated under the SITE Program at the U.S. Department of Energy's (DOE) Rocky Flats Environmental Technology Site (formerly the Rocky Flats Plant) near Golden, Colorado. Approximately 4,500 gallons of wastewater containing low levels of the radionuclides uranium, plutonium, and americium were treated in August and September 1995. Water from the solar evaporation ponds was used in the demonstration. Six preruns, five optimization runs, and four demonstration runs were conducted over a 54-day period.

The demonstration runs lasted 5.5 to 6 hours each, operating the CURE system at approximately 3 gallons per minute. Filling the clarifier took approximately 2.5 hours of this time. Once the clarifier was filled, untreated influent, and effluent from the clarifier were collected every 20 minutes for 3 hours. Because of the shortened run times, there is uncertainty whether the data represent long-term operating

conditions.

Results indicated that removal efficiencies for the four runs ranged from 32 to 52 percent for uranium, 63 to 99 percent for plutonium, and 69 to 99 percent for americium. Colorado Water Quality Control Commission (CWQCC) standards were met for plutonium and americium in some, but not all cases. However, CWQCC standards for uranium were not met. Arsenic and calcium concentrations were also decreased by an average of 74 and 50 percent, respectively for the two runs for which metals were measured.

Evaluation of the CURE electrocoagulation technology against the nine criteria used by the EPA in evaluating potential remediation alternatives indicates that the CURE system provides both long- and short-term protection of the environment, reduces contaminant mobility and volume, and presents few risks to the community or the environment.

Potential sites for applying this technology include Superfund, DOE, U.S. Department of Defense, and other hazardous waste sites where water is contaminated with radionuclides or metals. Economic analysis indicates that remediation cost for a 1OO-gallon-per-minute CURE system could range from about $0.003 to $0.009 per gallon, depending on the duration of the remedial action.