Electrokinetic Decontamination of Concrete

Developer: ISOTRON® Corporation
Contract Number: DE-AC21-93MC30162
Crosscutting Area: N/A

Deactivation & Decommissioning FOCUS AREA

Problem:

Concrete surfaces contaminated by radioactive isotopes, heavy metals, and organics create severe problems for conventional decontamination methods. Surface cleanup by mechanical scabbling or physical abrasion can result in the generation of large quantities of secondary wastes and highly toxic fine particles. Use of these methods also make it necessary to employ stringent precautions to protect working personnel during the actual procedure. Disposal of large volumes of contaminated concrete and other wastes is expensive and absorbs limited resources.

Solution:

An in-situ non-abrasive electrokinetic process for efficient removal of contaminants from concrete with limited generation of secondary waste.

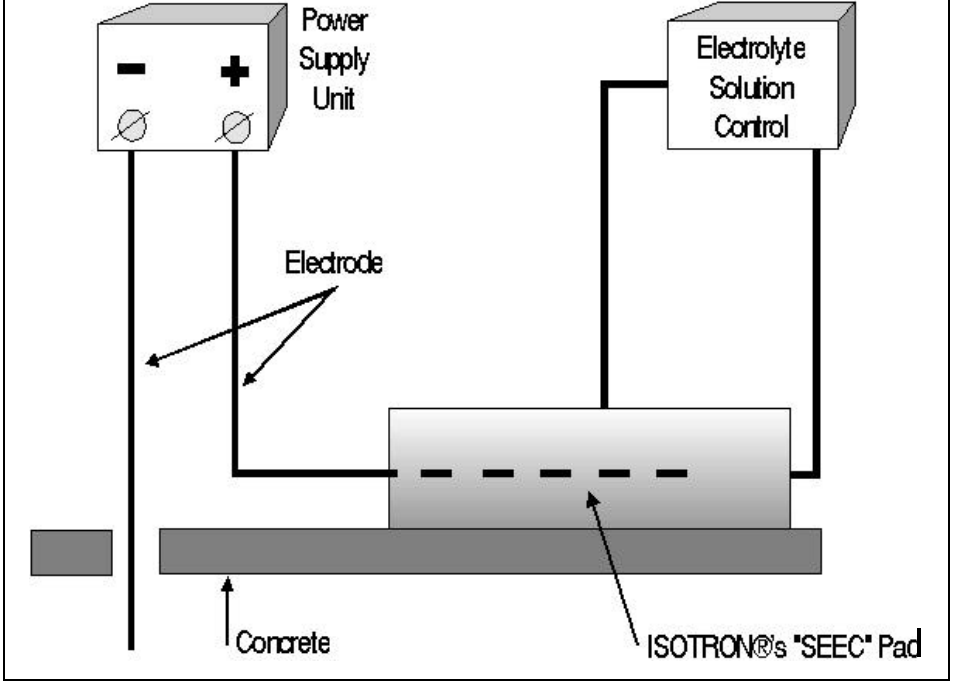
Benefits:

- Potential cleanup of concrete surfaces without mechanical and physical damage to the concrete
- Removal of contaminants diffused deeply into the concrete
- No airborne particulates
- Improved cost efficiency
- Minimized generation of secondary wastes
- Resulting secondary wastes compatible with rad waste disposal technologies

Technology:

ISOTRON® Corporation has developed an electrokinetic process for in-situ removal of contaminants (i.e., radioisotopes, heavy metals, and organics) from porous concrete. This method provides a viable alternative to scabbling or physical abrasion. The secondary waste generated by this process, contaminated electrolyte solutions or other ion-sorbent material (e.g., ion exchange media) are readily disposed of by conventional ion-immobilization technologies.

The technology developed for electrokinetic decontamination of concrete surfaces applies an electrical field to induce migration of



ionic contaminants from within the porous concrete into the ISOTRON® decontamination unit. The system as illustrated has the following components: ISOTRON®'s proprietary "SEEC" pad, electrolyte solution, and electrode. ISOTRON®'s proprietary "SEEC" pad consists of a fabric or carpet-like material which partially removes contaminants from the electrolyte solution and limits the bulk flow of the electrolyte solution. The electrolyte solution contains various complexants, as well as other materials, to promote formation of a soluble ionic complex of each specific contaminant present. The electrolyte solution is in contact with the concrete surface through the "SEEC" pad.

All contaminants are collected in either the aqueous electrolyte solution and/or in the proprietary "SEEC" pad. Both of these can be treated and disposed of by conventional technologies.

ISOTRON® is evaluating alternative configurations of the system to enhance the removal of contaminants from the concrete. One possible configuration replaces the anode rod, pictured penetrating the concrete, with an anode "SEEC" pad to be placed adjacent to the pictured "SEEC" pad.

Project Conclusion:

The project was completed in June 1997. The ELECTROSORB "C" electrokinetic extraction process presents a highly effective process for cleaning radioactively contaminated concrete. The process can remove contaminants which are deep in concrete inasmuch as the "electromobile" contaminants, such as cesium and strontium which are likely to travel to such depths, are also responsive to the electric transport. The process can operate in a semiautomatic mode, thus freeing workers from extended "hands-on" activities and prolonged "stay time" in a rad zone.

Because of other competing technologies and limitation of funds, additional engineering development work was not completed for the process to be ready for evaluation in DOE's large scale demonstration program.

Contacts:

ISOTRON® Corporation develops innovative approaches to environmentally safe, energy- and cost-efficient technologies for environmental restoration. For information on this project, the contractor contact is:

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