

ELECTROKINETIC DECONTAMINATION OF CONCRETE

Author:

Henry L. Lomasney
Valeriy Yachmenev

Contractor:

ISOTRON® Corporation
13152 Chef Menteur Highway
New Orleans, LA 70129

Contract Number:

DE-AC21-93MC30162

Conference Title:

Opportunity '95 - Environmental Technology Through
Small Business

Conference Location:

Morgantown, West Virginia

MASTER

Conference Dates:

November 16 - 17, 1994

Conference Sponsor:

U.S. Department of Energy - Morgantown Energy Technology Center

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

This report has been reproduced directly from the best available copy.

Available to DOE and DOE contractors from the Office of Scientific and Technical Information, 175 Oak Ridge Turnpike, Oak Ridge, TN 37831; prices available at (615) 576-8401.

Available to the public from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161; phone orders accepted at (703) 487-4650.

DISCLAIMER

**Portions of this document may be illegible
in electronic image products. Images are
produced from the best available original
document.**

4.3

Electrokinetic Decontamination of Concrete

CONTRACT INFORMATION

Contract Number DE-AC21-93MC30162

Contractor ISOTRON® Corporation
13152 Chef Menteur Highway
New Orleans, LA 70129
(504) 254-4624

Contractor Project Manager Henry L. Lomasney

Principal Investigators Henry L. Lomasney
Valeriy Yachmenev

METC Project Manager Mary Beth Ashbaugh

Period of Performance August 31, 1994, to November 30, 1994

ABSTRACT

Concrete structures which have been contaminated with uranium and other radioisotopes may be decontaminated using in-situ electrokinetic remediation. By placing an electrode cell on the concrete surface and using the concrete's rebar, a ground rod, or another surface cell as the counter electrode, the radioisotopes may be migrated from the concrete into this cell. The process is highly dependent upon the chemical parameters of the species involved; namely, the concrete, the contaminants, and the solubilizers used to mobilize the contaminants.

The chemical behavior of concrete may be described as similar to the behavior of calcium hydroxide having a high pH and a high calcium content. Concrete is also fairly reactive toward the contaminants incorporating some of the contaminants in the cement matrix.

Uranium may be found in concrete in either the +4 or +6 oxidation states with roughly 80 percent being found in the latter. Uranium is readily solubilized at basic pHs, the condition of concrete by many oxygen-donating ligands. The applicability of these complexants is dependent upon the solubility of these ligands at high pH and as calcium salts.

In a preliminary study conducted at the K-25 site of the Oak Ridge National Labs, an estimated removal of > 40 percent of uranium has been observed for a short duration run. This removal occurred using traditional uranium solubilizers in contact with the contaminated surface.

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED
dv

It has also been observed that complexants which form soluble calcium salts can be migrated through concrete and induce uranium removal enabling decontamination of deeper regions of the concrete.

The results show a varying ratio of uranium removed to activity removed. Some post-test solutions show a high activity with only modest uranium concentration, and some results show a high concentration of uranium with a low total activity. These results appear more dependent upon decontamination strategy than solubilizer used.

The results obtained from the study suggests further work which can be performed to further the process toward large-scale remediation. This work includes extended runs on well-characterized concrete to obtain a better estimate of the costs and removal efficiency. The work should also include a large-scale run to determine the problems unique to larger scale work. Remediation tests focusing on the removal of other isotopes in addition to uranium, and focusing on the use of the complexants which form soluble calcium salts is integral to the establishment of the use of electrokinetics for the decontamination of concrete.