



Removal of Contaminants from Equipment and Debris
and Waste Minimization Using TECHXTRACT®



Developer: EET, Inc.
Contract Number: DE-AC21-96MC33138
Crosscutting Area: ESP

Deactivation & Decommissioning
FOCUS AREA

Problem:

The Department of Energy's (DOE's) deactivation and decommissioning (D&D) program will produce massive volumes of radioactive and/or hazardous wastes. On a mass or volumetric basis, however, the radioactive and toxic constituents in these waste streams comprise a very small percentage. Prime examples of these types of waste are equipment which was used in the production or processing of nuclear materials, structural steel from buildings, and concrete and masonry debris from building demolition.

In each of these cases, the gross contamination will have been removed in the initial stages of the

D&D process. However, the existence of trace residuals requires that the materials still be treated as low level radioactive, hazardous, or mixed waste. This results in three distinct issues for the DOE Environmental Management (EM) program: (1) large, expensive waste volume, (2) failure to capture scrap or salvage values, and (3) inability to dispose of mixed waste.

Solution:

Develop and demonstrate a full-scale, economical system for the decontamination of equipment and debris, with further treatment of secondary waste streams to minimize waste volumes. Contaminants will be removed from the subject media

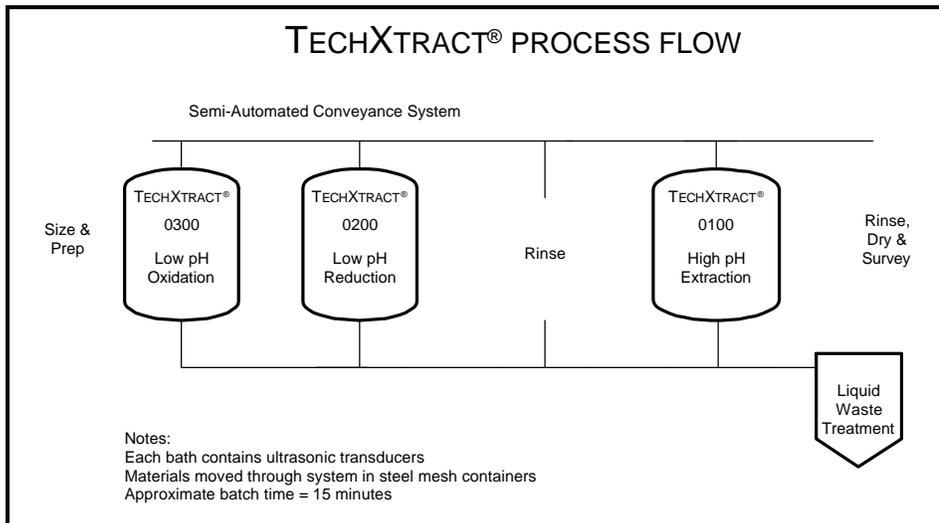
to levels which allow unrestricted use. The entire system will be designed with maximum flexibility and automation in mind.

Benefits:

- ▶Applicable for surplus equipment, structural steel, rubble, and other typical D&D waste streams
- ▶Removal of hazardous and radioactive contaminants (including "fixed") to meet "free release" standards
- ▶Minimizes secondary waste volume
- ▶Avoids disposal of valuable raw materials and allows resale
- ▶Provides flexible system for a wide variety of feed streams

Technology:

The scope of the project was to develop an integrated, full-scale system for the decontamination of small equipment and debris and the treatment/waste minimization of the resulting secondary waste. The system is based on EET's TECHXTRACT® contaminant extraction technology. This



technology has already been substantially proven in related applications, but has not been developed to the point of offering an integrated, economical system.

The TECHXTRACT[®] technology is a unique and highly effective process which chemically extracts hazardous contaminants from the surface and substrate of concrete, steel, and other solid materials. This technology has been successfully used to remove contaminants as varied as polychlorinated biphenyls (PCBs), radionuclides, heavy metals, and hazardous organics. The process is preferred over other alternatives due to its effectiveness in safe and consistent extraction of subsurface contamination. TECHXTRACT[®] is a proprietary process developed, owned, and provided by EET, Inc.

The TECHXTRACT[®] process employs as many as 25 different components in three separate chemical formulations which are used in sequence to accomplish the extraction of contaminants. The first two chemicals are surface preparation formulas which contain complex blends of acids and other chemical agents to clean dirt, oil, grease, and other interferences from the surface. These blends also solubilize inorganics and organics and prepare the substrate by establishing proper conditions for the extraction step. The third blend uses advanced chemistry in the

fields of microemulsification and chemical ion exchange to interact with and extract contaminants at the molecular level. The project was to extend the application of the chemistry to large-scale, semi-automated decontamination with an additional waste treatment step.

Project Conclusion:

The TECHXTRACT[®] chemical decontamination technology was demonstrated in the decontamination of lead bricks at the Hanford C-Reactor Large-Scale Demonstration and Deployment Project (LSDDP) during the week of May 11, 1998. Out of 80 bricks run through the TECHXTRACT[®] chemical decontamination process, 78 bricks were decontaminated to background or non-detectable levels. With the system, production throughput rates of 200 bricks per day are achievable. Secondary waste production was 0.01 gallons per brick or 6 pounds per ton of lead bricks processed.

The decontamination was performed in a safe work place environment with improved as low as is reasonably achievable (ALARA) practice. The spent chemical solutions do not contain any hazardous constituents (except for extracted contaminants which are precipitated out) and are disposed of by incineration, solidification (and land disposed), or discharged to liquid effluent treatment systems. This LSDDP completed the EET TECHXTRACT[®] research and development effort.

Contacts:

For information on this project, the contractor contact is:

Principal Investigator:
Mr. Michael W. Bonem
EET, Inc.
4710 Bellaire Boulevard
Bellaire, TX 77401
Phone: (713) 662-0727
Fax: (713) 662-2322
E-mail: eet@natk.com

DOE's Federal Energy Technology Center supports the Environmental Management - Office of Science and Technology by contracting the research and development of new technologies for waste site characterization and cleanup. For information regarding this project, the DOE contact is:

DOE Project Manager:
Dr. Harold D. Shoemaker
Federal Energy Technology Center
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880
Phone: (304) 285-4715
Fax: (304) 285-4403
E-mail: hshoem@fetc.doe.gov

