



TD\*X Associates

## PROJECT PROFILE

### VACUUM THERMAL DESORPTION DEPLOYMENT PROJECT

#### PROJECT DESCRIPTION

The US Department of Energy's Fernald Environmental Management Project had inventoried an estimated 1900 containers of mixed waste that were contaminated by both radioactive materials and hazardous chemicals. These wastes contained hazardous organic chemicals, PCBs and mercury above levels suitable for land disposal and required treatment to meet the USEPA's Universal Treatment Standards. Fernald identified vacuum-assisted thermal desorption (VTD) as the best technology for treatment of the wide range of physical and chemical forms present in their waste. However, the VTD capacity in the market was an order of magnitude or more below that required to effectively manage the waste at Fernald, let alone similar mixed waste stored at other DOE sites. So Fernald funded the deployment of a more productive and efficient VTD unit for these wastes.

The VTD deployment project required that a unit be modified or constructed with nominal capacity of 20 drum/day or greater. It would need to be fully permitted under the Resource Conservation and Recovery Act (RCRA) hazardous waste regulations, licensed for radioactive materials, and have approval to process PCBs regulated under the Toxic Substances Control Act (TSCA). The deployment (permitting, modification, and construction) needed to be conducted in a short time frame, with a 150-drum system operability test starting within 180 days of contract award.

#### TD\*X SCOPE OF WORK

In mid-2002 Fernald awarded the VTD deployment project to Envirocare of Utah, Inc., and TD\*X Associates, LLC was the selected by Envirocare as the VTD treatment technology subcontractor for the project. Envirocare was to provide the radioactive materials licensed facility, modify an existing on-site building for system installation, and modify their existing RCRA permit to allow operation of the VTD unit. TD\*X had the following extensive project responsibilities:

- prepare the detailed process design and the permit documents required to secure a national mobile TSCA operating permit from USEPA,
- prepare documents to support modifications to the State RCRA hazardous waste treatment permit, radioactive materials license, and air emissions permit,
- perform on-site pilot testing to confirm the ability of the treatment process to meet the demanding project requirements,
- prepare the detailed equipment drawings and construct the processing equipment for the project, making it suitable for operation on radioactive mixed wastes,
- perform the modification and construction of the equipment, both at the shop facility and at the project site, with TD\*X being the VTD treatment system owner, operating the unit at the client's site,



- perform the pre-test and full three-run performance demonstration tests and prepare comprehensive test reports required by the project and permits,
- have full responsibility for VTD unit operations and provide the Thermal Engineer, Site Engineer, Lead Plant Operators, Maintenance Manager, and Plant Operators, as well as all consumable materials, spare parts and maintenance for the duration of the project, with responsibility for operation of the treatment equipment and meeting the stringent requirements of the numerous permits and licenses.

## PROJECT RESULTS

The VTD unit was designed, constructed and permitted on schedule. The system operability test was completed in two phases with all of the major test objectives being met. Fernald shipped the 150 drum test lot, which included highly contaminated sludges and complex debris, all of which were successfully processed by the VTD unit to the treatment standards and then permanently disposed in the landfill. Based on this success, over 1,000 drums have been shipped to the site for VTD treatment. The summarized results were:

- A new permit was granted for TSCA regulated PCB waste treatment, and a RCRA permit modification was secured for operation of the VTD unit,
- Two radioactive materials license modifications were completed to process mixed waste in the VTD unit, one for SNM management in VTD and another to allow for the receipt of liquid radioactive waste greater than 1% by volume,
- Achieved greater than 99.9999% equivalent "destruction and removal efficiency" (DRE) for PCBs during the pre-test emissions test,
- No detectible dioxin or radioactive materials emissions during PCB treatment operations,
- Achieved the RCRA Land Disposal Restriction Universal Treatment Standards (LDR UTS) for all material,
- Successfully treated material that had 584,000 ppm tetrachloroethene to below the LDR UTS,
- Demonstrated an equivalent DRE ranging from 99.9996% to 99.9999998% on RCRA waste constituents (TCE, 1,2-DCE, 1,2-dichlorobenzene, and m-cresol),
- Demonstrated VTD unit capacity of 39 drums per day.



TD\*X demonstrated complete treatment of numerous difficult to treat waste materials as listed in the following Table. The photos below show the treated product and condensate liquid.

Fernald ID No.	Description	Fernald ID No.	Description
10026	1,1,1 TCE Still Bottoms – PCB	30005	Oily Sludges
2626	Oily / Water / Sludge – PCB	60051	Solvents and Filter Material
10023	Non-Recoverable Trash – PCB	61003	Oily rags
1427	Mop Heads	1411	Contaminated Solvents from Paint Shop
2682	Soil Extract Waste	3171	Dry Contact Waste
2992	Non-Recoverable Trash	50014	Non-Recoverable Trash
30010	Sludge	742	Oily Sludges from Floor Drains
396	Paint Thinner Rags	3767	Oily Sludges from Building 12 D&D
60303	Flame Retardant Blankets	10012	PCB Contaminated Burnables
514	Paint Waste	2785	Sludge from Ignitable Liquid Tank
2085	Liquid Chlorinated Solvents	3170	PCB Trash



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