

Bringing State of the Art Technology to a Developing Country: A Capacity Building and Knowledge Transfer Success Story

James Galligan (jgalligan@terratherm.com), Gorm Heron, John Bierschenk, Richard Michalewich and Stanley Walker (TerraTherm, Gardner, MA, USA)
Glenn Anderson, Tim Burdett, Dzung Tran, Christopher Pruitt (TerraTherm, Danang, Vietnam)
Kent Sorenson (CDM-Smith, Denver, CO), Peter Chenevey (CDM-Smith, Danang, VN)

Background/Objectives. The US Agency for International Development (USAID) was tasked as the lead US agency for cleanup of legacy Agent Orange hotspots at the former US military base at Danang, Vietnam, now a Vietnamese military and civilian airport. Agent Orange, a defoliant used during the U.S.-Vietnam War, was found to contain dioxin, a highly toxic persistent organic pollutant (POP). The 2010 Environmental Assessment developed by USAID selected In-Pile Thermal Desorption® (IPTD®), an innovative aboveground form of thermal conduction heating (TCH), for treatment of dioxin impacted soil and sediment. As part of its overall mission of delivering “Aid from the American People,” USAID seeks to help developing nations build human capital. As such, “capacity building” was one of the key objectives for the implementing contractors on this large, multi-year project.

Approach/Activities. Treatability studies and previous field projects demonstrated that TCH treatment at a temperature of 335°C (635°F) with a residence time of 21 days was capable of achieving the stringent 150 ppt GVN dioxin remediation goal. With direction from US-based prime contractors and technology experts, Vietnamese subcontractors installed the IPTD infrastructure and constructed the vapor/liquid treatment plant, then supported ongoing operations of the IPTD heating system and treatment plant. Given the safety, environmental, and health hazards inherent in treating the dioxin-contaminated soil and sediment, training of the local work force was a critical element in the success of the overall project. Vietnamese staff received general construction safety and task specific training, and workers with potential exposure to dioxin-impacted materials received extensive health and safety training. Project staff also worked collaboratively with Vietnamese Government researchers and agencies to provide educational opportunities about the technologies and work practices used at the site, as well as opportunities for independent collection and analysis of samples throughout the project. Vietnamese suppliers of equipment, materials and laboratory analytical services were introduced to higher level international standards for manufacturing, inspection, testing and quality assurance/quality control, through their work on the project.

Results/Lessons Learned. An innovative technology implementation was deployed in Vietnam with the aid of the local workforce to treat over 87,000 m³ of dioxin-impacted soil and sediment to low part-per-trillion concentrations to comply with US and Vietnamese standards. Sampling events concluded that the post-treatment dioxin concentrations were orders of magnitude below the GVN clean-up standard and that combined destruction/removal efficiency (DRE) for dioxin ranged from 90% to >99.99%. The success of the project relied on cooperation and collaboration between USAID, Vietnamese Government agencies, implementing contractors, and the local Vietnamese subcontractors and labor force. Throughout the 4-year implementation period, valuable partnerships were formed with Vietnamese contractors and workers who demonstrated their knowledge, aptitude, skill and desire to learn. As the project winds down, the local Vietnamese contractors, work force and Government agencies are better trained and more prepared to take on challenging environmental and construction projects in the years ahead as Vietnam continues its remarkable development. The collaborative working model implemented on this project can be used as a model for capacity building to improve the standard of living in developing nations around the world.