TECHNOLOGY DESCRIPTION
ARI’s thermochemical conversion technology (TCCT) is a mobile, aboveground treatment system capable of destroying organic compounds and immobilizing metals and radionuclides present in soil, sediment, sludge, liquid, and demolition debris. TCCT has demonstrated effectiveness in treating polychlorinated biphenyls (PCBs) and asbestos-containing material (ACM). ARI is currently permitted to process ACM at its facility in Tacoma, Washington.

TCCT involves heating contaminated media in a rotary hearth furnace. This process results in pyrolyzation of organic materials and removal/immobilization of metals. Metals and radionuclides that are not volatile at processing temperatures (e.g., chromium, barium, uranium, and plutonium) are immobilized as the metals are incorporated into the molecular structure of the remineralized, inert product. More volatile metals (e.g., lead, arsenic, and cesium) may undergo partial volatilization. A high efficiency wet scrubber removes volatilized metals in the off-gas. TCCT is similar to vitrification but does not involve complete melting. Instead, the process results in sintering of the material.

Pyrolysis of organic compounds takes place in the rotary hearth. The pyrolysis products are directed via an induced draft to a thermal oxidation unit that destroys any residual organic contamination that might be present in the off-gas. From the thermal oxidizer, the off-gases are cooled and scrubbed for particulates and acid components that might be present.

Wastes that are suitable for treatment using TCCT include soil, ACM, liquids, sediment, sludge and demolition debris. The full-scale TCCT system can treat 25 tons of waste per day. Volume reduction of waste can range from 10% to over 90% depending on the waste.

Following a series of demonstrations at the Puget Sound Naval Shipyard (PSNSY), the U.S. Environmental Protection Agency (U.S. EPA) National Program Chemicals Division issued ARI a National Mobile Operating Permit under the Toxic Substance Control Act (TSCA). This permit facilitates the use of the technology anywhere in the U.S. or it’s territories for the destruction of PCBs. The U.S. EPA does not classify TCCT as incineration. Under Washington State Department of Ecology Rules (WAC 173-303-071), ARI can also perform treatability studies at its Tacoma facility on up to 10,000 kg of wastes containing other types of waste.

TECHNOLOGY MERITS
TCCT costs are competitive to incineration costs because the end product (produced from remineralization) is expected to meet land disposal requirements. Thereby, waste disposal costs will be reduced substantially. Also, the rotary hearth does not agitate the waste like a rotary kiln resulting in significantly less particulate. TCCT is less expensive than vitrification because processing temperatures are significantly lower, resulting in lower energy costs, and because costs associated with handling molten waste are not incurred.

The technical merits of TCCT are summarized as follows:
- Permitted by EPA for destruction of ACM and PCBs
- Destroys organics and immobilizes metals and radionuclides
- Not classified as incineration by EPA
- Able to process a wide variety of contaminated media
- Transportable
- Waste treatment costs for DoD are discounted

NAVY DEMONSTRATION
The Navy has contracted ARI to build and test a new full-scale system to demonstrate effectiveness on Department of Defense (DoD) wastes. The demonstration will be conducted at ARI’s Tacoma facility.

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