



## Water Recovery From Engine Exhaust

### Phase III IMPACTS

- US Patent 6,581,375: Jagtoyen, et al., issued June 24, 2003 "Apparatus and method for the recovery and purification of water from the exhaust gases of internal combustion engines."
- \$3.1M R&D funds contributed by the U.S. Army.



A soldier requires 1.5 to 3.5 gallons of water per day to prevent dehydration. When personal hygiene, combat meal preparation, and emergency medical treatment are added, this becomes 6.6 gallons or 55 pounds per soldier per day. Water distribution is projected to be 30% of the Future Force daily sustainment requirement. The U.S. Army TARDEC is developing novel technologies to produce water anywhere on the battlefield, thereby reducing the water logistics footprint. One of the most promising concepts under development is the recovery of water from internal combustion engine exhaust, in which, theoretically, one gallon of diesel fuel could produce approximately one gallon of water.

LexCarb LLC demonstrated that the water in the exhaust could be collected and purified to drinking water standards. To recover potable water from engine emissions, the water must be condensed from the exhaust gas and then purified. The

condensate contains oxides of nitrogen and sulfur from the combustion process that make the water very acidic and it is full of soot particles, organic compounds from incomplete combustion, metals, and contaminants from fuels, oils, and corrosion. LexCarb developed and tested a HMMWV-mounted system that consistently recovered 50 to 60% of the available water. The treatment train consists of filtration, activated carbon, and ion exchange resin. The water treatment was effective in removing all regulated contaminants below drinking water standards.

These systems may revolutionize battlefield water sustainment by producing drinking water wherever the soldier is and reducing the quantity and frequency of water resupply. Water resupply may transition from a daily requirement to a weekly requirement, creating a cascading reduction in the overall battlefield logistics requirements.