Residential Fuel Cell Program at Brooks City-Base Successful

San Antonio —Southwest Research Institute® recently completed a year-long residential fuel cell demonstration program conducted at a local military installation.

Funded by the Construction Engineering Research Laboratory (CERL) of the U.S. Army Corps of Engineers research laboratories, SwRI successfully demonstrated three 5-kW proton exchange membrane (PEM) fuel cells at Brooks City-Base in San Antonio.

The fuel cells, fueled with hydrogen through natural gas reformers, supplemented the power to three individual base housing units at Brooks City-Base. The units were grid-connected, meaning that the electric grid provided additional power to the housing units if the electric load exceeded the capacity of the fuel cell or if the fuel cell went off-line. Fuel cell-generated electricity also flowed into the power grid during times of surplus. The PEM fuel cells, in concert with natural gas reformers, cleanly and silently converted natural gas directly into electricity.

“One of our requirements was that the fuel cells attain 90 percent overall availability for a period of one year,” said Alan F. Montemayor, a principal engineer in SwRI’s Engine, Emissions and Vehicle Research Division. “We easily met that requirement on two of the fuel cells, with availabilities of 96.2 and 93.9 percent. The third cell required a short time extension to attain a 91.6-percent availability for a one-year period.”

“The fuel cells were successful in several other areas as well,” continued Montemayor. “Program results show that the cells produced more electricity than the residential dwellings used, with the surplus power going into the San Antonio City Public Serivce (CPS) electrical grid. The average electrical efficiencies for the fuel cells were determined to be 24.09, 21.96 and 17.73 percent.”

The program was carried out by a team from SwRI, CPS and St. Philips College, a local community college. Plug Power Inc. provided the fuel cells under contract. The Institute provided project management and coordination among team members, facilitated training activities, implemented a web-based link to the units, monitored and recorded data on the fuel cells and reported to CERL.

The primary objective of the program was to install, operate, maintain, monitor and report data on the fuel cells to CERL. Secondary objectives included familiarizing Brooks City-Base personnel and San Antonio military installations with fuel cell technology and demonstrating the potential of environmentally friendly electric generation technologies to CPS customers.

Other goals were establishing the basis for a fuel cell education program for St. Philips College, providing feedback to Plug Power for its fuel cells operating in the warm San Antonio climate, and demonstrating fuel cell technology to the San Antonio populace through articles, television spots and Internet access.

Fuel cells promise to achieve many of these objectives, through their quiet, clean, efficient and potentially long-lived operation. CERL, beginning in 1993, performed a successful demonstration of 30 phosphoric acid fuel cells powered with natural gas under the Department of Defense Fuel Cell demonstration. The SwRI PEM project was a continuation of these demonstrations. The main goal of these demonstrations is to gain critical performance data that will be provided to the fuel cell industry , which will push this technology to the commercial market faster.

At the completion of the demonstration, Plug Power Inc. donated the fuel cells to St. Philips College, San Antonio; Texas State Technical College, Waco, Texas; and Lamar University, Beaumont, Texas. For more information about the program, visit www.swri.org/fuelcell.

SwRI is an independent, nonprofit, applied research and development organization based in San Antonio, Texas, with more than 2,800 employeesand an annual research volume of approximately $355 million.