ADVANCED LEAD–ACID BATTERIES FOR ELECTRIC UTILITY LOAD-LEVELING

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This project is directed to the research, development and demonstration of advanced lead–acid battery technology, leading to increased cycle life, energy efficiency and area density, and to reduced initial cost ($/kW h) and operating and maintenance cost (mil/kW h) of the battery for electric utility load-leveling applications. The applicability of lead–acid batteries to load-leveling has been examined in *Cost and Design of State-of-the-Art Lead–Acid Batteries* by ESB, Gould, ELTRA, and Westinghouse. The results of these studies, *i.e.*, projected cost and life of the state-of-the-art lead–acid batteries, showed these batteries to be marginally acceptable to industry. It is the purpose of this project to advance lead–acid technology and produce a battery more acceptable to utility industry. The major development efforts are being subcontracted, on a cost-sharing basis, with battery manufacturers who have developed the background technologies. Other activities to support this program include a small support research group at ANL, technical support to the BEST Facility including the participation in BEST-Developer User Group, and the development of H_2/O_2 recombination devices for the lead–acid battery.

The role of ANL is to assist DOE with the management and coordination of these industrial contracts under a uniformly directed plan. The basic research group at ANL provides support to the industrial contracts.

The strategy of this project encompasses a three-phase effort. The three efforts are expected to last about six years. The first phase will emphasize research and development of advanced concepts leading to the fabrication of advanced cells/modules. The second phase will emphasize engineering development and the demonstration of pilot-line production of advanced modules, and the third phase will be construction and testing in the BEST Facility of a 5-MW h advanced lead–acid battery. Verification and qualification of advanced cells/modules (Phases I & II) developed under this project will be conducted in the National Battery Testing Laboratory at ANL. The technology and economics of the advanced lead–acid battery will be adequately demonstrated within the 6 years scheduled for this program.

During the current contract period, two subcontractors (ELTRA and ESB, Inc.) were selected and awarded contracts for phase I of the RD&D of advanced lead–acid batteries for electric utility load-leveling application. A review and approval of subcontractors program management and quality assurance plans are currently underway.

The work being carried out by the supporting research group at ANL is primarily directed to the development of an *in situ* analytical approach to characterize the compositional changes of the positive active material which impact cycle life, utilization and capacity retention of active material. During