January/February 2007 www.BatteryPowerOnline.com Volume 11, Issue 1

BATTERY POWER PRODUCTS & TECHNOLOGY

Solutions for OEM Design Engineers, Integrators & Specifiers of Power Management Products

World's Largest Battery Energy Storage System Completes Third Year of Operation

The world's most powerful battery energy storage system (BESS) has completed its third year in operation. Operated since 2003 by Golden Valley Electric Association (GVEA) located in Fairbanks, Ala., the BESS has prevented more than 734,000 customer electrical outages while responding to 163 emergency 'events.' GVEA serves 90,000 Alaskan residents spread over 2,000 square miles.

The area serviced by GVEA's BESS is considered an "energy island", a geographic area served by electric systems that cannot be connected to large grid networks. Because of the extremely harsh weather conditions, back-up power is essential to stabilize the local electric grid and reduce its vulnerability to blackout events, which can literally be a matter of life and death in the below freezing Alaskan temperatures.

Several companies contributed to developing the BESS, including Saft, the battery supplier; ABB, which provided the power conversion system; and Philadelphia Scientific, a manufacturer of industrial battery components and accessories, which provided the battery watering system, deionization system and battery monitoring system.

At the heart of the BESS are 13,760 Saft SBH 920 high-performance rechargeable nickel-cadmium cells and an ABB converter, which changes the batteries' direct current into alternating current ready for use in the GVEA transmission system. Arranged in four parallel strings, the cells provide a nominal voltage of 5,000 volts and a storage capacity of 3,680 Ampere-hours. The complete battery weighs approximately 1,300 metric tons and occupies a space measuring 940 square meters.

With all four battery strings operational, the BESS provides 27 megawatts (MW) of power for 15 minutes, long enough for GVEA to start up local generation when there are problems with the delivery of electricity from power plants in Anchorage, about 350 miles away. Although the GVEA battery system was initially configured with four strings, it can readily be expanded to six strings to provide a full 40 MW for 15 minutes. The facility can ultimately accommodate up to eight battery strings, giving flexibility to boost output or prolong the useful life of the system beyond the planned operation for 20 years.

The batteries were designed to maintain a four-year water reserve. However, when the watering process is required, the system must be temporarily taken offline. The watering must be done quickly, and if a single cell is missed, the entire system can fail. During tests, the Philadelphia Scientific single-point watering system reliably filled each of the 13,760 battery cells in 10 hours, six times faster than the next fastest watering system that was considered.

The monitoring system supplied by Philadelphia Scientific measures, records and reports the module voltage, string current, cell electrolyte level and cell internal temperature. Data collection and transfer are organized hierarchically with multiple devices dedicated to measuring and collecting data. Approximately 5,560 readings are taken every 30 seconds, a total of 5.8 billion readings per year. The data is analyzed and displayed through a central computer that forwards summary data to the human machine interface and is the main terminal for personnel who need to access the monitoring system.

The GVEA BESS demonstrates the long-term cost-efficiency and environmental benefits of this technology, underscoring the viability of battery energy storage as a reliable back-up power system for many electric utilities.

Reprinted from the January/February 2007 issue of *Battery Power Products & Technology* magazine. ©2006 Webcom Communications Corp.
7355 E. Orchard Rd., Ste. 100, Greenwood Village, CO 80111 USA Phone 720-528-3770. Fax 720-528-3771. wwwinfowebcom.com