

## **Mobile Substations Reflect Cooperative Practices**

*Scanner Magazine* – January 2009

Providing the Members of South Mississippi Electric with reliable electric power means many things, such as planning for future growth, managing fuel costs, maintaining generating facilities and designing transmission facilities as the system expands. Recently, two new mobile substations were purchased to increase the options for any of the Members needing backup capabilities for substations and transformers.

A mobile substation is exactly what the name implies—a complete, self-contained, trailer-mounted unit that can function as a substation. It is composed of a transformer, cooling equipment, high voltage and low voltage disconnects, power circuit protection, metering, relaying, AC and DC auxiliary power, surge protection, and optional cable reeling equipment. Mobile substations can be used by Members, when necessary, for planned maintenance, forced outage repairs, weather-related and other unplanned outages, temporary substation capacity increases, and sabotage.

“With the purchase of these two new mobile substations, SME now owns four mobile substations that are available to our Members,” said John Gilbertson, substation and communications manager. “We believe that it is important to have the resources not only to help meet the needs of our Members, but also to ensure the overall reliability of our system.”

The obvious advantage of a mobile substation is its rapid deployment capability. Depending on the distance required for travel, a mobile sub can be delivered, set up, and ready for operation in less than eight hours. In emergency situations, the timing may be reduced to four hours or less.

All transformers are rated in terms of volt-amperes, which determine the amount of capacity or power that the transformer is capable of delivering. The mobile substations owned by SME range from 20 MVA (Mega Volt Ampere) to 30 MVA. A Mega Volt Ampere is equivalent to one million volt-amperes. An average substation transformer is rated between 10 and 50 MVA. By comparison, distribution transformers mounted on poles are usually in the neighborhood of 25 kVA (or 25,000 VA).

The process of ordering and receiving the new substations took more than a year. The engineering department completed a study in April 2007 to assess the ability of SME’s mobile substation fleet to support Members’ needs. Each Member’s distribution system and the mobile substations that were available at the time were analyzed.

“The study concluded that although most of SME’s eleven members have their own mobile substation or transformer, not all are sized to provide adequate backup power for the Members’ larger transformers,” said Gilbertson. “In order to properly back up their transformer banks during forced outages or an emergency, several Members have been forced to transfer load to other substations in order to reduce the load of a substation being served by the mobile sub. The study uncovered various vulnerabilities for

some of the Members, such as having no mobile, having a mobile that was undersized, or not having a mobile to cover all voltages.

“We also collected data for each Member to determine their specific mobile sub needs and their ability to store, transport, and inspect mobile subs. As expected, the results showed that it would be very useful and economical for us to add to our fleet of substations for the Members to share.”

Based on the needs found in the study, a 20 MVA capacity substation and a 30 MVA capacity substation were purchased from Delta Star, Inc. Both of the mobile subs are standardized with identical accessory equipment, protection systems, and voltage ratings. The units have dual voltage ratings on the high/transmission side (69 kV or 115 kV) and the low/distribution side (13.2 kV or 26.4 kV) with an option to raise or lower the voltage up to 5%, meaning that the voltage can be matched to a variety of situations.

An additional 30 MVA mobile sub was ordered in the second quarter of 2008 to meet additional needs requested by the Members and will be delivered in May 2009.

“A 30 MVA transformer is becoming a standard transformer size for our distribution members,” said Gilbertson. “Having options, though, when we take the mobile subs into the field is very important. The 20 MVA mobile substations are shorter in length and considerably lighter in weight for use in the confined spaces of smaller substations, while the 30 MVA units will be able to support the more heavily loaded substations.

“A centralized fleet of five mobile substations should meet our needs for many years to come,” Gilbertson added. “This also establishes a new system-wide philosophy so that as the Members’ mobiles age, SME can evaluate the fleet and purchase additional units as needed. This is a great example of how cooperative relationships are supposed to work.”