Major Transformer Moves Begin Domino Effect
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The Purvis Bulk 230/161kV substation, South Mississippi Electric's only interconnection with Mississippi Power, is undergoing a major transition. The station's two 168 MVA transformers are being replaced by two 448 MVA transformers in order to increase the transfer capability between SME and Mississippi Power. The first 448 MVA transformer was delivered in June after a two-year journey.

The 680,845-pound transformer (360,000 pounds shipping weight) was previously in service at the Waynesboro 230/161kV substation, until an internal fault damaged the unit in July 2007. After an attempt to repair the transformer on site at the substation, factory personnel determined that the damaged area was not accessible, so the transformer was shipped to the factory in Canonsburg, Pennsylvania, near Pittsburgh.

As one might imagine, transporting a 180-ton load is not an easy task. A railcar with sufficient strength to carry the transformer was not available until March 2008. After multiple complications with railroad routes, the transformer began its 950-mile journey north in May 2008. Once the factory received the transformer, the 12-month repair process involved disassembling the internal windings, analyzing the failure, developing a repair plan, completing the repairs, and testing the completed transformer.

"When this transformer was purchased, SME was looking ahead to the point where we are now," said John Gilbertson, substation and communications manager. "We knew that increased capacity at the Purvis Bulk substation would eventually be needed, so a larger transformer was purchased in March 2005 for the Waynesboro substation, with plans for it to eventually be moved to Purvis Bulk. With the railroad issues that we had previously faced in the Waynesboro area, as well as the growing need foradditional capacity at Purvis Bulk, we decided to go ahead and place the repaired unit in service at Purvis Bulk, rather than transporting it back to Waynesboro."

Relocating the two existing Purvis Bulk units to Waynesboro will increase the reliability of the interconnection there with PowerSouth Energy Cooperative by adding redundancy – having two transformers in service instead of just one. Using the repaired 448 MVA unit at Purvis Bulk and ordering a second sister unit also allows SME to save money by not having to purchase two new 448 MVA units at current prices. This decision resulted in nearly $2 million in savings.

"Because shipping the transformer to the factory took over a month, we looked at several options for expediting the process of getting it back," Gilbertson said. "We secured a rider—a man who drove from switchyard to switchyard monitoring the transformer on its route. Having the rider follow the transformer made a tremendous difference in the transport time because he advanced the transformer through the various switchyards. The rider was able to reduce the shipping time by two weeks."

The transformer arrived at Plant Morrow on May 29 and was unloaded from the railcar. Two weeks later, H. Brown, Inc., a Louisiana-based contractor that specializes in moving heavy loads and has

transported several SME transformers in the past, prepared the repaired transformer for the final leg of its journey. Crews used a 144-wheel trailer designed for extremely heavy loads to make the four-mile trek to the substation. Because of the transformer's size and weight, a second truck was called in to assist in the transport.

More than twelve hours after the transformer left Plant Morrow, it arrived at the Purvis Bulk Substation. At 9 a.m. on June 11, system operators coordinated a short outage of the interconnection so that the repaired transformer could be moved into the substation. H. Brown then began the tedious work of slowly but carefully unloading the transformer from the transport trailer to the transformer foundation.

"It takes a combined effort from several departments at SME to bring these units online," said Matt Tillman, design engineer. "This process began several years ago when it was forecasted that SME would have increased generation responsibilities. Several sections of the bulk power operations department and most sections of the engineering department had a hand in making this happen."

Construction Supervisor Bob McCaskill was heavily involved in working with the contractors making the modifications needed at the Purvis Bulk substation in order to utilize the full ratings of the two new transformers. These modifications include the replacement of two 230kV circuit switchers, two 161kV circuit switchers, twelve 161kV disconnect switches, and modifications to the electrical bus surrounding the transformers to accept the larger units. The project also involved six different contractors to handle the substation modifications, transformer transportation, and final assembly.

In order to make room for the repaired transformer at Purvis Bulk, one of that substation's 168 MVA transformers was removed from service in June and transported to Waynesboro where it will be installed later this summer. The second 448 MVA transformer has been ordered for Purvis and will be placed in service in late 2009. At that time, the second 168 MVA unit at Purvis will be moved to Waynesboro.

At Waynesboro, the 448 MVA transformer originally replaced a 150 MVA transformer that was scheduled to be installed at the newly built Southeast Greene 230/161/69kV substation in late 2007, a move that was delayed. Since the 150 MVA transformer was kept onsite at Waynesboro, it was able to be returned to service while the 448 MVA transformer was repaired. Once the repaired unit is in service at Purvis Bulk and the 168 MVA unit is installed at Waynesboro, the 150 MVA transformer will be relocated to Southeast Greene.