

The Reduction of Squirrel Outages in Substations

By

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Introduction

Entergy Mississippi considers its service territory to be a very beautiful part of Mississippi's landscape. With substations hidden in groves of pine, oak and pecan trees they would go undetected if not for the overhead wires. Unfortunately, it is these same beautiful locations that have caused Entergy's Substation personnel many headaches due to squirrel related outages and equipment damage. This report is about an initiative taken by Entergy Mississippi to reduce the number of squirrel related outages and equipment damage within its substations.

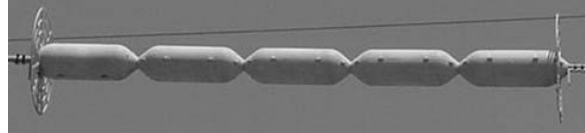
Squirrel Related Substation Outages at Entergy Mississippi

Over the past five years Entergy Mississippi has experienced 14 squirrels related outages. That's an average of almost five a year. All these outages have proven to be very expensive with the loss of revenue, man hours to make repairs and cost to replace damaged equipment. Entergy Mississippi has tried numerous types of wildlife protection devices to prevent these outages. Conductors have been insulated using various types of tubing, tape and covers. Planned outages have been taken and different types of discs were installed on insulators leading to energized equipment in the substations. Some of these efforts proved to be very expensive and yet the squirrel related outages continued.

Investigation Of Critter Guard

After applying various types of wildlife protection devices and still not achieving the desired results, a team was formed in 2001 to investigate a more effective method to mitigate squirrel related outages. During the investigation one of the team members heard about a new product called Critter Guard. The

team contacted Critter Guard to begin its review of the product. After a careful review of the products' technical data, workmanship, durability, ease of installment, and cost, the team agreed to give the product a try.



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Critter Guard Product Installation

In July of 2002, twenty-three hundred Line Guards were purchased and installation began immediately. The installation process started in the south sections of Mississippi with a contractor performing the work. Installation of the Line Guards at the first substation required an average time of 30 minutes each to install. After the first installation process the contractor's time to install each line guard was reduced to an average of 20 minutes each with no switching of the circuits required. Within four months over 680 circuits in the Entergy Mississippi service area were protected with the Line Guards. The cost to install each Line Guard was \$150 per circuit labor and \$120 per circuit material for a total of \$272 to protect each circuit. This cost was only a fraction of what was currently being spent on each circuit to mitigate squirrel outages. At this point the cost to protect each circuit and the time required to install the Line Guards were proving to be very cost effective, given that the product worked.

Results from Critter Guard Substation Protection

In the year 2003 there were no substation outages due to squirrels in Entergy Mississippi. To date in 2004 there have been two squirrel related outages

at the same substation on the same piece of equipment occurring one week apart. After the first outage an investigation was launched to determine how the squirrel gained access to the equipment. Upon arriving at the station it was obvious that the Line Guards at this site were not installed properly. At the beginning of the installation process the contractor was instructed to install the Line Guards between the first pole leaving the substation and the substation buss. The Line Guards at this site were installed between the first and second poles outside the substation. The contractor was notified of this improper installation but before the problem could be corrected another outage occurred. No outages have occurred after this problem was corrected. It is our belief that the Line Guards have been very effective and have saved Entergy Mississippi thousands of dollars in man-hours, equipment and loss of revenue due to substation outages caused by squirrels.

Simple Installation with Few Problems

Over 90% of the Line Guard installations in Entergy Mississippi were clear-cut and simple. Problems were encountered on circuits that did not have enough line length between the first pole and the substation. At substations where these problems occurred the Line Guards were installed between the first and second line poles. In order to fully protect the substation in these situations a Pole Guard was installed on the first line pole leaving the substation. The Pole Guards will prevent a squirrel from using the first pole to gain access into the substation equipment.

Performance History of Critter Guard Protection

Entergy Mississippi has over 2,300 Line Guards protecting its substations. Only two squirrel related substation outages have occurred since the Line Guards were installed. These two outages have been attributed to improper installation and no outages have occurred after this problem was corrected. To date the Line Guards have proven to be a cost effective, time efficient product to prevent outages and damage to substation equipment. In short, this product has worked for Entergy Mississippi.

Credentials Of Thomas Harrell

My name is Thomas Harrell and I hold a Bachelors Degree in Industrial Vocational Education from Mississippi Valley State University. I am an Area Substation Supervisor for Entergy Mississippi with over 22 years of experience in substation maintenance and construction.

