Transmission Line Corona

Electric transmission lines can generate a small amount of sound energy as a result of corona. Corona is a phenomenon associated with all transmission lines. Under certain conditions, the localized electric field near energized components and conductors can produce a tiny electric discharge or corona, that causes the surrounding air molecules to ionize, or undergo a slight localized change of electric charge. Utility companies try to reduce the amount of corona because in addition to the low levels of noise that result, corona is a power loss, and in extreme cases, it can damage system components over time.

Corona occurs on all types of transmission lines, but it becomes more noticeable at higher voltages (345 kV and higher). Under fair weather conditions, the audible noise from corona is minor and rarely noticed. During wet and humid conditions, water drops collect on the conductors and increase corona activity. Under these conditions, a crackling or humming sound may be heard in the immediate vicinity of the line.

Corona results in a power loss, so our industry has been studying this effect for over 50 years. Power losses like corona result in operating inefficiencies and increase the cost of service for all ratepayers; a major concern in transmission line design is the reduction of losses. Steps that VT Transco has taken to minimize these line losses and corona activity include:

1. Bundling – on our 345 kV lines, we have installed multiple conductors per phase. This is a common way of increasing the effective diameter of the conductor, which in turn results in less resistance, which in turn reduces losses.
2. Elimination of sharp points- electric charges tend to form on sharp points; therefore when practicable we strive to eliminate sharp points on transmission line components.
3. Corona rings – On certain new 345 kV structures, we are now installing corona rings. These rings have smooth round surfaces which are designed to distribute charge across a wider area, thereby reducing the electric field and the resulting corona discharges.