



Failures in outdoor insulation caused by bird excrement

Gerardo Montoya Tena^{a,*}, Ramiro Hernández C.^a, Jorge I. Montoya T.^b

^a Instituto de Investigaciones Eléctricas, Reforma 113, Col. Palmira, C.P. 62490 Cuernavaca, Mor., Mexico

^b Universidad Politécnica del Valle de Toluca, Toluca Edomex, Mexico

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ABSTRACT

The bird excrement, combined with humidity, causes line outages in transmission lines. In order to standardize the criteria to solve the problem, a research project was developed in México. The solutions found in worldwide review can be classified into four groups: elimination of birds, devices of dissuasion, physical barriers, and covering devices. The first group includes all bird elimination techniques. These alternatives are forbidden in México, and in most of the countries. The second group has shown to be effective at the beginning of its application; however once the birds are habituated to the device, it loses its effectiveness. The efficiency of the third group, the use of physical barriers, is high, as demonstrated by more than a few review reports informing drastic reductions of flashovers on the transmission lines where they have been installed. The fourth group is conformed by components whose function is to protect or to cover the insulation. According to the experience in Mexico, covering devices have shown to be very effective. The contamination by bird excrement has not a unique solution. The most viable solution is a combination of alternatives. Even though, a solution adopted for a region may not be suitable for another region. Therefore, each case should be approached according to the particular conditions of the region.

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1. Introduction

Outdoor insulation in electrical systems is usually contaminated by the action of external agents around it. Contamination can be either natural or industrial. The climate, soil type, as well as the proximity of the coasts can generate natural contamination. Another source of polluting agents, considered natural, is bird excrement (BE). This contamination, combined with humidity, can cause flashovers on outdoor insulation, mainly in transmission lines.

The problem of contamination by BE has not a unique solution, since a diversity of variables must be considered, when dealing with it, such as bird type, excrement type, climate, physical structures, etc. Several programs and methods have been used to reduce the impact of BE contamination, in different utilities. The time of application of these programs is significant when the objective is to avoid the birds' settling in the site. A suitable action reduces the time and effort required to impel them away. For example, the use of scaring devices is more effective at the beginning of the migration cycle. Additional factors to consider are the application period,

the planning, and the organization of the selected program. Sometimes it is necessary to apply more than one methodology due to birds' variety. If a program is not producing the desired effects, it is essential to analyze the causes and possible modifications before rejecting it. The key to success in birds' dispersion programs are time, persistence, organization, and miscellany.

1.1. Flashover mechanism by BE

The BE is a mixture of urine and solid lees. The BE is classified according to three forms: rod or bar, snail, and fluid. The last one is produced by birds of prey and herons [1]. Carnivorous birds, which consume great amounts of proteomics weaves, produce great volumes of urethral liquid. This provokes a white or light (cream) color in their excrement. Factors that can modify the volume and consistency of the BE are: species, age, lunch time, dietetic content, amount of food and water consumption, females' reproductive cycle, and diseases. Birds can defecate at any time, but some do not when asleep, in which case volume of excrement in the morning is abundant [2]. It is common for the birds to eliminate the excrement before beginning their daily activities [3].

Big birds' fluid excrement liberation can cause line outage in continuous and conductive lines, and even a short circuit between the structure and the conductor. If the excrement release occurs near an insulator in vertical position, the arc distance of the insulator could short circuit in similar way.

* Corresponding author at: Instituto de Investigaciones Eléctricas, Transmission and Distribution, Reforma 113, Col. Palmira, 62490 Cuernavaca, Morelos, Mexico. Tel.: +52 777 362 3811; fax: +52 777 362 3881.

E-mail addresses: gmontoya@iie.org.mx (G. Montoya Tena), rhc@iie.org.mx (R. Hernández C.), joimt@yahoo.com.mx (J.I. Montoya T.).