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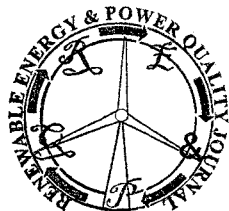
ANALYSIS OF BEHAVIOUR OF PHASE S CAPACITIVE TAP INSULATOR OF INTERCONNECTION 1, 220 kV, IN JINAMAR POWER PLANT (ISLAND OF GRAN CANARIA, CANARY ISLANDS, SPAIN)

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ABSTRACT

In the island of Gran Canaria, Canary Islands, there are two Power Plants called Jinamar Power Plant and Barranco de Tirajana Power Plant, both property of Unelco Generacion, a subsidiary of Endesa Generacion. The first one is placed in the northeast of the island, near its capital, Las Palmas de Gran Canaria, and the other is in the southeast, near the most significant touristic area of the island. Both plants are interconnected by means of four transmission lines, two with a voltage of 220 kV and the other two with 66 kV. Since its commissioning in 1995, several phase to ground shortcircuits have occurred in one of the capacitive tap insulators in the 220 kV lines, in Jinamar side, without a clear cause for them, causing problems of different kind in the electrical system of Gran Canaria. From construction of tap insulators to environmental conditions, every possible factor was carefully studied and laboratory tests were made. In this paper it is described the analysis that was carried out and how a deep study of every possible cause drove to a definitive solution of the problem.

KEYWORDS

Tap insulator, capacitive, dirtiness, shortcircuit, field tests.

1.- INTRODUCTION

In the island of Gran Canaria, Canary Islands, there are two Power Plants called Jinamar Power Plant and Barranco de Tirajana Power Plant, both property of Unelco Generacion, a subsidiary of Endesa Generacion. The first one is placed in the northeast of the island, near its capital, Las Palmas de Gran Canaria, and the other is in the southeast, near the most significant touristic area of the island. Jinamar Power Plant has an installed capacity of 416 MW, and Barranco de Tirajana Power plant has 697 MW. Both plants have practically every thermal generation technology (classic steam cycle, combined cycle, gas turbines and Diesel generators) and there is even a small wind plant in the second one. Both plants are interconnected by means of four transmission lines, two with a voltage of 220 kV and the other two with 66

kV. These two last have several intermediate substations inserted along their traces, all of them being of interior conventional type. Both 220 kV lines go straight from one plant substation to the other, and both of them are built totally with SF6 technology, having a length of 40 km each, being arranged in a double circuit line. Today, all of them are owned by Red Electrica de España, but formerly were by Endesa Distribucion Electrica. Both 220 kV substations, Barranco de Tirajana Power Plant and both 220 kV interconnection lines were put in service in 1995. Since then, with a certain regularity, several one phase to ground shortcircuits have been occurring, with their origin in the capacitive tap insulator installed in the central phase (S phase) in the outlet of the so called interconnection I line in Jinamar substation. In general, these situations are solved through the action of corresponding protective relays. Nevertheless, in some occasion, and with certain operational conditions in the system, some unbalancing between generation and demand has occurred, in such a way the integrity of the whole electric system has been in serious danger. In the diversity of tries to get a solution for this problem, several measures were taken. From operational actuations such as intensification of cleanings, to the mere change of the insulator with a certain periodicity (every 3-4 years), passing by constructive alterations such as modification of insulator head, all of them have proved to be ineffective and did not produce any improvement in the situation. In 2005, after last incident occurred, a decision was taken by the company who had the property of installations, Endesa Distribucion Electrica, S.A.. This decision was to carry out an exhaustive study of possible causes which were provoking these shortcircuits. This study was carried out along with University of Las Palmas de Gran Canaria, with the invaluable assistance of the Professor Fernando Garnacho, Director of Central Official Electrotechnic Laboratory, in Madrid, and Professor Luis Rouco, of Comillas Pontifical University,