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SUMMARY OF DAS TESTING PROGRAMS

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The Dissipation Array System (DAS) was introduced in 1971. The design of the DAS has substantially evolved since then, with numerous design improvements being made to its components, including the dissipation wire, the shape and geometry of the ionizer, etc. The nature of the DAS applications have evolved also, as the DAS application engineers have come to better understand DAS operation, how it is best applied, etc.

As part of this design evolution, the DAS has undergone numerous third-party testing programs. These programs are summarized below, and present a fairly consistent attestation to the DAS effectiveness:

1. Westinghouse Savannah River Company Process Canyons, Aiken, South Carolina, USA - In 1991 DAS's were installed to protect buildings at the Savannah River nuclear processing site. A report to evaluate the DAS concludes that the DAS protected area "has not experienced any losses from a direct lightning flash to the protected area." [Ref. 1]

2. Hitachi Testing #1, Tokyo, Japan - In 1997 engineers of the Hitachi Techno Engineering Company simulated the ionizing effect of a DAS by placing a modular ionizer and a conventional air terminal in a high voltage field, in a comparative test. Video of the test shows arcing to the conventional air terminal but not the modular ionizer during identical conditions. The test report concludes that "the electrical field would be decreased by multi points Ionizer (DAS) drastically." [Ref. 2]

3. Tennessee Valley Authority, Browns Ferry Nuclear Power Plant, Athens, Alabama, USA - In 1998 a DAS was installed on a stack with a history of lightning strikes. After DAS installation, they have experienced zero strikes to the stack, as well as an 80% reduction of lightning strikes near the stack. [Ref. 3]

4. Ministry of Defense, Singapore - In 1999 military engineers tested the effectiveness of the DAS at Sembawang Air Base. The report states that "the DAS has shown positively that it is capable of preventing lightning strikes to the region it protects." [Ref. 4]

5. Moscow Institute of Physics and Technology, Moscow, Russia - In 2002-2004 a team of Russian scientists tested and analyzed the DAS. Some of their conclusions are as follows [Ref. 5]:
    1. "DAS controls the downward leader by delaying or suppressing the counter leader."
    2. "A counter leader could be totally suppressed if the radius of the DAS and number of points were chosen in a proper way."

3. "The total corona current through the surface of DAS increases by several orders of magnitude …at short distances between the leader and the DAS."

6. Tri State Generation & Transmission, Westminster, Colorado, USA - In the summer of 2007 a test was conducted to measure electric field strengths at a DAS site. Field strengths were measured both within and outside of the DAS protected area. It was found that the DAS caused an average field strength reduction of 55%. The lower the field strength, the less likely it is to develop an upward streamer. No strikes have been reported at this site since installation in 1991. [Ref. 6]

7. Current Discharge Comparison of Various Air Terminals Subjected to High Voltage DC – In May 2017, NTS Lightning Technologies in Pittsfield, Massachusetts, conducted a series of high voltage tests to compare the ionization rates of different types of air terminals. Four different terminals were tested: an LEC Dissipation Array Hemisphere, an LEC Spline Ball Terminal, a Lightning Master terminal and a conventional air terminal. The test results show that the discharge current from the DAS Hemisphere is substantially greater than that for the other types of terminals, on the order of 15 times that of a conventional air terminal. The greater the discharge current, the less likely it is to form upward streamers. [Ref. 7]

8. Wyle Laboratories – In July 1988, seventeen high voltage tests were conducted on various shapes of ionizers. The ionizers included Dissipation Wire, a panel of Dissipation Wire, an air terminal brush and an air terminal brush with extra bristles. The Dissipation Wire panel demonstrated a higher discharge rate than either type of brush. [Ref. 8]

9. Mississippi State University – In June 1990 high voltage tests were conducted on various configurations of Dissipation Wire, 2 different types of Spline Ball Ionizer's (SBI's) and a conventional air terminal. All of the configurations of Dissipation Wire and the two SBI's demonstrated greater discharge rates than the conventional air terminal. The larger SBI with a diameter of 48 inches generated more discharge current than the smaller SBI. The greater the discharge current, the less likely it is to form upward streamers. [Ref. 9]

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