

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Physical processes in high field insulating liquid conduction.¹

MICHAEL MAZARAKIS, MARK KIEFER, JOSHUA LECKBEE, DELMAR ANDERSON, FRANK WILKINS, ROBERT OBREGON, Sandia National Laboratories — In the power grid transmission where a large amount of energy is transmitted to long distances, High Voltage DC (HVDC) transmission of up to 1MV becomes more attractive since is more efficient than the counterpart AC. However, two of the most difficult problems to solve are the cable connections to the high voltage power sources and their insulation from the ground. The insulating systems are usually composed of transformer oil and solid insulators. The oil behavior under HVDC is similar to that of a weak electrolyte. Its behavior under HVDC is dominated more by conductivity than dielectric constant. Space charge effects in the oil bulk near high voltage electrodes and impeded plastic insulators affect the voltage oil hold-off. We have constructed an experimental facility where we study the oil and plastic insulator behavior in an actual HVDC System. Experimental results will be presented and compared with the present understanding of the physics governing the oil behavior under very high electrical stresses.

¹Sandia National Laboratories managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. D.O.E., NNSA under contract DE-NA-0003525

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Date submitted: 21 Jul 2017

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