

## **Mold Prevention and Control in the Army Using Electro-Osmotic Pulse**

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A major research and development initiative undertaken by the US Army Engineer Research and Development Center's Construction Engineering Research Laboratory (ERDC-CERL) has been the development and enhancement of electro-osmotic pulse (EOP) technology. Laboratory research and demonstrations have shown that EOP technology eliminates the prime environmental factor necessary for mold and mildew growth and poor indoor air quality: water.

EOP is a novel moisture management technology that uses low-power, pulsed direct current (DC) current and electro-kinetics to keep the inside surfaces of concrete or masonry structures dry, and in so doing reducing indoor relative humidity. The system initiates electro-osmosis within concrete and masonry structures through application of a pulsating electric field. Pulsing DC voltage is applied between the electrodes strategically placed inside and outside the structure to produce an electric field in the walls, which moves water from the interior side of the walls toward the exterior side. The positive electrical pulsed current causes cations (e.g., Ca<sup>++</sup>) and surrounding water molecules to move from the interior positive side (anode) toward the exterior negative side (cathode) against the direction of flow created by the hydraulic gradient, thus preventing water from penetrating through a buried or submerged concrete structure.

EOP was installed in the basements of two Pre-Civil War buildings at Ft. McNair, DC, and in the basements of 267 family housing quarters on Fort Sill, OK, constructed between the late 1800s and the mid 1900s. Benefits from these projects include the elimination of water intrusion in the basements where EOP was installed, improvement in air quality in the living quarters and elimination of mold growth problems.

EOP is over 98% more energy efficient than dehumidifiers while reducing the concrete surface humidity below 55%, preventing mold and bacteria growth. In the basements where the EOP system was installed, there is no longer any water intrusion through the walls or floors.