

## Chloride, Dust and RH, Risks in Coastal and Inland Areas

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Sea salt aerosol is a significant cause of metal corrosion in coastal regions. The synergistic effects of the salt, dust particles and relative humidity are important in understanding the corrosion process and risk. Dover Castle on the South East Coast of England holds a collection of important wartime telecommunications equipment, displayed in a series of chalk tunnels. The potential salt sources from the mechanical ventilation system; from efflorescence on the ceilings and from redistribution by visitor circulation, were investigated. The filtration on the ventilation system was found to be adequate, and dust and chloride deposition and corrosion rates were significantly reduced when the system was in operation. Corrosion rate is strongly influenced by time of wetness. Monitoring with grid type wetness sensors has shown that both salt and dust deposition significantly increase time of wetness on metal surfaces. The critical RH in dusty conditions was found to be around 50%, somewhat lower than would be expected. Improved housekeeping and a commercial corrosion inhibitor have been found effective at retarding ferrous corrosion in the aggressive tunnel environment. Covers have also been tested to protect the intricate interiors or equipment from dust, without generating harmful microclimates promoting corrosion or microbial growth. Showcases displaying archaeological iron at Porchester Castle were found to be allowing ingress of salt aerosol. The amount was compared to that released by an ongoing deterioration reaction of the iron. Re-development of the display will introduce high performance display cases which will both reduce the ingress of salt and retard the internal reaction through better RH control. Salt crystals were observed in fresh cracks appearing on an historic porcelain dinner service displayed at Walmer Castle raising the possibility that the deposition rate was sufficient to contaminate ceramics to such an extent to promote damage from crystallisation cycles. Even many miles from the coast, chloride has been found to be major constituent of silver tarnish and its deposition as an aerosol cannot be ignored if the tarnishing of silver is to be controlled. Showcases can significantly reduce dust ingress and a positive correlation between air exchange rate and higher dust and chloride deposition rates and silver tarnish rates has been established.