

## Reference Information for RF Induced Corrosion

(compiled by SkyVision Solutions, August 2014)

### Reference 1

"A Nonlinear Model for AC Induced Corrosion," by N. Ida, Y. Le Menach, X. Shan and J. Payer; *Advanced Electromagnetics*, Vol. 1, No. 1, May 2012.

#### Abstract

"The modeling of corrosion poses particular difficulties. The understanding of corrosion as an electrochemical process has led to simple capacitive-resistive models that take into account the resistance of the electrolytic cell and the capacitive effect of the surface potential at the interface between conductors and the electrolyte. In some models, nonlinear conduction effects have been added to account for more complex observed behavior. While these models are sufficient to describe the behavior in systems with cathodic protection, ***the behavior in the presence of induced AC currents from power lines and from RF sources cannot be accounted for and are insufficient to describe the effects observed in the field.*** Field observations have shown that a rectifying effect exists that affects the efficacy of cathodic protection and this effect is responsible for corrosion in the presence of AC currents."

#### Extract from Article

"Because the process of corrosion and the cathodic protection are DC processes it has been assumed that only DC currents can produce corrosion. However, it has been known for some time that AC induced currents not only affect the rate of corrosion but also alter the DC currents and potentials and hence can accelerate the rate of corrosion. ***There is anecdotal evidence that high frequency fields produced by antennas can also affect corrosion rates.***"

Full article at: <https://skyvisionsolutions.files.wordpress.com/2014/08/corrosion-54-641-1-pb.pdf>

### Reference 2

"Electromagnetic Radiation Effects on Corrosion," by Joe H. Payer, Nathan Ida, Xi Shan, Karin Bodnar, Department of Electrical and Computer Engineering at the University of Akron.

#### Summary Information

***"The effects of electromagnetic radiation on the corrosion of structures have been recognized anecdotally,*** but there has been little or no rigorous investigation. The objectives of this work are to demonstrate the effect electromagnetic radiation on corrosion under controlled laboratory conditions and to determine the magnitude of the effect electromagnetic radiation on the form and extent corrosion damage."

Link at: <http://nace.confex.com/nace/DoD2011/webprogram/Paper20455.html>

### Reference 3

Public [Comments](#) before the Maryland Public Service Commission, September 28, 2012

#### Extract from Comments

"[A] fundamental difference between the two meter approaches is that the smart meter approach relies upon RF radiation to communicate information to other smart meters, the utility and eventually to the ratepayer's appliances. ***It now appears that the RF radiation degrades the contacts, causing corrosion resulting in resistance, overheating and ultimately a fire.***"