

## Effect of oxygen injection on the FAC phenomenon

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### ABSTRACT

Oxygen injection represent a potential solution to reduce FAC in PWR's as it has been proven that an elevation by a few  $\mu\text{g}/\text{kg}$  significantly reduces FAC corrosion rates [1]. The aim of the present study is to better understand the impact of oxygen on the FAC phenomenon. Three tests were performed on the CIROCO loop at  $180^\circ\text{C}$ , with a  $\text{pH}_{25^\circ\text{C}}$  set at 9 by ammonia injection. Oxygen injections were realized at different concentrations varying from 0.5 to 4  $\mu\text{g}/\text{kg}$ . The oxygen concentration was modified up and down around the supposed stifling value of 1  $\mu\text{g}/\text{kg}$ .

The conclusions of these tests are summarized below:

- Under the conditions of the CIROCO loop, the FAC process is significantly reduced when the oxygen concentration increases over 1.5  $\mu\text{g}/\text{kg}$ . There are indications that the oxygen concentration value over which the material is protected from FAC degradation depends on other parameters such as the water velocity, the composition of the solution, or the temperature. Depending on the experimental conditions, the presence of oxygen does not stop the FAC phenomenon but only slows it down.
- When the dissolved oxygen concentration increases (and decreases) the composition and the aspect of the surface oxide changes reversibly from a porous layer of magnetite to a dense homogeneous layer of hematite.
- The evolution of the FAC rate over a long period of time (over a thousand hours) needs to be investigated to better understand the kinetics effects linked to FAC.

### REFERENCES

- [1] K. Yoneda, C. Mansour (2014) "Impact of oxygen on Flow-Accelerated Corrosion : Bibliography" MAI Report H-B60-2013-03622-EN