

1991 **Title:** **Engineering Analysis of Recovery Boiler Superheater Corrosion**

Authors: John F. La Fond, Arie Verloop, and Allan R. Walsh

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ABSTRACT:

The fireside corrosion of superheater tubes in recovery boilers has become increasingly more common and troublesome as recovery boilers are fired above their design levels. This often leads to excessive superheated steam temperatures and elevated superheater metal temperatures. These conditions can accelerate corrosive metal loss if proper modifications are not made to the boiler combustion system or superheater design.

Efforts to reduce salt cake makeup by improving chemical capture and recycle efficiencies have contributed to higher potassium and chloride levels in the as-fired black liquor. The presence of these two elements in elevated amounts can contribute to a higher susceptibility to deposit formation and fireside corrosion in the superheater area.

In addition, the high-performance steam turbines used in some recent cogeneration projects require higher steam temperatures from the recovery boiler than previously considered practical. Operation at higher steam temperatures can also lead to excessive superheater-tube metal temperatures and accelerated corrosion rates.

For these reasons, a better understanding of fireside superheater corrosion has been of recent interest. Along with a better understanding of the mechanisms that promote superheater corrosion, there has been a need for the development of analytical tools to help engineer solutions to corrosion problems. In cases where fireside superheater corrosion is occurring, engineering analysis can offer the following:

- Prediction of tube metal temperatures to identify areas most vulnerable to corrosive attack.
- Identification of limits to boiler operating parameters to maintain tube metal temperatures at safe levels.



- Allow redesign of superheater tube arrangement and metallurgy to avoid exposure of the tube metal to excessive temperatures and heat fluxes.

This paper describes the “ingredients” of such an engineering analysis tool and provides an example of calculation results.