

**IAPWS Certified Research Need – ICRN**

**Improved Coolant Sampling and Analysis of  
Low Concentration Metals (Fe, Cu, Co, etc.)**

**Closing Statement**

In formulating ICRN 19 in 2006, the IAPWS Working Group *Power Cycle Chemistry* had examined the published work in the area of sampling insoluble impurities in water and steam, especially of metals and their oxides. It was noted that representative samples of such species are essential for the control of corrosion product transport in nuclear and fossil-fired power plants.

IAPWS recognized that there was a requirement for work to be pursued in this field and so prepared the ICRN to assist potential investigators in obtaining sponsorship. Specifically, requirements for isokinetic sampling, conditions governing the deposition of particles in sample lines, the influence of the corrosion film on the sample line surfaces, and precipitation of soluble corrosion products were identified as subjects to be researched.

The ICRN was due to expire in 2009 but was extended to 2011. Up to that time and until the present (2014), reports of research into corrosion-product sampling were generated. Much of the work has been described in an IAPWS Technical Guidance Document,<sup>1</sup> which presents the background material and outlines the state-of-the-art of sampling steam/water systems for corrosion products. Design of sample systems as well as recommended methods for withdrawing samples are described along with guidelines for subsequent handling of withdrawn samples and analysis of common corrosion products. Although the TGD is written for fossil and combined cycle power plants, many of the principles it espouses apply to sampling the coolant systems of nuclear reactor systems.

While the TGD presents current best practices, it is recognised that there remain uncertainties in relating what is analysed in a withdrawn sample to what exists in the main fluid stream. The problem arises from interactions between the walls of the sample system itself and the sample stream. In particular, depending on the chemistry of the fluid and the solubility characteristics of the corrosion products under consideration, precipitation or dissolution may occur as the sample is cooled for handling at room temperature. Research into such phenomena continues.

**New Brunswick, Canada, 2014 October**

***References***

[1] IAPWS, Technical Guidance Document: Corrosion Product Sampling and Analysis for Fossil and Combined Cycle Plants, September 2013. Available from: <http://www.iapws.org>.