Proposal for IAPWS International Collaboration

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Overview:
Over the past three-years, David Addison (New Zealand) and Willy Cook (Canada) have worked together through an International Collaboration Project focused on examining the effects of combined impurities (chloride and sulfate) on the corrosion of boiler steels. The work was initiated from two IAPWS ICRN's, #25 – Corrosion mechanisms related to the presence of contaminants in steam/water circuits, particularly in boiler water and; #20 – Sensors for use at Elevated Temperature in the Plant Cycle of the Power Industry. The primary objectives of the previous International Collaboration were:

- Design and construct two-electrode and/or three-electrode high-temperature electrochemical flow-through cell
- Upgrade test loop at UNB, install and commission electrochemical test system.
- Run baseline testing to verify and validate experimental method.

The intent was to have the system and methods ready for an ongoing, long-term test program and this intent has now been completed. The test rig and electrochemical cell is now ready for implementing a full experimental test program, which is the focus of the present International Collaboration proposal.

Scope:
The work proposed in this International Collaboration project will capitalize on the efforts from the previous collaboration. A Master's student (person yet to be determined) will be supported through this IC project to utilize the UNB test rig and electrochemical test system. A full scope of experiments to pin-point the progression of corrosion in boiler systems with individual and mixed contaminants will be conducted. As demonstrated through the commissioning and initial testing, the Linear Polarization method is well suited to identify the threshold for the onset of accelerated corrosion. The test plan will encompass typical AVT(R) and AVT(O) chemistry conditions with a range of pH between 9.0 – 9.8 and chloride and sulfate concentrations between 0 – 1000 ppb. In addition, the Canadian Nuclear Laboratories (CNL) has begun to take an interest in this test program and there is agreement that this work may be further supported through CNL with potential parallel experimental work to be conducted at the Chalk River Laboratories.

Deliverable: Report describing results of the test program with potential for incorporating the results into a future revision of the PCC Technical Guidance Documents.

Budget:

Student Support (student yet to be identified):	£ 12,000
Travel Support (UNB to CRL; attend IAPWS meetings):	£ 6,000
Total:	**£18,000**

References:

1. IAPWS ICRN#25, "*Corrosion mechanisms related to the presence of contaminants in steam/water circuits, particularly in boiler water*".
2. IAPWS ICRN#20, "*Sensors for use at Elevated Temperature in the Plant Cycle of the Power Industry*".