

IAPWS Certified Research Need
ICRN #5

**Origin, Behavior, and Fate of Organics in the Power Cycle and their
Impact on Chemical Specifications**

ICRN Issue Date: September 1993

Closing Statement

The objectives of this ICRN have been largely met. Owing to the extended period that this ICRN has been active it is suggested that it be closed, but that a new ICRN be issued to cover the remaining research requirements.

Background

This ICRN was first issued in September 1993 since it was recognised that *“the origin, composition, behaviour and fate of organics in the plant cycle is important when investigating appropriate measures which could influence the decrease of the first condensate pH and also turbine disk and blade failures”*.

The ICRN was approved and Dr. R. Gilbert, Institut de recherche d’Hydro-Québec, Canada, was appointed as custodian. An interim report was made at the IAPWS Meeting in Fredericia, September 1996.

Results Achieved:

Objective #1: Origin and Composition of Organics in the Power Plant Cycle

Most of this has been adequately covered in the VGB Instruction Sheet Organic Matter and Dissolved Carbon Dioxide in the Steam Water Circuit of Power Plant VGB-M 418 Le, May 2002.

Additional knowledge is still required on organic plant cycle additives.

Objective #2: Behavior and Fate of Organics in the Power Cycle

This has been covered by I. Jiricek (PowerPlant Chemistry Journal, 2000, 2(10), pp. 591-594 and S. Huber (www.doc-labor.de).

Objective #3: Needed research activities

Critical review and evaluation of literature and laboratory determinations has been completed. There are 65 references in the VGB-M 418 Le Instruction Sheet and a further 37 from the International Conference: “Interaction of Organics and Organic Cycle Treatment Chemicals in Water, Steam and Materials”, Stuttgart, Germany, October 2005.

Knowledge regarding organic dispersants requires further research.

Stability of organic decomposition products may require further investigation.

Mass balance of organic species in the plant cycle: There is sufficient information.

Reduction of permanent leachables from ion exchange resin: There is sufficient information available.

Reduction of organics in make-up water: There is sufficient information available. Membrane techniques are widely chosen to serve this purpose.

Establishing less restrictive cycle operational conditions: This is not recommended until further research has been conducted.

Conclusion

Although a significant amount of work has been done, there remain open questions:

- organic plant cycle additives
- stability of organic decomposition products
- irrefutable evidence of damage cause by organics
- root cause analysis and not subjective opinions is required
- revised guidelines cannot be produced without sufficient knowledge which presently is lacking.

A follow-on ICRN is recommended to on the basis of the remaining open questions.

References

1. IAPWS Certified Research Need - ICRN #5,
2. VGB Instruction Sheet Organic Matter and Dissolved Carbon Dioxide in the Steam Water Circuit of Power Plant VGB-M 418 Le, May 2002
3. Proceedings of the International Conference: "Interaction of Organics and Organic Cycle Treatment Chemicals in Water, Steam and Materials", Stuttgart, Germany, October 4-6, 2005.
4. Website www.doc-labor.de

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