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AREVA Position on Revised LOCA Criteria

- > With the exception of Breakaway Oxidation**
 - ◆ The existing rule implemented with IN 98-29 Is adequate
 - ◆ Protection for Breakaway Oxidation should be added to LOCA requirements but does not require a 50.46 change

- > Enabling Rule for Burnup Effects on Oxidation**
 - ◆ Example “Cladding shall retain ductility post LOCA”
 - ◆ This is possible to write now, however
 - Numeric values must be design and alloy dependent
 - Burnup dependencies should, to the extent reasonable, tie to basic causes (This would be Hydrogen with Corrosion as a surrogate)
 - The implementation should be by NuReg or Reg Guide with sufficient time allowed for development and compliance

Issues Not Reviewed or Considered for Enabling Rule

- > Definitions of Metrics (What is ductility?)**
- > Retained Margins (Where and how much?)**
- > Where Metrics are Applied (Ruptured Zone?)**
- > Determination of Numeric Criteria (Whom, When?)**
- > Cost Benefits of Back Fit Implementation**
- > Implementation Schedules**

Validation Issues Yet to Be Established With the Industry

> New Alloy

- ◆ **Determination (What changes constitute a New Alloy?)**
- ◆ **Test spectrum**
 - **For new alloy?**
 - **A set of screening test for variations on a current alloy**
- ◆ **Can burnup dependencies (Hydrogen) evolve with use of alloy?**

> Should Periodic Testing be Mandated?

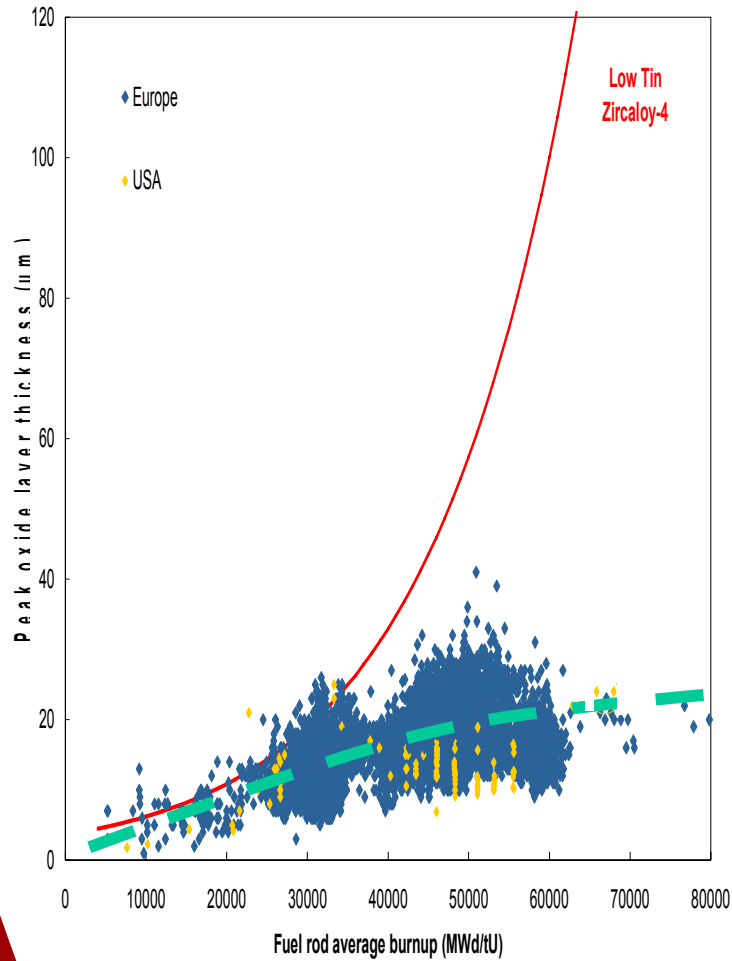
- ◆ **If so, what type of test?**
 - **Should be simple and non-intrusive on production**
 - **Should be clearly delineated (fair across design and alloy differences)**
 - **Should only serve a screening purpose (not for compliance)**

A View of a Needed Hydrogen/Corrosion Correlation

- > Hydrogen is Closest to the Scientific Cause**
- > If Corrosion is Employed**
 - ◆ Comprehensive corrosion/ductility correlation needed, or
 - ◆ Relationship to Hydrogen must be reasonably known
 - ◆ Prevents suppression of ductility impacts
- > BWR Alloys and Designs – Keep Hydrogen Base**
- > Modern PWR Alloys - Relationship Is Reasonable Established**
 - ◆ Corrosion measured and Hydrogen measured
 - ◆ Combine on a best estimate basis
- > Zr-4 PWR Alloys – Use Historical Relationships**
 - ◆ Use disappearing – utilities switch to advanced claddings
 - ◆ Historical corrosion/Hydrogen correlations sufficient

Corrosion/Hydrogen Database

Corrosion Database in USA and in Europe



Hydrogen Data Base

