

April 12, 2010 (9:10am)

OFFICE OF SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

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**PRM-50-93 is based on sound science**

Of course, the Commissioners of the NRC were not presented with the very substantial amount of the available and applicable documentation when they approved the denial of PRM-50-76 that was posted in the Federal Register on Tuesday, September 6, 2005. The NRC very strongly asserted: "NRC's technical safety analysis demonstrates that current procedures for evaluating ECCS performance are based on sound science and that no amendments to the NRC's regulations and guidance documents are necessary." In PRM-50-93, the very thorough analysis and documentation by the Petitioner, Mark Edward Leyse, unambiguously demonstrates that the NRC's current procedures for evaluating ECCS performance are most certainly not based on sound science.

In its posted denial of PRM-50-76, the NRC states, "The remaining data from Bostrum ("The High Temperature Oxidation of Zircaloy in Water," W. A. Bostrum, WAPD-104 March 1954) and Lemmon ("Studies Relating to the Reaction Between Zirconium and Water at High Temperatures," A. W. Lemmon, Jr., BMI-1154, January 1957), at more relevant zirconium cladding conditions, were used by Baker and Just in the derivation of their equation." However, it is unlikely that the authors of NRC's technical safety analysis, ML041210109, ever looked at either WAPD-104 or BMI-1154. It is more likely that those authors merely lifted the description of those references from the Baker-Just report, ML050550198. Thus the authors of ML041210109 were not aware that Bostrom and Lemmon each used induction heating in their investigations. Furthermore, those authors also were likely unaware of FZKA 5846, the Hofmann and Noack report from which this Commenter has already quoted as follows in his Comment 4 to PRM-50-93 on 04/05/10.

*A series of separate-effects tests is being carried out on Zircaloy PWR fuel rod cladding to study the enhanced oxidation which can occur on quenching. In these tests, performed in the QUENCH rig, **single tube specimens are heated by induction to a high temperature and then quenched by water or rapidly cooled down by steam injection.***

***No significant temperature excursion during quenching occurred such as had been observed for example in the quenched (flooded) CORA-bundle tests /4, 5/. This absence of any temperature escalation is believed to be due to the high radiative heat losses in the QUENCH rig.***

The opening statement in PMR-50-93 is founded on sound science, "Petitioner requests that the United States Nuclear Regulatory Commission ("NRC") revise 10 C.F.R. § 50.46(b)(1) to require that the calculated maximum fuel element cladding temperature not exceed a limit based on data from multi-rod (assembly) severe fuel damage experiments."

Finally, in view of its importance, I want to assure the public that I have a well-documented e-mail trail in support of the following assertion that I have copied from the foregoing: *However, it is unlikely that the authors of NRC's technical safety analysis,*

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*ML041210109, ever looked at either WAPD-104 or BMI-1154. It is more likely that those authors merely lifted the description of those references from the Baker-Just report, ML050550198. Thus on 2/7/2010 I e-mailed [chairman@nrc.gov](mailto:chairman@nrc.gov), "Please make these two reports, WAPD-104 and BMI-1154, available to the public." Receiving no reply, I forwarded that e-mail to [stephen.burns@nrc.gov](mailto:stephen.burns@nrc.gov) on 2/17/2010. On 3/4/2010 I received an e-mail from [Richard.Dudley@nrc.gov](mailto:Richard.Dudley@nrc.gov) informing me that BMI-1154 was now in ADAMS (ML100570218). On 3/31/2010, [Richard.Dudley@nrc.gov](mailto:Richard.Dudley@nrc.gov) e-mailed a pdf version of WAPD-104. These are the facts regarding the timing of NRC's access to WAPD-104 and BMI-1154.*

Comment submitted by

Robert H. Leyse\*  
Chemical Engineer and Nuclear Engineer  
P. O. Box 2850  
Sun Valley, ID 83353

**\*Experience:**

**Career to date:** Commenter's ongoing career spans several decades: General Electric at Hanford Works (1950), Argonne, DuPont Savannah River Plant, General Electric Vallecitos, Westinghouse Pittsburgh, Scandpower Norway, Consulting with Westinghouse at TMI-2, EPRI Nuclear Safety Analysis Center, EPRI Exploratory Research, and now self employed (2010).

**Selected Experience pertinent to this comment on PRM-50-93:**

PWR FLECHT: Test design, discoveries and reporting as referenced in PRM-50-93.

Presentation at 2003 RELAP5 International Users Seminar, West Yellowstone, Montana  
Unmet Challenges for SCDAP/RELAP5-3D. Analysis of Severe Accidents for Light Water Nuclear Reactors with Heavily Fouled Cores. Robert H. Leyse,  
[www.inl.gov/relap5/rius/yellowstone/leyse.pdf](http://www.inl.gov/relap5/rius/yellowstone/leyse.pdf)

Comment NEI PETITION FOR RULEMAKING: PRM-50-78 (Cladding Materials) September 9, 2002

The petition should be denied because the evaluations of cladding materials do not account for the realities of plant operation under so-called normal conditions as well as the LOCA environment.

PETITION FOR RULEMAKING: PRM-50-76 May 8, 2002

Petitioner is aware of deficiencies in Appendix K. 1. A. 5. The Baker-Just equation does not include any consideration of the complex thermal hydraulic conditions during LOCA including the potential for very high fluid temperatures. Likewise, petitioner is aware of deficiencies in Regulatory Guide 1.157, BESTESTIMATE CALCULATIONS OF ECCS PERFORMANCE, Paragraph 3.2.5.1. The report NUREG-17 does not include any consideration of the complex thermal hydraulic conditions during LOCA including the potential for very high fluid temperatures.

PETITION FOR RULEMAKING: PRM-50-73 September 04, 2001

The specific issue is that 50.46 and Appendix K do not address the impact of crud on coolability during a fast moving (large break) LOCA.

PETITION FOR RULEMAKING: PRM-50-78 September 9, 2002

Regulations are needed to address the impact of fouling on the performance of heat transfer surfaces throughout licensed nuclear power plants.

**Current field** is microscale heat transfer to pressurized water at ultra-high heat fluxes.

Microscale Heat Transfer to Subcooled Water

LEYSE: MICROSCALE HEAT TRANSFER

*doi.wiley.com/10.1111/j.1749-6632.2002.tb05912.x*

Or go to: <http://www3.interscience.wiley.com/journal/118947467/abstract>

MICROSCALE PHASE CHANGE HEAT TRANSFER AT HIGH HEAT FLUX. Robert H. Leye. Inz, Inc.

Phani K. Meduri, Gopinath R. Warriar and Vijay K. Dhir ...

*boiling.seas.ucla.edu/Publications/Conf\_LMWD2003*

## Rulemaking Comments

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**From:** Gallagher, Carol  
**Sent:** Friday, April 09, 2010 10:24 AM  
**To:** Rulemaking Comments  
**Subject:** Comment on PRM-50-93  
**Attachments:** NRC-2009-0554-DRAFT-0013.1[1].doc

Van,

Attached for docketing is a comment from Robert H. Leyse on PRM-50-93 that I received via the regulations.gov website on April 8, 2010.

Thanks,  
Carol

Received: from HQCLSTR01.nrc.gov ([148.184.44.79]) by OWMS01.nrc.gov  
([148.184.100.43]) with mapi; Fri, 9 Apr 2010 10:24:17 -0400  
Content-Type: application/ms-tnef; name="winmail.dat"  
Content-Transfer-Encoding: binary  
From: "Gallagher, Carol" <Carol.Gallagher@nrc.gov>  
To: Rulemaking Comments <Rulemaking.Comments@nrc.gov>  
Date: Fri, 9 Apr 2010 10:23:49 -0400  
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Thread-Topic: Comment on PRM-50-93  
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