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SUBJECT: Mismanagement of operations: NRC's denial of PRM 50-78

ACTION: Appropriate

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Date: Fri, Oct 14, 2005 7:09 PM
Subject: Mismanagement of Operations: NRC's Denial of PRM-50-76

Today I have mailed the attached to the NRC's Inspector General.

Robert H. Leye bobleuse@aol.com

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Subject: Mismanagement of Operations: NRC's Denial of PRM-50-76
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October 14, 2005

Hubert T. Bell, Inspector General
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Mismanagement of Operations: NRC's Denial of PRM-50-76

Sir:

You will find the attached three pages pertinent to your responsibilities. This is public information.

Robert H. Leyse

Copies mailed to:

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A Mismanagement of Operations: NRC's Denial of PRM-50-76

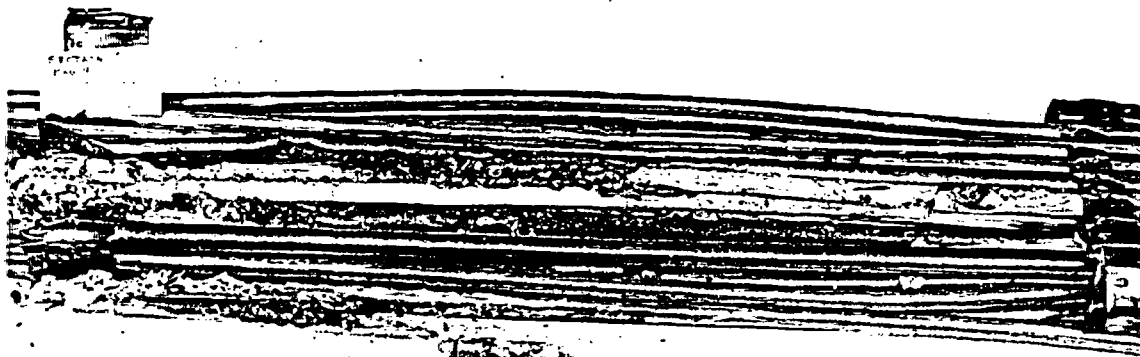
Partial Response by the Petitioner:

I. Assertion by NRC

The NRC obtained tabular time/temperature data from Westinghouse for 19 of the 21 locations analyzed by Westinghouse for the four Zircaloy FLECHT tests. The Baker-Just correlation was applied to these 19 data sets as a check on the analysis in WCAP-7665. The RES technical study clearly demonstrates that the analysis in WCAP-7665 is correct and that the Baker-Just correlation is conservative even under the severe conditions of run 9573.

Response from Petitioner

The NRC did not obtain data for the pertinent locations for run 9573. Below is the photograph of a portion of the inner part of the Zircaloy FLECHT assembly following run 9573.



The NRC did not apply its TRACE capabilities in assessing PRM-50-76.

II. Assertion by NRC

The petitioner states that more experiments with Zircaloy cladding have not been conducted on the scale necessary to overcome the impression left from run 9573. The NRC disagrees. In fact additional Zircaloy tests have been performed. In the early 1980s, the NRC contracted with National Research Universal (NRU) at Chalk River, Ontario, Canada to run a series of LOCA tests in the NRU reactor. More than 50 tests were conducted to evaluate the thermal-hydraulic and mechanical deformation behavior of a full-length 32-rod nuclear bundle during the heatup, reflood, and quench phases of a large-break LOCA. The NRC is reviewing the data from this program to determine its value for assessing the current generation of codes such as TRAC-M (now renamed TRACE).

Response from Petitioner

Apparently the "More than 50 tests ..." at NRU have never been discussed with the ACRS. On Friday, May 31, 2002, three subcommittees of the ACRS held a joint meeting: Materials and Metallurgy, Thermal Hydraulic Phenomena, Reliability and Probabilistic Risk Assessment. This would have been an appropriate setting for a discussion of those "More than 50 tests ..." Yet, here in bold face, is the extent of discussion of the NRU tests at that meeting:

CHAIRMAN SHACK: There are very few full scale tests of a reflood LOCA load down.

PARTICIPANT: NRU --

MEMBER WALLIS: 2200 has a very iffy basis. The only justification really is that it is worked over 30 or 40 years. If you are going to change it you're going to have to have some really good arguments.

It is also significant that the "More than 50 tests..." are not discussed in NRC's Compendium of ECCS Research for Realistic LOCA Analysis, NUREG 1230 R4, December 1988. The Appendix on page A-197 has four paragraphs under the heading A.21 NRU FACILITIES, and lists two references, one of which is a "Program Plan" dated July 1979 and the other is a presentation to NRC staff on "Coolant Boilaway and Damage Progression" dated March 8, 1983. Table A.21-1 lists "Characteristics of NRU" and Table A21-2 lists "Test conditions for the NRU LOCA simulation program." The March 8, 1983 presentation is not available via the NRC's Public Document Room. Clearly, the NRC did not have a high regard for the "More than 50 tests ..." when the Compendium was issued during December 1988.

Furthermore, the "More than 50 tests..." are not discussed in the EPRI report NP-4146-SR dated July 1985 that is included as APPENDIX B in NUREG 1230 R4. There is no reference to any EPRI work at NRU.

The petitioner has not located the documentation of the "More than 50 tests ...". The petitioner believes that it is also unlikely that the NRC staff have located that documentation. In the cited Technical Safety Analysis, 09/06/05, ML041210109, the petitioner learns, "As mentioned above, the NRC is attempting to obtain the NRU Zircaloy clad nuclear fuel bundle test results for further code assessment."

III. Assertion by NRC

The current programs being conducted at Pennsylvania State University and the Argonne National Laboratory are far more cost-effective.

Response from Petitioner

The work at Pennsylvania State University, ML023040657, does not include zirconium alloy components. The work at Argonne National Laboratory does not include the complex thermal hydraulic environment of LWR reflooding.

IV. Assertion by NRC

The (petitioner's) second letter introduced the issue of severe fouling, which was the subject of PRM-50-78 and addressed by the staff's evaluation of that petition for rulemaking.

Response from Petitioner

Fouling is ubiquitous among the worldwide fleet of LWRs. Fouling will most certainly have a significant impact on the performance of emergency core cooling systems. Fouling leads to a very substantial increase in the temperature of the zirconium alloy at the start of the LOCA. Fouling leads to a very substantial amount of dissolved oxygen in the zirconium alloy cladding at the start of the accident. Fouling leads to a substantial amount of zirconium oxide (approaching 17% has been reported) at the start of the accident. Fouling leads to an increase in the flow resistance through the reactor core during the reflooding and thus increases eccs bypass.

In the USA ultrasonic cleaning is employed to remove fouling from fuel elements in both PWRs and BWRs. Following is EPRI's announcement dated October 2005:

EPRI's Patented Nuclear Fuel Cleaning Technology Receives R&D 100 Award
EPRI, AmerenUE, Exelon Corp. and South Texas Project Nuclear Operating Co. and Dominion Engineering, Inc. (DEI) have earned a prestigious 2005 R&D 100 Award for ultrasonic cleaning of nuclear fuel, a promising new technology that safely removes deposits from irradiated fuel assemblies in nuclear power plants.

In Europe, chemical cleaning has been employed. In a May 2003 report to the Chairman, Hungarian AEC, the extensive fouling of the Paks PWRs is candidly discussed. There is no description of the thermal resistance of the fouling or the amount of zircaloy corrosion. However, the fouling (magnetite)) has been extensive. Quoting, "...magnetite deposits in the fuel assemblies increased and the cooling water flow-rate decreased. Consequently the power of Units 1-3 had to be decreased." Chemical cleaning of fuel elements in batches of seven elements became routine. In 2002, Framatome ANP expanded the cleaning process to batches of 30 elements.

V. Assertion by NRC

To develop heat transfer models as expeditiously as possible, the Atomic Energy Commission (AEC), Westinghouse, and Electric Power Research Institute (EPRI), cooperatively developed the PWR FLECHT program.

Response from Petitioner

EPRI was formally established during 1973. The NRC's denial cites PWR FLECHT Final Report , WCAP-7665, April 1971, ML052230221.