



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001**

October 17, 2011

Mr. R.W. Borchardt
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: DRAFT FINAL REGULATORY GUIDE (RG) 1.82, "WATER SOURCES FOR LONG-TERM RECIRCULATION COOLING FOLLOWING A LOSS-OF-COOLANT ACCIDENT," REVISION 4

Dear Mr. Borchardt:

During the 587th meeting of the Advisory Committee on Reactor Safeguards, October 6-8, 2011, we reviewed Draft Final Regulatory Guide (RG) 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," Revision 4. Our Thermal-Hydraulics Phenomena Subcommittee also reviewed this matter during a meeting on September 7, 2011. During these meetings we had the benefit of discussions with representatives of the NRC staff and the Nuclear Energy Institute (NEI). We also had the benefit of the documents referenced.

RECOMMENDATION

Revision 4 to RG 1.82 should not be issued until revisions are made to address our comments.

BACKGROUND

RG 1.82 was issued in 1974 to provide guidance on sources of water during the recirculation core cooling phase of postulated loss-of-coolant accidents (LOCAs). Three revisions have been issued since that time, the first in November 1985, the second in May 1996, and the third in November 2003. These revisions have addressed several issues, among them the most significant being debris blockage of the strainers through which water is recirculated for emergency core cooling and the granting of credit for containment accident pressure (CAP) in determining the net positive suction head (NPSH) available for the recirculation pumps.

Draft Final Revision 4 to RG 1.82 consolidates existing staff positions related to debris blockage of strainers developed as part of the ongoing resolution of Generic Safety Issue (GSI)-191, "Assessment of Debris Accumulation on PWR Sump Performance." This information is currently scattered over many documents. The revision does not address in-vessel downstream effects of debris that pass through the strainers, although it does present guidance for ex-vessel

effects. Furthermore, it does not provide guidance related to GSI-191 closure options recently approved by the Commission. These are still being evaluated in response to Staff Requirements Memorandum (SRM)-SECY-10-0113, "Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance," dated December 23, 2010. Draft Final RG 1.82, Revision 4 also does not update guidance for use of CAP credit for NPSH.

DISCUSSION

While Draft Final RG 1.82, Revision 4, contains no new information or guidance, it does aggregate current staff positions in one place and attempts to structure the information in a concise, logical, and useful form. In particular, it collects guidance on determination of strainer head loss, including the treatment of chemical effects, coating debris, latent debris, and susceptibility to air ingestion. It also provides guidance on the evaluation of ex-vessel debris effects downstream of strainers.

In view of the limited scope of the revisions, the question arises as to whether Draft Final RG 1.82, Revision 4, should be issued at this time. The alternative would be to wait until evaluations in response to the SRM are completed and the results incorporated in RG 1.82. In view of the extensive nature of even these limited scope revisions, we favor issuance of Revision 4 after our comments are addressed.

Users would benefit greatly from inclusion of clearer signposts and references to help locate specific information that is widely dispersed among many sources. For example, the guidance would be more useful if a clearer roadmap, perhaps based on Figure 2 of Draft Final RG 1.82, Revision 4, could be produced.

Discussion of several important issues is brief and at a high level, without suggesting approaches to resolution. For instance in Section 1.3.4.1 of Draft Final RG 1.82, Revision 4, it is stated that "the calculation of debris quantities transported to the ECCS strainers should consider all modes of debris transport," but acceptable ways showing how this many-faceted problem might be resolved should be more clearly indicated.

Taken literally, some expectations in the guide would be difficult or impossible to meet. For example in Section 1.3.12, Item c of Draft Final RG 1.82, Revision 4, it is stated that, "the test specifications should be designed to determine the worst-case head loss from all of the possible types of debris beds that could accumulate given the bounding quantities of debris." This is clearly a Herculean task since head loss in debris beds is affected by a large number of interacting parameters, and small changes in some have large effects on the whole. The order in which fibers, particulates, and chemicals are added is important, as well as their concentrations and physical-chemical characteristics. Guidelines for prototypical tests have been developed based on the results of many experiments. These guidelines are thought to give conservative head loss results, but may not always lead to the worst cases. The guidance regarding test specifications should be based on these guidelines.

Certain other important matters are only cursorily touched on, such as the statement in Section 1.3.12, Item g of Draft Final RG 1.82, Revision 4 that “licensees may sample the fluid downstream of the test strainer.” The passage of debris through the strainers is very important in determining the downstream effects of debris, particularly for in-vessel effects. Guidance for acceptable approaches to measure the passage of debris through strainers should be discussed.

Another area where the guidance should be clearer is with regard to the zone of influence (ZOI) of jets emanating from breaks. All experiments to determine ZOIs are performed on a much smaller scale than in actual systems. Guidance is needed on how such experiments should be performed and scaled.

There are other detailed comments which have been listed in our consultant’s report and transmitted to the staff. We understand that the staff is addressing those which they consider the most important.

Revision 4 to RG 1.82 should not be issued until revisions are made to address our comments.

Sincerely,

/RA/

Said Abdel-Khalik
Chairman

REFERENCES

1. Memorandum, Final Draft of Regulatory Guide 1.82, Revision 4, “Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident,” 09/27/2011 (ML112081190)
2. ACRS Consultant Report, “Consultant Report: ACRS Subcommittee Meeting on Draft Final Regulatory Guide 1.82, Revision 4, 9/7/2011,” dated 09/18/2011 (ML11287A200)
3. Staff Requirements Memorandum - SECY 10-0113, “Closure Options for Generic Safety Issue – 191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance,” dated 08/26/2010 (ML101820212)

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- 5. ACRS Consultant Report, “Consultant Report: ACRS Subcommittee Meeting on Draft Final Regulatory Guide 1.82, Revision 4, 9/7/2011,” dated 09/18/2011) (ML11287A200)
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Letter to Mr. R.W, Borchardt, EDO, from Said Abdel-Khalik, ACRS Chairman, dated October 17, 2011

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