July 25, 2000

Dr. Dana A. Powers, Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: PROPOSED FINAL REGULATORY GUIDE AND STANDARD REVIEW PLAN SECTION ASSOCIATED WITH THE ALTERNATIVE SOURCE TERM RULE

Dear Dr. Powers:

Thank you for your letter of June 20, 2000, on the proposed final Regulatory Guide 1.183 (formerly DG-1081), "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants," and the proposed Standard Review Plan (SRP) Section 15.0.1., "Radiological Consequence Analyses Using Alternative Source Terms." In your letter you suggested the need to address minor editorial changes and to purge the regulatory guide of several carryover items from previous regulatory guides that are not appropriate for implementation of alternative source terms. Dr. Kress forwarded these comments to the staff by memorandum dated June 16, 2000. The staff has considered these comments and revised the document where appropriate. Enclosed is a summary of the comments received and their resolution. The staff appreciates the input from the ACRS.

Sincerely,

/RA/

William D. Travers
Executive Director
for Operations

Enclosure: As stated

cc: Chairman Meserve
Commissioner Dicus
Commissioner Diaz
Commissioner McGaffigan
Commissioner Merrifield
SECY

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RESOLUTION OF ACRS COMMENTS ON THE PROPOSED
FINAL REGULATORY GUIDE 1.183 (DG-1081)
"ALTERNATIVE RADIOLOGICAL SOURCE TERMS FOR EVALUATING DESIGN-BASIS ACCIDENTS AT NUCLEAR POWER PLANTS"

In a general comment, the ACRS noted that "Overall, the Regulatory Guide and the Standard Review Plan (SRP) adequately deal with the various associated issues. There are, however, a number of relatively minor items in the regulatory guide that are not appropriate for use of an alternative source term (AST) and should be considered for modification. These items are listed below for the staff's consideration."

1. "Elimination of any references to the use of 1.02 times rated power."

Response: *Although the original language of the guide provided the flexibility to use other values, the staff has revised the text to reference Appendix K in the text rather than the value of 1.02 in the interest of clarity.*

2. "Page 18: It seems inappropriate to specify the breathing rate to three significant figures, given the uncertainties in the source term itself."

Response: *The staff has rounded the breathing rates to two significant digits.*

3. "The speciation noted for the gap iodine has no technical basis and is, in fact, incorrect. The regulatory guide should return to the specification for the speciation contained in the original document."

Response: *As was discussed during our presentation before the ACRS on June 7, 2000, the staff does not agree with this comment. The draft guide retained the traditional assumption that the iodine species in the fuel gap would be predominantly elemental iodine. In the fuel handling accident, the activity in the fuel gap is released through the water in the spent fuel pool where the ratio of the iodines species may change due to chemical and physical processes. Although the staff had sufficient technical bases to assume that the iodine species in the fuel gap would be predominantly CsI, uncertainty regarding the dissociation of CsI in the spent fuel pool had led the staff to conservatively assume the predominant species in the fuel gap to be elemental iodine. This would be the limiting case.*

In comments provided during the public comment period, the industry stated that the iodine species in the fuel gap would be almost entirely CsI and that the staff assumption of elemental iodine was inconsistent with current research insights. In re-considering this issue, the staff determined that it would be possible to change the fuel gap assumption in the final guide if the dissociation of CsI were addressed. Therefore, the final guide was revised to provide the assumption that the iodine species in the fuel gap would be predominantly CsI. Further, the final guide qualitatively assumes that the CsI released from the fuel gap would immediately dissociate into cesium and elemental iodine and that the elemental iodine thus created would be immediately released from the pool to the fuel

building (or containment). This is effectively the same endpoint that would have been reached using the iodine species assumption in the draft guide.

In implementing these data in the final regulatory guide, the staff conservatively interpreted "predominantly CsI" to be 95 percent of the iodine in the fuel gap. The remainder would be assumed to be elemental iodine of which 3 percent would be assumed to convert to organic forms. The values selected by the staff are deemed to be conservative and consistent with their intended use in a deterministic analysis of an event of low risk.

4. "References to an "ignition" temperature should either be deleted or given a very clear and rigorous definition."

Response: *The staff discussed this comment with the ACRS staff and the comment was withdrawn.*

5. "There is a need for a clear explanation as to when the clock is to start for use of the AST."

Response: *The staff agrees, and text was added to section 3.3, "Timing of Release Phases," to clarify that the onset of the gap and early in-vessel phases are specified from the initiation of the accident (e.g., time = 0) and that the early in-vessel phase immediately follows the gap release phase.*

6. "There is a need for identification of the full spectrum of isotopes that belongs to any given group."

Response: *The current Table 5 in the final guide is a reproduction of Table 3.8 of NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants" which tabulates elements rather than isotopes. Section 4.1 of the final guide provides the following: "[consider] all radionuclides, including progeny from the decay of parent radionuclides, that are significant with regard to dose consequences and the released radioactivity." The staff believes that identification of individual isotopes for each of the elements is unnecessarily prescriptive.*

7. "The PRA information on page 2 adds little value to the document."

Response: *This information was specifically included in the "Discussion" to explain why the staff was releasing a deterministic regulatory guide in an environment that focuses on risk.*

8. "We should not limit how the licensee is to calculate the "worst 2 hours." If an alternate method is proposed and can be defended, it should be allowed."

Response: *The guidance in section 4.1.5 is general in nature and reflects, in part, comments received from the industry. The guide provides a minimum method acceptable to the staff and, as with all regulatory guides, applicants may propose alternatives. Thus, the flexibility sought by the comment has been provided.*

9. “The paragraph on page 19 regarding calculation of control room dose has questionable elements.”

Response: *The staff discussed this comment with the ACRS staff and the comment was withdrawn.*

10. “The purpose of the paragraph at the bottom of page 19 appears ambiguous.”

Response: *The staff agrees. The text of this paragraph was revised in response to another comment received during office concurrence. The staff believes that the current language is clearer.*

11. “Page 20: How is “V” related to the control room volume? It is not specified.”

Response: *The staff agrees. The regulatory guide was revised to clarify that “V” in the equation was the equivalent volume of the control room modeled as a hemisphere.*

12. “The dose-acceptance criteria of Table 6 is specified at a higher precision than is warranted. Are these criteria consistent with each other in terms of probability times dose?”

Response: *The staff agrees. The 6.25-rem criteria were changed to 6.3 rem. This number has the same number of significant places as the 25-rem criterion and the 25 percent factor assigned. These criteria are all based on the accident dose criteria of 10 CFR 50.67, adjusted by accident-specific factors intended to qualitatively address the differences in relative frequencies of the various events. These accident-specific factors, which are independent of source term, are identical to those provided in other SRP sections for analyses based on TID-14844 and whole body and thyroid dose guidelines.*

13. “Page A.2: What does “particulate” refer to? Isn’t this iodine we are dealing with?”

Response: *The text was revised from “particulate removal rate” to “particulate iodine removal rate,” which was the staff’s intent.*

14. “B-1; Item 3.6 page 2 and Item 4.4 page D-2: Gap speciation!”

Response: *See the response to Comment #3 with regard to Appendix B. Most of the design basis accidents addressed in the regulatory guide, such as the PWR Main Steam Line Break addressed in Appendix D, do not involve core-melting. In these accidents it is assumed that technical specification reactor coolant activity (with iodine spiking as appropriate) is released to the secondary plant or to the environment. The staff did not identify the iodine species released from the fuel or the transport or mitigation of iodine species within the reactor coolant system. Instead, the staff elected to conservatively assume that the activity released from the plant systems to the environment (or plant buildings) would be predominantly elemental iodine. The staff has conservatively assumed that 3% of the elemental iodine released from the reactor coolant will convert to an organic form.*

15. “Page E-1: Why is an iodine spike not required?”

Response: *This assumption is a carryover from the current SRP guidance in which a coincident iodine spike is not considered if fuel damage is postulated. The activity released by the fuel damage will far exceed any release from the clad pin hole leakage that is the basis of an iodine spike.*