



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

July 7, 1994

MEMORANDUM FOR: The Chairman
Commissioner Rogers
Commissioner de Planque

FROM: James M. Taylor
Executive Director for Operations

SUBJECT: FURTHER REVIEW OF MIT DOCTORAL THESIS BY A. R. SICH, "THE
CHERNOBYL ACCIDENT REVISITED: SOURCE TERM ANALYSIS AND
RECONSTRUCTION OF EVENTS DURING THE ACTIVE PHASE"

Background:

In my memorandum of April 21, 1994 (Enclosure 1), concerning this thesis, which had received wide press circulation, I reported that our analyses showed that Mr. Sich's 185-megacurie (MCi) estimate of the Chernobyl source term was an overestimate due to calculational errors. We reported that with those errors corrected Mr. Sich's estimate of almost four times the original Soviet estimate of 45 MCi is reduced to about 100 MCi, reasonably close to more recent Soviet estimates.

We further reported that we had asked two experts, from Oak Ridge National Laboratory and Sandia National Laboratories, to do additional reviews and that our results were discussed with Dr. Norman Rasmussen, of M.I.T., Mr. Sich's thesis advisor.

The purpose of this memorandum is to inform you of the results of the further reviews.

Summary:

The further reviews support the NRC staff analysis reported to you on April 21.

Discussion:

The largest error we had found was Mr. Sich's overestimate of cesium-136 (Cs-136) release due to overstated Cs-136 inventory. Our calculations showed an estimated Cs-136 release of about 1 MCi, compared to Mr. Sich's 48.1 MCi. This accounts for over half the total error. The corrected total estimated release is about 100 MCi, compared with Mr. Sich's 185 MCi.

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The reviews by Dana A. Powers, of Sandia, and by Morris F. Osborne, of Oak Ridge, are enclosed (Enclosures 2 and 3). Mr. Powers estimates a Cs-136 inventory of about 2 MCi (c.f. Mr. Sich's 169). This is consistent, to a fair approximation, with our 1 MCi release estimate. Mr. Osborne presents an analysis indicating that Mr. Sich's Cs-136 inventory figure was high by at least a factor of 50.

Dr. Rasmussen has stated that he agrees with our 1 MCi estimate for Cs-136 release and with our approximately 100 MCi total estimated release figure. (Informal communication, N. Rasmussen, M.I.T., to T. Speis, NRC, April 20, 1994.)

Original signed by
James M. Taylor

James M. Taylor
Executive Director
for Operations

Enclosures:

1. Memorandum, J. Taylor to the Commissioners, "Review of MIT Doctoral Thesis by A. R. Sich, 'The Chernobyl Accident Revisited: Source Term Analysis and Reconstruction of Events During the Active Phase'," April 21, 1994.
2. Letter, D. Powers, SNL, to R. Lee, NRC, "Comments on Doctoral Thesis entitled 'The Chernobyl Accident Revisited: Source Term Analysis and Reconstruction of Events During the Active Phase'," May 7, 1994.
3. Letter, M. Osborne, ORNL, to R. Lee, NRC, April 27, 1994.

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