



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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APR 24 1980

MEMORANDUM FOR: Gary Quittschreiber, Senior Staff Engineer
Advisory Committee for Reactor Safeguards

FROM: Raymond DiSalvo,
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Office of Nuclear Regulatory Research

SUBJECT: REQUEST FOR INPUT TO COMMISSIONER GILINSKY'S
QUESTIONS ON CORE MELT

REFERENCE: Your Memorandum, same subject, April 18, 1980

I am not sure whether you have requested comments on the specific proposal offered by Mr. Latter or on the more general issue his letter addresses as raised by Commissioner Gilinsky. Mr. Latter's letter is short on technical substance. Nevertheless, I will frame my comments within the context of his letter and trust that they will be applicable to the more general issue.

COMMENTS ON RATIONALE

1. Latter recommends changing regulatory policy to require "containment of all accidents" without defining acceptability criteria. Does "containment" mean zero release, a release less than TMI-2, a release giving doses less than those in 10 CFR 100, no release to groundwater, or what? Does "all accidents" include low probability externally initiated events which could destroy the containment building, or sabotage or human error which could reduce the effectiveness of any containment design? Feasibility of retaining a molten core is a red herring. The real issue is acceptability.
2. If the technology of containment is "well understood and reliable" enough to base changes in current policy on, why are we bothering to study containment response during accidents within and beyond design basis?
3. The sentence "If the probability of a containment failure were estimated to be low..." is puzzling. To what "empirically determined data" does it refer; containment leak tests? Their applicability to the questions at hand is suspect at best.
4. Latter states, "...the critical question is whether adequate containment is technically possible and economically reasonable. On the basis of our preliminary work, we believe the answer is yes." Putting aside the lack of definition for "adequate," I have no reason to doubt the conclusion. In fact, if I substitute "improved" for "adequate," I agree with his answer. I disagree that this is the "critical question," however, preferring to think that effectiveness and necessity are more important.

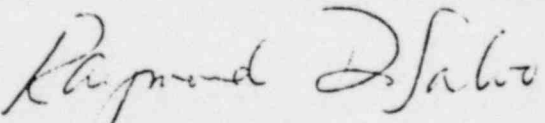
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COMMENTS ON CONCEPTS

1. Latter offers little technical content, on which to base an evaluation. The generalities are characteristic of earlier dissertations on improved containment design except that Latter is the first soul I have found who is confident enough to predict "no releases of radioactivity."
2. Reducing static pressure may only be a partial answer to retaining containment integrity. Recent analyses by Battelle Columbus Laboratories and Sandia National Laboratories* indicate that pressure spikes from rapid generation of steam or hydrogen burning also challenge containment integrity in core melt sequences having relatively high probability of occurrence. Concepts have been proposed to overcome this potential problem.
3. Containing a molten core via a core retention device and a passive cooling system is feasible to the extent that on the order of 40 MW can be transferred from the core debris to its surroundings and an ultimate heat sink via natural circulation. In addition to being a "dense, inert, low melting point, and high thermal conductivity melting bed" (could it be lead?), it would be desirable that the material be economically available, workable into the proper configuration, and that its production and fabrication have no adverse effects on health, safety and environment.
4. In order to achieve the appearance of total containment of a core melt accident, all recognized containment failure modes must be precluded. This means eliminating failure to isolate in addition to the more spectacular failure modes Latter cites. The probability of isolation failure may put a lower limit on the feasibility of containing a core melt totally.

Please let me know if I can provide any further information or clarification of these comments.

* W. B. Murfin, "Summary of the Zion/Indian Point Study," SAND80-0617, NUREG/CR-1409, in publication.


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