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MEMORANDUM FOR: Robert B. Minogue, Director  
Office of Nuclear Regulatory Research

FROM: Robert M. Bernero, Director  
Accident Source Term Program Office  
Office of Nuclear Regulatory Research

SUBJECT: EQUIPMENT QUALIFICATION SOURCE TERM

As I told you recently, I believe the various research efforts relating to source terms have ripened to a degree that warrants undertaking specific work now to identify new source term(s) for equipment qualification to replace TID-14844 which is now the reference for Regulatory Guide 1.89. I believe the contractor analyses of fission product transport in many accident sequences, now being published in BMI-2104 (the Battelle Source Term Reports), constitute a suitable technical basis for equipment qualification source terms which is not likely to change in the near future.

I recommend that activities be started now to produce a regulatory package for the new equipment qualification source term(s) by early 1985. I make certain assumptions in drawing up my recommended course of action; these assumptions are:

- a. The equipment qualification source term(s) will provide the dose rate and integrated dose, both  $\beta$  and  $\gamma$ , for the qualification of equipment in the containment.
- b. There will be one, or at most two, source term(s) for this purpose, and the vehicle of promulgation will be a revision of R.G. 1.89.
- c. The source term(s) will be selected for that equipment whose survival in the accident environment is important to the course of the accident considering the appropriate spectrum of severe accident sequences.

The actions I recommend now are in three steps:

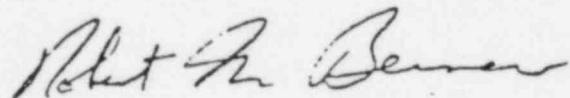
1. Identification of equipment and accident sequence considerations. For this action I would recommend formation of an NRC staff group with contributors from DET, DRAO, and DAE in RES and DST, DE, and DSI in NRR. This staff group would examine the severe accident sequence spectra now available (PRA's, ASEP, etc.) and identify the important

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equipment in containment which: (1) might be significant to arresting the accident sequence, (2) might be significant to containment performance in the sequence, or (3) might be necessary to monitor the course of the accident. When identifying this equipment, this group would consider whether typical locations, high in the containment vapor space or down low near the sump liquid, would be important. This group would also consider exposure times of interest (1 hour, 10 hours, 100 hours) in the context of accident recovery.

2. Calculation of integrated doses and dose rates. For this action a competent contractor would be needed to perform the work under NRC direction. The principal national laboratories in our RES work have the capability. The work would be to calculate  $\dot{D}$  dose and  $\int D$  dose as a function of time, in the upper and lower containment space, consistent with equipment and accident sequences identified in Step 1. It is important for the results to display both rate and integrated dose in a way that would allow the NRC staff to conduct a sound cost-benefit analysis of the equipment qualification source term parameters such as location, time of exposure, and rate of exposure.
3. Development of the regulatory position. In this activity the NRC staff would select the source term(s) which sufficiently envelope the equipment and circumstances of interest through a regulatory analysis. The result would then be formed into an appropriate instrument such as a revision to R.G. 1.89.

I believe that this activity to develop a new equipment qualification source term(s) could be completed in 6-9 months, a schedule quite compatible with the projected schedule of NRC source term position. I believe you should give DET the lead on steps 1 and 3 and DAE the lead on step 2. There is an excellent base of accident sequence and plant system data available for this purpose. As for the Step 2 calculations, I believe that results with sufficient accuracy for this purpose can be obtained quickly and at low cost.



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