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NUCLEAR REGULATORY COMMISSION
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Generic Task No. A-17

MEMORANDUM FOR: Stephen H. Hanauer, Director, Unresolved Safety Issues Program
FROM: John Angelo, Task Manager, Generic Task No. A-17, Systems Interactions in Nuclear Power Plants
SUBJECT: ANNUAL REPORT SECTION FOR TASK A-17

Enclosed is a draft of the 1979 Annual Report Section on Task A-17. The changes made to the previous report are: (1) a new date of March 1980 for completion of Phase I; (2) word change to indicate that Sandia Laboratories is conducting the study; and (3) a new paragraph (para. 5) to describe progress made since last report up to October 1, 1979, and major milestones for completion of work.

John Angelo
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Enclosure:
Draft of Annual Report Section on Task
A-17

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ENCLOSURE

SYSTEMS INTERACTIONS IN NUCLEAR POWER PLANTS

In November 1974, the Advisory Committee on Reactor Safeguards requested that the NRC staff give attention to the evaluation of safety systems from a multi-disciplinary point of view, in order to identify potentially undesirable interactions between plant systems. The concern arises because the design and analysis of systems is frequently assigned to teams with functional engineering specialties—such as civil, electrical, mechanical, or nuclear. The question is whether the work of these functional specialists is sufficiently integrated in their design and analysis activities to enable them to identify adverse interactions between and among systems. Such adverse events might occur, for example, because designers did not assure that redundancy and independence of safety systems were provided under all conditions of operation required, which might happen if the functional teams were not adequately coordinated. Simply stated, the left hand may not know or understand what the right hand is doing in all cases where it is necessary for the hands to be coordinated.

The NRC staff believes that its current review procedures and safety criteria provide reasonable assurance that an acceptable level of redundancy and independence is provided for systems that are required for safety. Nonetheless, in mid-1977, this task (Task A-17) was initiated to confirm that present procedures adequately take into account the potential for undesirable interactions between and among systems.

The NRC staff's current review procedures assign primary responsibility for review of various technical areas and safety systems to specific organizational units and assign secondary responsibility to other units where there is a functional or interdisciplinary relationship. Designers follow somewhat similar

procedures and provide for interdisciplinary reviews and analyses of systems. Task A-17 will provide an independent investigation of safety functions—and systems required to perform these functions—in order to assess the adequacy of current review procedures. This investigation is being conducted by Sandia Laboratories under contract assistance to the NRC staff.

The contract effort, Phase I of the task, began in May 1978 and is expected to be completed in March 1980. The Phase I investigation is structured to identify areas where interactions are possible between and among systems and have the potential of negating or seriously degrading the performance of safety functions. The investigation will then identify where NRC review procedures may not have properly accounted for these interactions. Finally, in a follow-on Phase II of the task, specific corrective measures will be taken in areas where the investigation shows a need.

The systems investigation of Phase I is being conducted by the method of fault tree analysis. As of October 1, 1979, the detailed fault trees have been completed. Analysis of the fault trees, and the comparison of the results against the NRC review procedures will be completed by December 31, 1979. The follow-on work of Phase II will be identified by March 1, 1980.

As noted above, the NRC staff believes that its review procedures and acceptance criteria currently provide reasonable assurance that an acceptable level of system redundancy and independence is provided in plant designs and this task is expected to confirm this belief. Nonetheless, because adverse systems interactions are potentially of large significance to plant safety, this issue has been identified as an "Unresolved Safety Issue." If no significant system interactions are identified in the Phase I investigation described above, as is expected, this issue will not be treated in subsequent reports as an "Unresolved Safety Issue."