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MEMORANDUM FOR: Robert J. Budnitz, Director, RES

FROM: Harold R. Denton, Director, NRR

SUBJECT: DEVELOPING DRAFT STRATEGY FOR FEDERAL RESEARCH INTO THE BIOLOGICAL EFFECTS OF IONIZING RADIATION (NRR-3867)

Regarding your memoraddum of March 12, 1980 on the above subject, NRR has reviewed possible regulatory issues to which research should be addressed. The staff is aware of much valuable research on biological effects of ionizing radiation. While it is known that such research addresses important issues in the field, we can identify regulatory issues to which additional research might be addressed.

NRR applies regulatory policy that limits radiation exposure received by the public from releases of radioactive effluents from nuclear power plants and radiation exposure received by workers at nuclear power plants. Since regulatory policy assures that normal releases from plants produce exposures to the public that are very small, research strategy regarding public exposure needs to address the possible consequences of small increments of radiation exposure in producing health effects in a population exposed to several larger increments of radiation, both natural and man-made. The strategy also needs to address the possible hypersensitivity of certain individuals to low levels of radiation exposure. To our knowledge, such research is already in the programs of several organizations. The Three Mile Island accident has not, to this point in time, and to our knowledge, identified new issues for research strategy.

The major recipients of radiation exposure resulting from NRC licensed facilities are nuclear power plant workers. Our regulatory policy is that these workers should not receive exposure in excess of the limits of 10 CFR Part 20, Standards for Radiation Protection, and in addition, that such radiation exposures should be as low as is reasonably achievable. This policy attempts to reduce collective exposure while keeping individual exposures within the regulatory exposure limits. This policy is based in part on the linear non-threshold hypothesis relating total radiation exposure to human health effects. It also assumes there is little or no exposure rate effect. This regulatory policy may change in meaningful ways if research were to:

1. prove a non-linearity of exposure-health effects relationship;

2. demonstrate an exposure rate effect in either somatic or genetic radiation induced health effects; and,

3. demonstrate thresholds for radiation exposure-health effect induction.

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meet the criterion are required to be upgraded. The exceptions to this are the charging (make-up) line, main steam lines, and main feedwater lines. In most (possibly all) cases, these penetrations do meet the criterion. However, since these systems have such a large impact on plant operations and safety, no modifications are being required under the scope of Lessons Learned. For all other non-essential systems which do not meet the double barrier criterion, the licensee is asked to make a commitment to upgrade the isolation provisions and to provide a schedule for completing the required modifications. In the interim, the licensee is required to close the manual valves in the system upon receipt of a confirmed safety injection signal.

4. The design of control systems for automatic containment isolation valves shall be such that resetting the isolation signal will not result in the automatic reopening of containment isolation valves. Reopening of containment isolation valves shall require deliberate operator action.

The licensee is asked to confirm that their plant meets this requirement. If modifications have been made, the licensee is asked to describe the modifications. If the modifications involve the use of a "daisy chain," the licensee is asked to provide a schedule for eliminating this aspect of the design. Electrical drawings are not examined during the review. The licensee's "functional" description is considered to be accurate. Valve control switches found in remote locations (i.e., not in control room) are also required to meet this position if they are used to operate containment isolation valves. If any containment isolation controls are found which do not meet this position, the licensee is required to modify their design and provide a schedule for completion of the modifications.

In the interim, the licensee is required to implement administrative procedures to prevent valves from re-opening upon reset of any of the isolation signals.

The licensee is asked to confirm that no valve control switch controls the re-opening of more than one containment isolation valve. If more than one valve in a penetration is controlled by a single switch, electrical independence must be established. The licensee is asked to describe exactly how separation is maintained between redundant trains (e.g., separation of 6" or more between contact blocks, insulating barriers between contact blocks). If more than one penetration is controlled by a single valve control switch, the penetrations must be associated with a single system. The licensee must provide information which demonstrates that the operation of valves in more than one penetration does not have an adverse impact on safety. Valve control switches which do not meet these criteria are required to be modified. The licensee is asked to commit to making these modifications

and to provide a schedule for completion. In several plants, a single valve control switch operates all the containment isolation valves in several sample lines. Although the sample lines are not always associated with the same system, individual valve control has not been required for these lines.