UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

COMMISSIONER

January 9, 2001

MEMORANDUM TO: Chairman Meserve
Commissioner Dicus
Commissioner McGaffigan
Commissioner Merrifield

FROM: Nils J. Diaz

SUBJECT: FINAL TECHNICAL STUDY ON SPENT FUEL POOL ACCIDENT RISK AT DECOMMISSIONING NUCLEAR POWER PLANTS (WITS #199900132)

I know the Commission is considering making this document publicly available; I agree that we should. However, before we do, I want you to consider the following comments.

I have problems with the wording of the significant finding of the report "the possibility for a zirconium fire leading to a large fission product release cannot be generically eliminated even many years after final shutdown" (from the EDO memorandum dated December 20, 2000). It appears to me that the zero factor is here again, and I believe that any postulated worst case scenario should be realistic.

From the top of my head:

1. We do not need a study to conclude that "the possibility ...". It is obvious that once you have a cause (heat generation, no matter how small) and an effect (meltdown, fire by ignition, etc.), the effect cannot be generically eliminated unless you eliminate the cause.

2. If a major disruption of the spent fuel geometry occurs, there is already a problem, and possibly a radiation release. Events like the one postulated for the zirconium fire (large earthquakes and cask drop events) are the ones that get prompt attention and remediation. It has been my experience that only the little problems tend to go unattended.

3. The postulated catastrophic events are not conducive to geometries with low heat transfer area; on the contrary, there is usually disruption and dispersion of materials. Even if a few bundles are bundled together, heat transfer will inevitably occur, and heat will flow due to conduction, convection and radiation; the larger the surface the better. This assumes heat flows from hotter to colder, and that there is air. Postulates like "transfer of heat between high powered bundles and low powered bundles was not modeled", and "that for partial draindown or other cases, the lack of air cooling because

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of flow blockage combined with the geometry of the fuel racks result in the decay heat in the fuel rods effectively heating up the spent fuel in a near adiabatic manner" are troubling.

4. If you set out to find the impossible, i.e., "the time after shutdown that a release of fission products is no longer possible", you will not find it.

I could go on and on, but it is now more important to state, in clear and unambiguous terms, consistent with reality and the clarity that we owe the American people, what are the conclusions of the study that are important to regulatory actions. I am not contemplating changing the methodology or re-doing anything at this time, but to work at carefully communicating the meaning.

Therefore, I disapprove issuing the statement of "the significant finding..." because it does not provide, without the provisions imbedded in the report which are only understandable by thermal-hydraulics experts, a useable result in the context of reasonable assurance of public health and safety. One example of how the text could be modified is as follows:

It is inherent to nuclear power fuel to generate radioactive decay heat even after the fuel is no longer in use at the reactor. Cooling of the spent fuel is normally provided proportional to the heat load, either via cooling water in spent fuel pools or by air convection in dry casks. The amount of decay heat generated decreases with time and is quite manageable by a variety of mechanisms for normal and most postulated abnormal conditions. The heat generated becomes small but is not ever zero, and has to be considered for safety purposes even many years after final shutdown. It is, therefore, not feasible to define a generic decay heat level beyond which heating of the fuel is not physically possible. The heating of the fuel, under some severe accidents, and no mitigation efforts, could lead to a zirconium fire and a large fission product release, if certain assumptions are made regarding fuel geometry and lack of heat removal. The probability of such an occurrence under the postulated conditions and modeling is not zero, but is extremely low.

cc: W. Travers