

Staff Responses to an NEI Assertions in a White Paper on Improving Decommissioning Regulations

EP

- 1) NEI states that the spent fuel pool zirconium fire accident consequence is insensitive to early evacuation.

The staff performed a consequence assessment of a zirconium fire accident in its risk study. The staff concluded that short-term consequences (early fatalities) are reduced by a factor of 2 from 30 days to 1 year. Early evacuation reduces early fatalities by a factor of 100.

Long-term consequences (cancer fatalities and societal dose) are less affected by additional decay and early evacuation.

- 2) NEI states that offsite EP does not contribute significantly to public health and safety for the SFP accident.

As discussed in the response to item (1) above, there is clearly benefit from an early evacuation. During the first year of spent fuel decay at a decommissioning plant spent fuel pool, it is the staff's judgment that there is justification for keeping an offsite EP program because of the uncertainties in time available to conduct an early evacuation in the event of a zirconium fire event. After 1 year of spent fuel decay, there should be at least 10 hours to implement protective actions for impacted communities assuming an instantaneous draining of the spent fuel pool. The staff has concluded that with 10 hours available from the initiation of an event that could lead to a zirconium fire, there is sufficient time to implement offsite protective actions, if necessary, without extensive site-specific offsite radiological emergency response preplanning.

- 3) NEI suggested that EP for a decommissioning spent fuel pool should be modeled after the regulations for an ISFSI under 10 CFR 72.32.

The staff has recommend that for the first year of spent fuel decay, full EP be maintained in effect as for an operating reactor. Between 1 and 5 years of spent fuel decay, the staff recommends that EP be modeled after the regulations for a monitored retrievable storage installation (MRS) which is also addressed under 10 CFR 72.32. The staff finds the MRS regulations more appropriate because of the low, but possible, chance of an offsite release due a zirconium fire accident for up to 5 years of spent fuel decay. After 5 years, the staff agrees with NEI that EP regulations modeled after those for an ISFSI would be appropriate.

- 4) NEI states that an evacuation is unfeasible following an earthquake of sufficient magnitude to compromise the very robust designs of SFPs.

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The staff cannot predict the conditions or status of a community's infrastructure following an earthquake of sufficient magnitude to compromise the robust spent fuel pool design but it could be assumed that the consequences would be severe. Within the first year of final shutdown and spent fuel decay, the staff is recommending that the EP program at the decommissioning site be maintained at the same level as that for an operating reactor and is, therefore, well suited for dealing with all emergencies — including severe earthquakes. After 1 year of spent fuel decay time, the staff is recommending the decommissioning licensees be allowed to discontinue their offsite EP. Even so, the staff believes that residual knowledge and capability built into the offsite emergency response programs would continue to be effective for some time after the requirements for offsite radiological EP are removed. In addition, the response to such an earthquake would likely be *ad hoc* in nature and result in the mobilization of numerous local, state, and federal resources that would have the capability to work around impediments caused by the random and unpredictable destruction. The staff has determined that with 1 year of spent fuel decay time, at least 10 hours would be available to take protective measures following a severe earthquake that instantaneously drains the spent fuel pool. It is the staff's conclusion that 10 hours is sufficient time to respond in an *ad hoc* fashion to unanticipated conditions that may result from a severe earthquake.

- 5) NEI states that an analysis of the staff's risk study demonstrates that the probability and consequence of a SFP accident are insensitive to evacuations.

The probability of a SFP accident is not related to radiological EP at a decommissioning nuclear power plant. The sensitivity of consequences to EP are discussed in the response to item (1).

- 6) NEI states that after a permanently shutdown plant has undergone a modest level of decay (60 to 90 days), the nuclide distribution is significantly different than that upon which the emergency planning rule was based.

NEI implies that after 90 days, the iodine and noble gases present in the spent fuel have decayed to levels below that assumed when developing the emergency planning rule for operating reactors and it is, therefore, justifiable to discontinue EP. The staff notes that a zirconium fire was not considered in developing the original EP rule. In addition, other radionuclides, such as ruthenium, may be released by a zirconium fire and can have short-term consequences well beyond 90 days.

- 7) NEI states that the consequences of a [zirconium fire] event for permanently shutdown plants are dominated by long-lived isotopes.

The staff agrees that the consequences of a zirconium fire event are dominated by long-lived isotopes. However, the staff does not believe this has any bearing on the also significant short-term consequences that can result from a zirconium fire event.

- 8) NEI states that the health consequences of a [zirconium fire] are dominated by the risk of latent cancer fatalities due to long-term exposures; there are no early fatalities and the risk of early injury is negligible.

The staff disagrees that is no possibility of early fatalities from a zirconium fire event. The short-term consequences from a zirconium fire are somewhat assumption driven and are very dependent on such factors as population density, release fractions, and accident timing.

Tables A4-8, A4-9, and A4-16 of the spent fuel pool risk study document cases where early fatalities occur.

- 9) NEI states that the requirements for a ten mile radius EPZ and protective action recommendations should not apply to decommissioning plants that have spent fuel which has undergone a modest level of decay.

NEI does not define modest level of decay. The staff has recommended in its rulemaking plan that at least 1 year of spent fuel decay has elapsed before offsite EP be discontinued as supported by the conclusions of the staff's technical risk study.

- 10) NEI states that operator recovery times for initiating events are very long and relatively insensitive to the time period after final plant shutdown. e.g., according to risk study, an operator has 90 hours to makeup prior to bulk boiling one year after shutdown; six months after shutdown, the time to bulk boiling is still 82 hours.

NEI appears to imply that at six months of spent fuel decay time, there could be 82 hours to respond to a SPF accident before a zirconium fire could occur. This is misleading since the dominant and limiting accident scenarios involve instantaneous draining of the spent fuel pool, for which a zirconium fire could occur within 10 hours even after 1 year of spent fuel decay time.

- 11) NEI believes that continuing the period of required evacuation capability to one year provides no significant benefit to public health and safety. Therefore, Part 50 emergency preparedness requirements are not necessary to either add significant benefit to public health and safety or to preserve the low risk results of the risk study for any portion of the brief time period during which spent fuel pool accidents could occur.

The staff's rulemaking plan supports the technical risk study recommendation that offsite EP not be reduced before 1 year of spent fuel decay for a decommissioning plant. There are a variety of factors and uncertainties that make 1 year a prudent minimum time to wait before reducing offsite EP.

- 12) The design basis accidents requiring evaluation for a defueled facility are best addressed by emergency planning requirements in 72.32. The following accidents are relevant to spent fuel pools or ISFSIs:
- a fuel handling accident
 - a spent fuel cask drop
 - accidents associated with radioactive waste storage or processing

The staff does not agree that these are the only accidents that need to be considered at decommissioning facility. The decommissioning SFP risk study addressed a number of accidents that are not represented on the above list. As the staff has stated in the proposed decommissioning rulemaking plan and in previous discussions on emergency planning and preparedness, EP is not only for design-basis accidents; it can also be an important consideration in mitigating the consequences in beyond-design-basis accidents. The spent fuel pool risk study showed that while the frequency of a spent fuel zirconium fire event was low, it could not be dismissed and is therefore, relevant to regulatory decision-making. In addition, as long as there are significant quantities of radioactive materials stored onsite, the licensee will have to continually ensure that there are no accident scenarios, including those not previously

considered, that could result in offsite releases exceeding environmental protection agency protective action guidelines.