ANPR 50
(77FR16175)
Rulemaking Comments

DOCKETED
USNRC

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Sent: Thursday, March 22, 2012 11:10 AM
To: Rulemaking Comments
Subject: Docket ID NRC-2011-0299

March 22, 2012 (1:20 pm)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

I include portable generators that can be hooked up and operated to provide alternate AC in a timely manner, related fuel supplies and alternate means of providing suitable cooling water if the severe natural event compromises UHS for the fuel in the reactor and fuel in the spent fuel pool in my answer to the NRC questions below:

• *Should SBO equipment be designed to withstand severe natural events the facility is not already designed for?*

Looking at NUREG/CR-6890 and NUREG-1776, the percent of total core damage frequency attributed to an initiating event of loss of offsite power due to causes that are external to the plant (loss of the grid, severe weather) ranges from 0% to 52%. Your own data tells you this. As exemplified by Fukushima, a severe natural event can reasonably be expected to take out the electrical grid, for prolonged periods of time. For plants in which external LOOP is a predominating CDF initiating sequence, then it is logical and wholly justifiable to require that SBO mitigation equipment be capable of working after severe natural events that can be expected to damage the electrical grid. Re-examination of seismic spectra, if anything, should be expected to increase those values.

• *Should SBO mitigation strategies consider such severe natural events?*

YES. If suitable survivability is built into SBO equipment, then mitigation strategies can be restricted providing alternate means of assuring subcriticality, core heat removal, containment integrity, and spent fuel pool inventory and cooling functions. However, if the SBO systems cannot be demonstrated to be survivable for the appropriate limiting natural phenomena for the site, then mitigation strategies are extremely limited, again as demonstrated by Fukushima.

• *Should SBO analysis consider a flood greater than the plant is designed for, and if so, what criteria should be used to determine that higher flood level?*

YES. It is preferable that both the primary on-site systems and the SBO equipment BOTH be capable of surviving such flooding. However, it may be permissible to allow only the SBO equipment to be survivable if the contribution to overall CDF falls below a suitable threshold value.

If the postulated flood can reasonably be expected to prevent achieving and maintaining safe and stable reactor shutdown condition (i.e., cold shutdown with heat removal by RHR pumps or their equivalents) and spent fuel pool inventory and cooling, then the SBO equipment MUST be capable of withstanding the higher flood level if it is impractical to assure that the onsite emergency systems can survive such a flood

Higher flood levels criteria should address:

1) Increase in predicted flooding due to improvements in modeling of PMP, inundation, etc.
2) Changes due to changes in infrastructure since the original analysis (e.g., increasing numbers of and heights of upstream levies, addition of bridges and dams upstream and downstream, changes in ground cover that act to increase the flow rate of the feeder sources, etc.)
3) Building settlement – both long-term and what can happen as a result of flooding or inundation (e.g., scour)
4) Damage to site buildings due to flood and inundation transported debris
5) Damage to flood prevention and control structures due to severe natural phenomena (e.g., earthquake) that can cause inundation of the facility or its vital support infrastructure (offsite grid, switchyard, onsite emergency power and UHS) beyond that previously considered in the design.
6) Single failure of on-site flood mitigation measures (e.g., forklift puncturing an inflatable flood barrier)

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7) Effect of flooding on multi-unit facilities – what can affect multiple units at the same site?

• *How should plant coping times for SBO conditions account for the time to 1) identify and determine the need to take mitigative actions and 2) implement SBO strategies under worst case conditions? and*

The need to take mitigative actions and how to implement them is based on the station abnormal and emergency operating procedures. However, the end-state that must be achieved is safe COLD shutdown and adequate inventory and cooling of the spent fuel pool. No more hokey "hot shutdown is a safe shutdown condition" nonsense that will be pushed by the lowest common denominator-seeking NEI.

• *How long should plants expect to rely on mitigation strategies before offsite help arrives?*

Logically, and as exemplified by Fukushima and Hurricane Andrew in 1992 at Turkey Point, the worse the natural phenomenon, the more extensive the damage to infrastructure necessary to bring electrical power, cooling water, and fuel for onsite emergency power sources. This infrastructure includes roads, sanitary sewers, potable water supplies, food, railroads, electrical power lines, fuel tank farms, pipelines, etc.

However, it is reasonable to assume that sufficient infrastructure can be restored within 30 days to allow electrical power and UHS to be fully restored so that the plant (including both fuel in the vessel and fuel in the spent fuel pool) can remain in a safe stable state for the long-term.

Regards,

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Fuoto immutable laws of organizations #1: ***Laurence J. Peter [who developed the "Peter Principle"] was an optimist.***