

ACCEPTANCE REVIEW--PROPOSED GENERIC ISSUE, “MULTI-UNIT CORE DAMAGE EVENTS”

Description and Background

The State-of-the-Art Consequence Analysis project staff identified “Multi-Unit Core Damage Events” as a proposed Generic Issue (GI). Such events can potentially occur as a result of random or common cause failures of shared emergency alternating current (AC) power sources (e.g. emergency diesel generators) following a loss of offsite power or failures resulting from common cause accident initiators such as internal flooding or seismic events which can damage normal and emergency AC power sources in multiple units. Multi-unit events impact not only the potential source terms, but also the potential effectiveness and the potential for successful implementation of mitigation measures since the plant staff must now deal simultaneously with accidents in more than one unit.

The submitter provided two examples. The Pressurized-Water Reactor (PWR) example was from Surry. The core damage frequency (CDF) due to internal flooding (turbine building flood) in the Surry probabilistic risk assessment was 3.3 E-6 per reactor year. The Boiling-Water Reactor (BWR) example was from Peach Bottom. The CDF due to long term station blackout due to an internal event was 5.3 E-7 per reactor year.

ACCEPTANCE REVIEW EVALUATION

Management Directive (MD) 6.4, “Generic Issues Program” and SECY-07-0022, “Status Report on Proposed Improvements to the Generic Issues Program,” dated January 30, 2007, provide criteria for determining those issues which should be treated within the Generic Issues Program (GIP). The guidance of MD 6.4 and SECY-07-0022 indicate that a proposed GI should not be accepted into the GIP if it fails any of the seven criteria below.

The discussion under each criterion below provides the acceptance review for this issue.

1. The issue affects public health and safety, the common defense and security, or the environment.

The issue involves multi-unit core damage accident scenarios which can potentially affect reactor safety. These scenarios could occur as a result of random or common cause failures of shared emergency AC power sources following a loss of offsite power or failures resulting from common cause accident initiators such as internal flooding or seismic events which can damage normal and emergency AC power sources in multiple units. Such multi-unit events impact not only the potential source terms, but also the potential effectiveness and the potential for successful implementation of mitigation measures since the plant staff must now deal with simultaneously with accidents in more than one unit.

Criterion 1 also has embedded numerical risk criteria. For this issue, risk tools are not available (multi-unit probabilistic risk assessments (PRA)) to directly assess the issue. OEGIB staff has determined, in consultation with senior PRA staff, that existing PRA information, with appropriate modifications, could be used to determine and assess the risk importance of this issue. PRA modifications would be needed to address areas such as the impact on the potential source terms, and the potential effectiveness and the potential for successful

implementation of mitigation measures given that plant staff must deal simultaneously with accidents in multiple units. Therefore, staff is currently unable to perform a credible risk calculation for this proposed issue. Therefore, the criterion outcome is “don’t know,” which is sufficient for the proposed issue to continue in the GIP.

2. The issue applies to two or more facilities and/or licensees/certificate holders, or holders of other regulatory approvals.

The submitter provided examples from both PWR and BWR multi-unit sites. There are 36 multi-unit reactor sites. Criterion met.

3. The issue cannot be readily addressed through other regulatory programs and processes; existing regulations, policies, or guidance; or voluntary industry initiatives.

GIP staff has interacted with the GIP Office Contacts and the Risk Management Team in an effort to identify ways to address this issue using other programs and processes. No other ways to readily address the issue were identified. In addition, there was a lack of consensus regarding the need to address the issue, or what actions to take, if any. Criterion met.

4. The issue can be resolved by new or revised regulation, policy, or guidance.

The staff has adequate capabilities to formulate an appropriate regulatory response once risk insights are obtained. This conclusion is based on our interactions with internal stakeholders, as noted under Criterion 3 above. Criterion met.

5. The issue’s risk or safety significance can be adequately determined (i.e., it does not involve phenomena or other uncertainties that would require long-term studies and/or experimental research to establish the risk or safety significance).

As noted under Criterion 1, existing PRA information, with appropriate modifications, can be used to determine and assess the risk importance of this issue. PRA modifications would be needed to address areas such as the impact on the potential source terms, and the potential effectiveness and the potential for successful implementation of mitigation measures since the plant staff must now deal simultaneously with accidents in multiple units. Criterion outcome is “don’t know,” which is sufficient for the issue to continue in the GIP.

6. The issue is well-defined, discrete, and technical.

The issue is well defined, but potentially involves many aspects of plant safety (e.g., safety system design, human factors, emergency planning, accident management, etc.). Without first understanding the potential risks associated with multi-unit events, it is difficult to forecast the extent of the regulatory response that may be required to adequately address the issue.

In addition, resolution of this issue may necessitate Commission guidance to resolve potential policy issues. This conclusion follows from the observation that multi-unit sites have been licensed since the birth of commercial nuclear power in the U.S., and it would be surprising to discover that multi-unit plant operations have significant risk implications. This issue potentially affects both currently operating plants and new plants. Criterion outcome is “don’t know,” which is sufficient to continue in the GIP.

7. Resolution of the issue may potentially involve review, analysis, or action by the affected licensees, certificate holders, or holders of other regulatory approvals.

The regulatory response to this issue, informed by risk insights, may necessitate licensee actions. Criterion met.

CONCLUSION

This Acceptance Review indicates that the issue does not fail any of the GIP criteria, and so the issue should be accepted into the GIP and proceed to the next stage (Screening).