# HEAF Initiating Event Frequency Based on Equipment Classification

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December 13, 2017

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## Description of Potential Realism Improvement

- A review of the Fire Events Database, as documented in NUREG-2169, shows that the rate of occurrence for High Energy Arcing Faults (HEAF) is different between Class 1E and Non-Class 1E Equipment

- From 1984 to 2001 seven HEAF events occurred; one on Class 1E equipment and six on Non-Class 1E equipment

- This difference can be explained by maintenance and management philosophies; safety equipment is more robustly maintained with a greater emphasis on quality and equipment monitoring.

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## Relevant Guidance

- **The guidance provided in NUREG/CR-6850 for Task 6, Fire Ignition Frequency states:**
  - Bin 16 – High-Energy Arcing Faults (Plant-Wide Components): High-energy arcing faults are associated with switchgear and load centers. Switchyard transformers and isolation phase buses are not part of this bin. For this bin, similar to electrical cabinets, the vertical segments of the switchgear and load centers should be counted. Additionally, to cover potential explosive failure of oil filled transformers (those transformers that are associated with 4.16 or 6.9kV switchgear and lower voltage load centers) may be included in vertical segment counts of the switchgear.

- **This guidance was augmented in FAQ 06-0017 (NUREG/CR-6850 Supplement 1) and NUREG-2169 to differentiate between low voltage and medium voltage switchgear.**

- **However, in none of the current approved guidance there is no differentiation between 1E and non-1E equipment**

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## Proposed Approach to Enhancing Realism

- **To address the difference in the risk between Class 1E and Non-Class 1E equipment, a split fraction based on equipment classification will be applied to the ignition frequency.**

- **Using the Fire Events Database data, the following are divided as follows**
  - Class 1E = 0.14
  - Non-Class 1E = 0.86

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## Summary of Anticipated Realism Improvements

- **Using the approach outlined in this presentation to a sample NEE site produced the following changes to the risk profile from HEAFs**

- **Total Core Damage Frequency was reduced**
  - One unit CDF decreased by ~16%
  - One unit CDF decreased by ~19%

- **HEAF risk profile more closely aligns with OE**
  - The HEAF risk contribution from Class 1E HEAF events decreased from 98% to 90%
  - The HEAF risk contribution from Non-Class 1E equipment increased from 2% to 10%