Technical Evaluation for Generic Issue: Pre-GI-018,
"High-Energy Arc Faults Involving Aluminum"

Performing a Risk Evaluation: Assess the Impact on Current Plants

This enclosure provides the detailed proposed risk evaluation process referred to in Task 4 of the short-term actions listed in Enclosure 3. The staff intends to work with the pilot plant licensees to accurately calculate the resulting increase in risk. Once the risk and safety significance have been calculated, the staff will consider how representative the results are for all licensees and will evaluate the findings against the criteria described in RES Office Instruction TEC-002," Procedure for Processing Generic Issues." TEC-002 provides criteria that can be used as guidance for determining whether a proposed generic issue poses a significant enough risk to warrant continuation in the Generic Issues Program.

RES Office Instruction TEC-002 provides guidance based on risk regarding whether a reactor issue should continue in the program or exit it. These figures are derived from the criteria described in Section 3 of NUREG/BR-0058, Rev. 4, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission," and Section 2.4 of Regulatory Guide 1.174, "An Approach for using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant Specific Changes to the Licensing Basis."

If the calculated increase in CDF is very small (less than 10^{-6} per reactor year), then the GIRP will consider the risk insignificant and recommend the generic issue not proceed in the program. If the calculated increase to CDF is large (greater than 10^{-5} per reactor year), then the GIRP will recommend the issue continue in the program. If the calculated increase in CDF is moderate (in the range of 10^{-6} per reactor year to 10^{-5} per reactor year), and if total CDF is less than 10^{-4} per reactor year, then the GIRP will determine whether to proceed in the GI program based upon additional factors the GIRP deems appropriate for this particular issue.

It is the policy of the NRC to have an effective program that will ensure that proposed backfits to be imposed on licensees are appropriately justified on the basis of the backfitting provisions of applicable NRC regulations and the Commission's backfitting policy and guidance. Before the staff imposes any changes upon licensees, the staff must perform a backfit regulatory analysis, similar to a regulatory analysis, to determine whether the specific requirements in 10 CFR 50.109(a)(3) and 10 CFR 50.109(c) are met.

Determine the Increase in Risk Due to the Increase in the ZOI:

The staff will apply an increased ZOI to HEAF configurations to calculate the increase in risk. In order to determine an updated ZOI for HEAFs originating from a cabinet or bus duct involving aluminum, the staff will rely upon expert elicitation or existing experimental and empirical data. The staff will also evaluate the characteristics of HEAF events that may affect frequency values used in PRAs. The staff believes the best approach to evaluate risk impacts would be to solicit pilot plants and use their existing HEAF scenarios. These scenarios would be evaluated for the presence of aluminum and modified to account for an increased ZOI. This approach requires cooperation from several pilot plants having configurations that will reflect any increase in risk from the increased ZOI. In particular, the pilot plants should verify that targets of significance (i.e., cables and electrical equipment) are out of the ZOI in the existing models, yet within the increased ZOI. The additional damage results, once incorporated into their existing and modified models, will calculate the change in CDF/LERF. All applicable licensees will perform analyses incorporating the increased ZOI. Licensees will report to the NRC any associated increase in risk. Regardless of the increase in risk, at a minimum, the NRC will update the appropriate regulatory guidance.

Based upon the step-by-step approach outlined above, the staff should be able to effectively conclude what the risk and safety significance will be from the presence of aluminum in HEAF. The staff believes an adequate evaluation to determine the increase in risk or safety significance can be performed in a timely manner if:

- Detailed plant information is available of the location of components that use aluminum and whether these components are in locations where HEAF may occur.
- Confirmation of results of NRC HEAF test experiments using representative configurations of electrical equipment such that an updated ZOI can be established.
- Confirmation that the configurations in NPPs are suitably represented by the empirical information derived from HEAF events.

Future testing on aluminum components will potentially last several years and will most likely not be completed within the time allotted for the Generic Issue Program Assessment stage. Hence, the risk assessment will most likely be performed prior to the completion of future testing on aluminum components. Detailed information from licensees is necessary to perform an accurate assessment on the significance of this proposed issue. Therefore, the staff will use the available interim guidance, operating experience, and limited test results to ensure realism when determining the increase in risk and the potential implications on NRC guidance and regulations. Any permanent needed regulatory actions, including changes to guidance and regulation, will be made during the Regulatory Office Implementation stage.