NRR-PMDAPEm Resource

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Sent: Wednesday, January 20, 2016 5:17 PM
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Subject: Request for Additional Information - Point Beach Nuclear Plant, Units 1 and 2 - NFPA 805 LAR - MF2372 and MF2373

By letter dated June 26, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML131820453), NextEra Energy Point Beach, LLC (NextEra) submitted a license amendment request for the Point Beach Nuclear Plant, Units 1 and 2 (Point Beach). The proposed amendment request would transition the fire protection licensing basis at Point Beach to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.48(c), National Fire Protection Association Standard NFPA 805. Upon review of your letter dated August 26, 2015 (ADAMS Accession No. ML15238A870), providing supplemental information, the staff provided a request for additional information via email dated October 9, 2015 (ADAMS Accession No. ML15348A262). In addition to this request, the NRC staff would need the following additional information to complete the review of this application.

Request for Additional Information

Based on discussions between the NRC staff and the licensee, the impact of High Energy Arcing Faults (HEAFs) in cable trays as a result of fire-induced loss of DC control power and fire induced fault(s) of medium voltage load cables has been modeled in accordance with the guidance in FAQ 07-0035 (ADAMS Accession No. ML091610189), which addresses HEAF events in bus ducts.

The NRC staff has several concerns with the use of FAQ 07-0035 for potential electrical faults of medium voltage cables in open cable trays (without top or bottom covers).

- While the staff believes that there may be situations where the use of the model presented in FAQ 07-0035 may be appropriate (those situations where the faulting load cable is routed in conduit), a bus duct enclosure provides a substantial barrier to the energy released in a HEAF. The conditions present in a cable tray are different than a bus duct. Unless the cable tray has top and bottom metal covers, there is substantially more exposure of nearby trays from a HEAF event. Cables damaged as part of the HEAF event can experience significant mechanical forces causing conductors to whip around, potentially causing additional arcing and larger zones of influence.
- The damage footprint created during a HEAF is dependent upon not only the voltage and current available to “feed” the fault, but the duration of the arc event. In the situation created by the loss of DC control power, the duration and energy expended will likely be significantly higher than would otherwise be expected if protective relaying isolates the fault.

There has been a number of HEAF events in the commercial nuclear industry. These events have both similarities and differences when compared to the expected conditions at Point Beach.

- For instance, one industry operating experience event (11/5/13 cable fault at Beaver Valley; Licensee Event Report (LER) documented at ADAMS Accession No. ML14008A110) involved a self-ignited cable fire on a 4 kV cable in a specially designed cable tray (aluminum tray with both top and bottom covers). The damage footprint of the event was fairly substantial (there was significant collateral damage to nearby cables) but the extent of the damage was limited due to the proper operation of protective relaying. The fault was very quickly isolated as a result of the actuation of a transformer differential relay. The loss of DC control power in the postulated Point Beach scenario means that a breaker upstream of the bus providing the power would have to open, resulting in potentially higher currents and a longer arc duration before isolation. Point Beach also differs from the Beaver Valley event since that cable was run in a cable tray with top and bottom covers.
- Another industry event (3/28/10 cable fault at Robinson; Licensee Event Report (LER) documented at ADAMS Accession No. ML101530502) involved a 4 kV cable fault inside a conduit feeding a switchgear unit. The bus feeder providing power to the supplying switchgear had a blown fuse in the trip circuit resulting in the need to isolate the fault using an upstream breaker (similar to the situation expected at Point Beach). However, although this event involves a degraded distribution system due to the loss of power to the trip circuit of the feeder breaker, it differs from the Point Beach scenario because the faulted cable was routed inside steel conduit. The fault caused significant damage to the conduit (portions of the conduit were blown free/vaporized by the fault) as well as damage to the top of the switchgear unit the conduit entered. Had the conduit not provided a substantial barrier that impeded the damage propagation, a larger zone of influence and more substantial damage footprint would likely have occurred.
- A third industry event (02/03/01 HEAF at San Onofre; Licensee Event Report (LER) documented at ADAMS Accession No. ML01950010) involved a circuit breaker fault in a 4 kV switchgear. As a result of the fault, the breaker failed to open, resulting in the need to clear the fault from upstream feeders. At the time of the breaker fault, the bus was being powered from the Unit Aux Transformer (UAT), which sensed both overload and differential overcurrent. Actuation of protective relays isolated the UAT and the main generator. As a result of ionized gases and smoke from the initial breaker fault, the feeder breaker to the Reserve Aux Transformer (RAT) faulted also causing a differential overcurrent trip of the Reserve Aux Transformer (RAT). Although isolated from the grid, the faulted bus continued to be powered from the main generator as the turbine coasted down. This resulted in the fault being fed electrically for a significant period of time. Although this event involved a fault inside a switchgear unit, substantial damage occurred outside the switchgear as a result of the duration of the fault. This event forms a significant part of the basis for the recommended zone of influence in NUREG\CR-6850 Appendix M for HEAF events (5’ vertical, 3’ horizontal from the fault location).
- A fourth industry event (080509 HEAF at Columbia Generating Station; Licensee Event Report (LER) documented at ADAMS Accession No. ML11145A114) involved an electrical fault on a 6.9 kV bus duct. While this event exhibited a limited zone of influence as a result of the HEAF, the conditions present differ from Point Beach in that the fault occurred inside a bus duct, which provides substantial physical protection between the fault and nearby targets.

As discussed above, each of the operating experience events indicate that there is the potential for larger zones of influence than the guidance in FAQ 07-0035 when applied to HEAFs in cable trays. Based on the expected conditions at Point Beach for a loss of DC control power combined with a fire-induced fault on 4 kV and/or 13 kV cables, a zone of influence calculated in accordance with NUREG\CR-6850 Appendix M (5’ vertical, 3’ horizontal) appears to be more appropriate.

Revise your analysis with a zone of influence as calculated in accordance with NUREG/CR-6850 Appendix M (5’ vertical, 3’ horizontal) for the expected conditions with the loss of DC control power

combined with a fire-induced fault on 4 kV and/or 13 kV cables in cable trays and provide an updated Attachment W for the Point Beach LAR using the Appendix M method.

Please provide your written response on the docket to this request and the earlier request dated October 9, 2015, within 30 days of the receipt of this email. In case of any further clarification needed, please arrange a teleconference to discuss the subject matter with the NRC staff. Thanks

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Hearing Identifier: NRR_PMDA
Email Number: 2609

Mail Envelope Properties (Mahesh.Chawla@nrc.gov20160120171600)

Subject: Request for Additional Information - Point Beach Nuclear Plant, Units 1 and 2 - NFPA 805 LAR - MF2372 and MF2373
Sent Date: 1/20/2016 5:16:33 PM
Received Date: 1/20/2016 5:16:00 PM
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