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REVIEW / COMMENT DOCUMENTATION

Commenter:	Joseph E. Pollock	**Phone:**	202.739.8114	**Document #, Rev:**	SAND2018-0706 O, DRAFT 0002
Discipline/Department:	Nuclear Energy Institute	**Date:**	5/17/2018	**Title:**	Aluminum High Energy Arc Fault (HEAF) Particle Size Characterization Test Plan - DRAFT

Comments shall be:
* CLEARLY STATED AS A MATTER OF FACT (OR A SPECIFIC QUESTION)
* LEGIBLE AND REPRODUCIBLE
* COMPLETE AND INCLUDE A REFERENCE TO THE AFFECTED DOCUMENT
* FOCUSED TO A SPECIFIC PROBLEM OR DEFIENCY

The majority of the document submitted by NEI were not related to the small-scale test plan as noticed in the Federal Register. Only those comments under the "Detailed Comments on Test Plan" section are included as part of this comment resolution.

Comment No.	Document Number Section / Paragraph	Review Comments (Print)/Basis for Comment	Comment Disposition / Resolution	Change to Document
1	General	Since bus bar spacing is dependent on the gear that is available for testing, and can vary from what is installed at nuclear plants in the US, when the test results and PRA frequencies are documented the deviation in bus bar spacing with respect to those in IEEE 1584 and in the industry should be documented and evaluated.	Small scale testing does not aim to replicate the bus bar spacing of plant equipment. The small-scale testing program is a "scaled" experimental series that aims at characterizing the arc particles. As such, the bus bar size and spacing are "scaled" to provide arc characteristics that are more representative of large-scale electrical arcing.	No change
2	General	The bus bar to be used is 3mm x 1mm, which is undersized for any commercial power plant.	This is scaled testing, the bus bars are much smaller than what you find in the plant. The bus bar dimensions were scaled to scale the energy and to allow for more precise measurements mass loss.	No change
3	General	The plan states that the test setup will be in an enclosure. Several figures depict the dimensions. If these figures are accurate, the enclosure is snugged up to the bus bar and will reflect the blast back on the bus bar, effectively doubling it.	The figure references is an illustration. In actual testing the bus bars are in the middle of the enclosure, so the "blast back" concern is minimized due to the symmetrical nature of the setup. The configuration of the small scale testing was described in detail at the public workshop on April 18-19, 2018.	Figure replaced with photo for clarity.
4	General	No artificial enclosures should be used on end of buses. If the bus does not terminate in a cabinet, then do not cap the ends. The buses at the plants are generally long runs with no blanked off ends.	It is unclear how this comment relates to the small-scale test program. No such enclosures or bus terminations are proposed for use in the small scale testing.	No change

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5	General	The ground intend to be placed in the cabinet is 2.6mm, roughly the same size as the bus bar. Again, this is not consistent with grounding used in a commercial power plant installation	The comment is in reference to the shorting wire, not a grounding wire. However, the draft test plan incorrectly used a shorting wire sized per IEEE guidance. Because of the short duration, narrow gap scaled nature of this testing that guidance is not appropriate to meet the purpose of the shorting wire. As such, the test plan has been updated to accurately document the size and configuration of the shorting wire.	Test plan corrected to clearly document test procedure.
6	General	The fault current profile utilized for testing at MV should resemble a typical generator behavior (ie. decrement curve). Typically MV gears have grounding transformers or grounding resistors on the neutral. This limits the phase to ground fault current to lower levels. Since NRC is performing phase to phase testing and the ground resistors only limit the phase to ground current, the testing procedure is not impacted by the presence of the ground resistor. However, presence ofthese phase-to-ground current limiting devices should be used to lower the probability of an arcing event at the MV voltage level	It is unclear how this comment relates to the small scale test program. The testing will be initiated with a shorting wire phase to phase in all cases. The intent of the small scale program does not aim to evaluate probability of occurrence.	No change

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7	General	Regarding "widely used high voltage bus bars," the bus widely used in NPPs is either low or medium voltage but not high. However, that depends on your definition. The high voltage terminology is not well defined even among industry standards. Many IEEE standards use high voltage to apply to anything greater than 1000V. NEMA C84.1 2016 defines high voltage as greater than 100kV. Reference NEMA C84.1 or some other standard for Voltage Class definitions. It is recommended that the voltage classes be defined in the test plan so that it is more clear what voltage ranges are being discussed	Agree-change wording to medium voltage	Change wording to medium voltage
8	General	Consider matching the location of the instrument racks being used to monitor the HEAF to match the existing ZOI's that were used in 6850 and FAQ 35. The material coupons on the instrument rack should include both steel and aluminum.	It is unclear how this comment relates to the small scale test program. The small scale test program does not use instrument racks or material coupons. The small scale testing will use carbon tape and an aerogel collection material to collect the products of the small scale HEAF byproducts for further analysis. The small-scale testing focuses on near field particle characterization, where as this comment appears to be concerned with far field measurements, which are outside the objectives of this testing.	No change
9	General	Regarding the tests exceeding equipment ratings, it seems the duration of fault currents would exceed the equipment ratings. Provide	It is unclear how this comment relates to the small scale test program. There is no rated equipment specified in this test plan.	No change

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		more specifics for this statement and the ratings discussed.		
10	General	For system voltages not specifically tested, there should be a method to extrapolate results to different voltages, e.g., 600V, 4.16kV for enclosure testing or 480V, 6.9kV for bus ducts.	The data from this testing will be evaluated and analyzed to determine if extrapolation is possible. However, the lack of repeatability will increase the uncertainty associated with any extrapolation. Any information related to the extrapolation will be documented and discussed after the data has been collected in a separate NUREG.	No change
11	General	Provide specifics on the type of cables that will be tested, i.e., thermoset, thermoplastic, IEEE 383 or not, etc. Alternatively, include in the test plan the requirement to document the relevant properties of the cable(s) that were tested.	It is unclear how this comment relates to the small scale test program. There are no insulated electrical cables being used in testing.	No change
12	General	Several sections reference IEEE standards meant for the testing of a first-off-the-line piece of switchgear, not a test rig.	The IEEE guide is only used as reference. Direct use of the IEEE guide has been removed from the test plan.	Remove reference to IEEE guide.