NRC/EPRI HEAF Working Group Update

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Public Workshop

October 20th, 2021

Working Group Members

EPRI

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Working Group Charter

- Characterize the primary factors that influence the occurrence and severity of arcing fault events (arc flash, arc blast, or HEAF).
- Develop tools and methods to assess the risk posed by arcing fault events based on experimental data, operating experience, and engineering judgement.

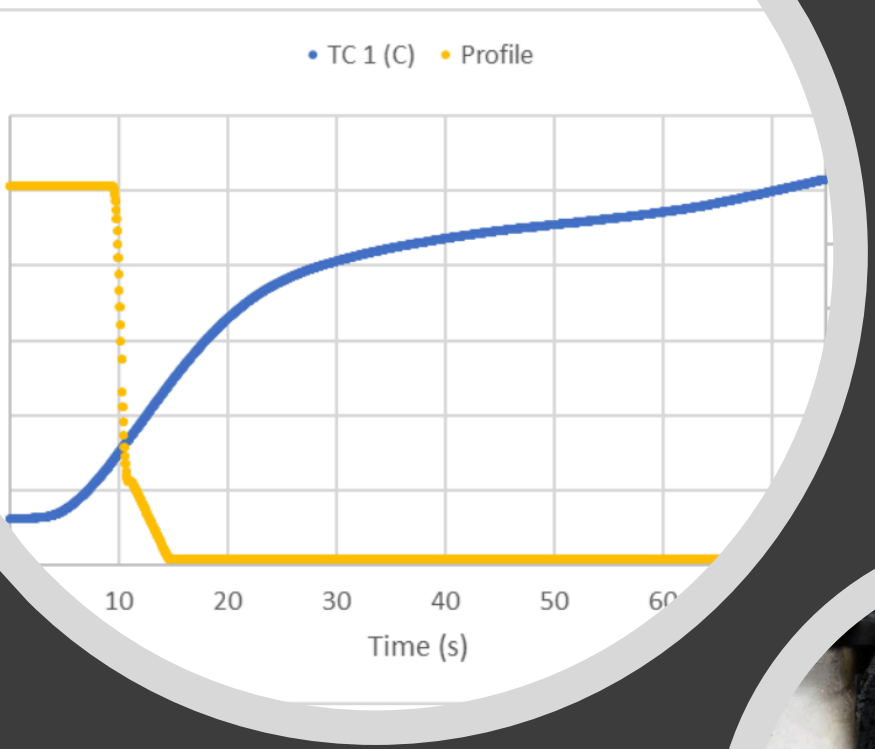
Public Website

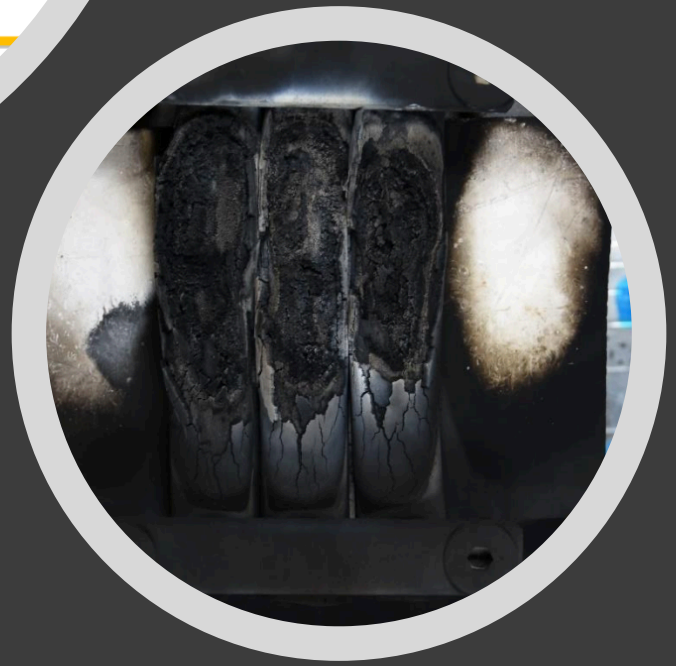
- Provides the most up-to-date information about NRC's HEAF Research activities.
- Detailed project plan available for download.

https://www.nrc.gov/about-nrc/regulatory/research/fire-research/heaf-research.html

Summary of Working Group Deliverables

Deliverable	Lead Org	Public Comment	Scheduled Publication (Draft)
Fragility Testing Data Report	SNL	No	Complete
Fragility Testing Methodology Report	NRC/EPRI	Yes	November 2021
KEMA Testing Data Report	NIST	No	December 2021
Modeling Report, Hazard Tables, and ZOIs	NRC/EPRI	Yes	March 2022
Final PRA Methodology Report	NRC/EPRI	Yes	June 2022





Fragility Testing Data Report

- Objective was to characterize the magnitude and durations of high flux, short duration exposures required to fail common PRA targets.
- 53 tests run between May of 2020 and February of 2021 at Sandia National Laboratories' Solar Thermal Test Facility.
- Report published in September 2021, and available on the NRC's HEAF Research Website.

Fragility Testing Methodology Report

- Objective is to use the data from the fragility test report, expert judgement, and modeling to determine the damage criteria for common PRA targets.
- The selected damage criteria will be coupled with the results of the hazard modeling to determine the Zone of Influence (ZOI) for HEAF events.
- Report will also include fragility of bus ducts and ERFBS protection.
- Draft publication for public comment scheduled for end of November 2021.

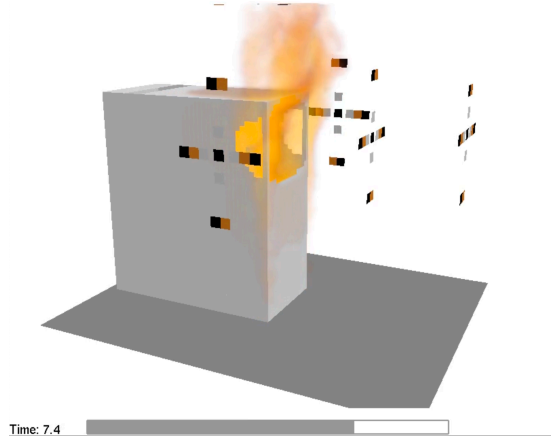
KEMA Testing Data Report

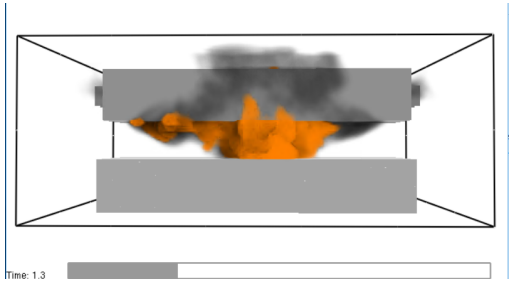
Objective is to document the full-scale tests performed at KEMA Laboratories.

Report consists of three parts: Medium-voltage switchgear tests, open-box tests, and low-voltage switchgear tests.

Each report will document the temperatures, pressures, heat fluxes, spectrometry, videography, and damage states evolved during testing.

Joint NIST/SNL/NRC report scheduled for publication by the end of December 2021.





Modeling Report, Hazard Tables, and ZOIs

- Objective is to model HEAFs, generate tables of environmental conditions, and calculate ZOIs based on target fragility criteria.
- Model in use is Fire Dynamics Simulator, which is widely used in fire PRA.
  - Benchmarks being performed against test data for validation of low voltage switchgear, medium voltage switchgear, and bus ducts.
- Report will document modeling assumptions, methodology, and results. Draft publication for public comment scheduled for end of March 2022.

Final PRA Methodology Report

- Objective is to provide the updated data, tools, and methods to analyze HEAFs in fire PRA.
- Includes an updated frequency and suppression rate based on review of OE.
- Defines scenarios and event trees based on fault location within plant electrical distribution system (EDS). Includes credit for EDS protective elements.
- Will incorporate the results of the other deliverables: modeling, fragility, and ZOIs.
- Report to be published for public comment by the end of June 2022.