FIRE SAFETY IN NUCLEAR POWER PLANTS AND MODELING FIRE IN A GENERIC EDG ROOM BY COMPBRN III

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ABSTRACT

This study emphasizes Nuclear Power Plant (NPP) fire safety, and discusses primary elements vulnerable to fire and fire accidents in NPP operation history including their causes. Fire Hazard Analysis, which has to be maintained on the design and operation phases of an NPP, is briefly addressed. Fire modeling; its evolution and standing in the literature are summed up, with respect to used approaches. Fire modeling code COMPBRN III, which is used in this study, and its Hot Gas Layer Model (HGLM) are also introduced while principal characteristics of room fires are discussed.

International Collaborative Fire Modeling Project (ICFMP) and its scenario development process are presented and COMPBRN III is validated by using the experiments of ICFMP. Structural elements and systems of Emergency Diesel Generators (EDG) are also introduced and their importance related to nuclear safety is mentioned. Potential Fire zones and combustible inventory they have are described using a generic Pressurized Water Reactor (PWR) data.

Cable fires are chosen using of fire events in history and fire scenario is adapted to an EDG room then fire modeling is performed.

As a conclusion of this study, when the redundancy and diversity principle is completely implemented on the cables of an EDG, a fire that breaks out on a cable tray would be insufficient to impact on the durability of EDG.

Keywords: Fire Protection of Nuclear Reactors, Fire safety, Fire Hazard Analysis, COMPBRN, EDG

References

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