

FIRE MODELING

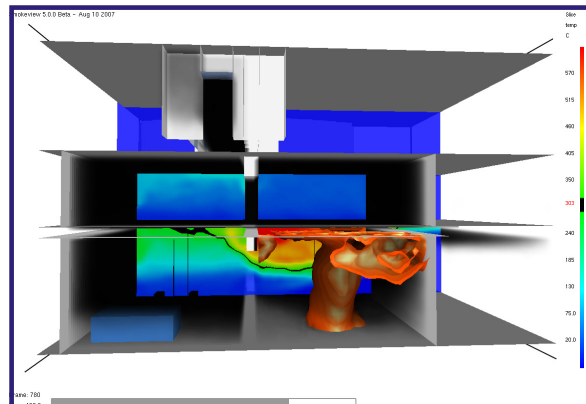
EPM has been supporting the nuclear industry with its extensive fire modeling capabilities for over a decade.

Application

EPM has been utilizing fire modeling techniques in the support of power plant transition to risk-informed, performance-based fire protection programs. Our extensive experience with verified and validated fire models provides reliable prediction of the consequences of fire.

EPM's fire protection engineers have used this capability to:

- Establish a design basis fire by determining possible fire spread to area combustibles given site specific conditions such as material properties, room geometry, ventilation, etc.



Computational Fluid Dynamics (CFD) fire model of a nuclear plant fire.

- Identify if and when critical equipment could be damaged by a fire to support safe shutdown, NFA 805, Fire PRA, address multiple spurious operations (RIS 04-03), 86-10 evaluations, exemptions, or any other type of analysis
- Determine if structural building elements will fail due to fire effects (with or without fire-proofing)
- Identify the need for and type of fixed fire detection and suppression systems given potential fire scenario impacts
- Determine optimum detection and suppression system coverage to meet performance goals
- Evaluate replacement protection options for Halon and CO₂ suppression
- Justify code compliance equivalencies for fire barriers and fire protection systems
- Evaluate tenability to support operator performance of recovery actions



EPM's Background and Experience

EPM's fire protection engineers have extensive fire modeling experience within the nuclear industry. This includes fire modeling analysis for over 30 nuclear plants in the United States, Canada, and Korea. EPM has utilized techniques and guidance such as that provided in NFPA 805 and NUREG/CR-6850 to prepare hundreds of fire models and fire scenarios in support of performance-based fire protection analyses, such as NFPA 805 transition projects, Fire Probabilistic Risk Assessments (PRA), Significance Determination Process (SDP), and safe shutdown analyses.

EPM has utilized the fire modeling tools provided in NUREG 1805, Fire Dynamics Tools (FDT[®]), and EPRI FIVE Methodology (EPRI TR-100370) to predict the extent of fire damage from various plant hazards and evaluate their impact on plant safe shutdown. The fire models were used to estimate flame height, plume temperature, thermal radiant exposure, ceiling jet temperature, and hot gas layer conditions to determine whether targets important to safe shutdown are located within a fire's zone of influence. Fire models have also been used to estimate sprinkler suppression and heat/smoke detection times. Additionally, as fire scenarios demand more complex fire modeling, EPM has made use of zone and field modeling software. EPM is trained, capable and experienced with sophisticated fire modeling codes such as NIST's Consolidated Model of Fire and Smoke Transport (CFAST) and Fire Dynamics Simulator (FDS).

EPM Offers

Proven Experience:

- Applying performance-based methodology eight years longer than the competition (EPM began using this approach when the Canadian Nuclear Safety Commission requested that all nuclear power plants in Canada perform analyses demonstrating safe shutdown capability during a fire and at a time when there were no concrete rules or guidance available to perform such a safe shutdown analysis. EPM used the techniques that were being developed in NFPA 805 and tailored them for use at the CANDU reactors.)
- Performing more risk-informed, performance-based nuclear fire protection work than any other company
- Only proven methodology for multiple spurious operations

A Well-Developed Team:

- Member of the most comprehensive NFPA 805 team in the industry; one-stop shopping
- All projects performed on schedule and on budget

Integration using EPM's Genesis Solution Suite[®] Software

- NFPA 805 and NUREG/CR-6850 process software that has been under development for five years and been proof-tested in the field for the last two years.
- Suite of integrated applications that work together to perform activities such as cable selection and cable routing.
- Licensed at 49 units across the U.S. and 3 units in the U.K.

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