



Experimental Explosion at Thiokol

Center for the Simulation of Accidental Fires & Explosions (C-SAFE)

Objective: The goal of C-SAFE is to develop the technical capability to simulate accidental fires and explosions involving hydrocarbons, structures, containers and high energy materials. Possible scenarios: fire at an explosive manufacturing plant, an airplane crash carrying conventional explosives.

Host Institution: University of Utah

Funding: Department of Energy as part of the Accelerated Strategic Computing Initiative (ASCI) Academic Strategic Alliance Program (ASAP). Funding level is currently projected at \$20,000,000 over 61 months, the largest ever competitive research award at UofU.

ASCI Alliance Centers: C-SAFE is one of five centers awarded nationally from a field of 48 applicants for Level 1 funding. Other centers were established at California Institute of Technology, Stanford University, the University of Chicago, and the University of Illinois at Urbana-Champaign.

Dates: September 3, 1997 to September 30, 2002

Limitations and Boundaries: Simulation will not include:

- any atomic devices or atomic reactions
- detonation on impact (the focus is on fires)
- destruction after detonation

What makes C-SAFE unique? What are its challenges?

- **Interdisciplinary teamwork:** Unlike traditional academic approaches to science and engineering, this project forms an integrated team of computer scientists, engineers and chemists. This team will make fundamental discoveries in chemistry and engineering about fires and explosives and incorporate their findings into a full-scale simulation.
- **Computer resources are one of a kind and only available from DOE:** As part of the ASCI program, DOE has invested in three supercomputers, designed to deliver tera-scale (a trillion calculations per second) computing capability. C-SAFE will receive a 2% allocation of the ASCI computational resources.
- **Scale of computational effort:** Simulation will span atomistic level to full fire spread and explosion (1 billion computational nodes) in length scales ranging from atoms to 10s of meters and in time scales of nanoseconds to minutes.
- **C-SAFE has developed a partnership with Thiokol Corporation, Brigham City, Utah to conduct experimental explosions designed to validate the predictions of the C-SAFE simulation product.**

Faculty Participation:

20 UofU faculty from 5 departments: Chemical & Fuels Engineering, Chemistry, Computer Science, Materials Science & Engineering, Mechanical Engineering, plus nationally renowned collaborative faculty from Brigham Young University [Chemical Engineering] and Worcester Polytechnic Institute, MA [Mathematics].

Students, Postdoctoral Fellows and Professional Staff

16 graduate students, 17 postdoctoral fellows, 6 professional staff

Leveraging Opportunities:

Funding from DOE in support of C-SAFE is the core element that can be leveraged into additional benefits for the project and the community. C-SAFE will be an active partner in the search for complementary opportunities, such as other grants and contracts and commercialization efforts.

More Information:

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