



## Teaching Process Safety

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“One of the largest reactive chemical accidents the CSB has investigated.” That’s how John Bresland, chairman of the U.S. Chemical Safety and Hazard Investigation Board (CSB), described the massive December 2007 explosion and fire at T2 Laboratories in Jacksonville, FL, that killed four employees and injured four others. The blast scattered debris up to a mile away and damaged buildings within a quarter-mile of the facility, injuring another 28 people working in nearby businesses.

The accident occurred as T2 was producing its 175th batch of the gasoline additive MCMT in a 2,500-gal batch reactor. The recipe involved two exothermic reactions — the first a necessary step in the production of MCMT, the second an unwanted side reaction that occurs above 390°F, which is slightly higher than the normal operating temperature. The CSB concluded that the reactor cooling system likely malfunctioned due to a blockage in the water supply piping or a valve failure, setting off a runaway reaction and allowing the temperature and pressure inside the reactor to rise uncontrollably. About ten minutes after the initial cooling problem was reported, the reactor burst and its contents exploded.

Investigation Supervisor Robert Hall, P.E., noted that “despite a number of near-misses during earlier production efforts, T2 failed to recognize the underlying runaway reaction hazard associated with its manufacturing process,” even though the two owners of the company had undergraduate degrees in chemistry and chemical engineering.

The recommendations in the CSB’s incident investigation report focus on improving the education of chemical engineering students on reactive chemical hazards. The CSB wants AIChE and the Accreditation Board for Engineering and Technology (ABET) to work together to add reactive hazard awareness to baccalaureate chemical engineering curricula requirements. We agree that students should have more awareness of process safety. AIChE and its Center for Chemical Process Safety have been proactive in this area since 1985, when the predecessor committee to Safety and Chemical Engineering Education (SACHE) began producing teaching resources that professors could use to incorporate process safety into their classes.

SACHE has recently adapted those materials to allow students to learn about process safety on their own. Launched in 2007, the SACHE Process Safety Certificate Program consists of modules on various process safety topics designed to give students a basic foundation in process safety. Upon successful completion of an online quiz at the end of each module, the student receives a certificate of achievement. This program and other SACHE materials are available free of charge to student members at U.S. schools with an AIChE Student Chapter, and for a nominal fee to students outside the U.S. In its report of the T2 incident, the CSB recommends that AIChE inform all student members about the certificate program and encourage their participation. Indeed, outreach to students is an ongoing effort (*CEP*, Apr. 2008, p. 21) that will be ramped up in the near future.

While we have been addressing these issues for quite some time, we welcome the CSB’s formal recommendations to help call attention to this important matter. If you are interested in helping to create SACHE modules or using them in the classroom, visit <http://sache.org> or email [sache@aiche.org](mailto:sache@aiche.org).

Scott Berger, Executive Director  
AIChE Center for Chemical Process Safety

