



Recently, I was asked to share my experiences related to the Bhopal catastrophe for a special section in AIChE's Process Safety Progress. The 30th anniversary of the catastrophe approaches, so for some it may seem to have happened a long time ago. However, the causes, latent conditions, systematic failings, and human factors associated with this event are not of the past, but similar to those challenging industry today. I ask that you share my story with others in honor of those who suffered harm due to the Bhopal catastrophe.

Sharing Stories

Angela E. Summers, PhD, PE

A few years ago, I had lunch with Carolyn Merritt, former chairman of the US Chemical Safety and Hazard Investigation Board. I asked her what she thought made the two of us different from others on the subject of process safety. She responded quickly with, "Because you and I have experienced catastrophic events directly and cannot go back to denying the reality that they happen." My follow-up question was, "How do we get everyone else there without experiencing more events?" Just as fast, Carolyn said, "By sharing our stories over and over."

On December 3, 1984, I was a senior chemical engineering student at Mississippi State University. I learned that the Bhopal tragedy had occurred when a professor, while handing out tests, asked if we had heard about the accident, then questioned whether we watched the news or read the paper. I mumbled something about studying for a test and resolved to look at the Clarion Ledger over the weekend; my dad always put the week's papers on top of the refrigerator. In the pre-internet, 24-hour news, and twitter age, the top of the refrigerator was my best source for breaking news. What I eventually read was horrifying and left me wondering what could have gone wrong, since my professors made chemical processes seem so predictable by analysis and controllable by design.

When I attended the 2004 Bhopal Gas Tragedy conference in Kanpur India, the different theories about the sequence of events leading to the Bhopal tragedy were presented. I toured the abandoned site in Bhopal with its collapsing process equipment overgrown with weeds and its control room still displaying the emergency evacuation procedure for non-essential personnel during toxic releases. I learned that the lessons to be gained from the tragedy extend beyond water and methyl isocyanate to the flawed safety culture used to operate the Union Carbide site. The tragedy occurred due to cost cutting in staffing, training, procedures, and maintenance. Management decisions systematically cut out nearly everything that provided them with protection against a release. They cut costs until a simple, predictable operator mistake resulted in a total loss of plant assets, the loss of 10,000 lives, severe health impact to 100,000s of people, and permanent damage to the brand of a major international chemical company.

5 years later after Bhopal in 1989, I completed my PhD course work in chemical engineering at The University of Alabama and took a job as an R&D engineer at Ethyl Corporation in Pasadena Texas. On the 23rd of October 1989, I was sitting in an engineering colleague's office in the 3rd floor corner closest to the



12621 Featherwood Drive • Suite 120 • Houston, Texas 77034
Tel: (281) 922-8324 • Fax: (281) 922-4362
www.SIS-Tech.com



Phillips Chemical Company site. I felt the polyethylene explosion and heard it too. To this date, I am still unsure which sensation I acknowledged first, but most significantly I felt the explosion viscerally as the pressure wave passed me. After the wave passed, I physically returned to normal but everything else seemed different.

Later, I learned that the personnel at the Phillips Chemical Company site were under constant pressure to increase production rates in a business climate where there was relentless effort to reduce operation and maintenance costs. An easy to make mistake during a routinely performed maintenance task resulted in the loss of 23 lives and 300 injuries. Among the casualties was Mary Kay O'Connor, the unit operations supervisor, a chemical engineer just a few years into her career and namesake of the Process Safety Center at Texas A&M University.

The industry learned a lot from the Bhopal and Pasadena tragedies. The way we assess, design, operate, maintain, and validate the safety of chemical processes has changed significantly in the last 30 years. It is important that these tragedies not be relegated to history, but forever seen as possibilities that we must actively invest resources to prevent. Engineers must be educated on the safety aspects of process design and operation, so that when they become responsible for a chemical process, they have a deeply embedded sense of the hazards entrusted to them. To prevent catastrophic events, we must, as the Mary Kay O'Connor Process Safety Center asks, make safety second nature.