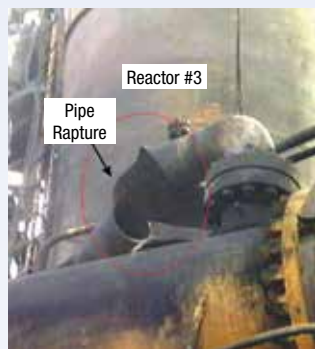
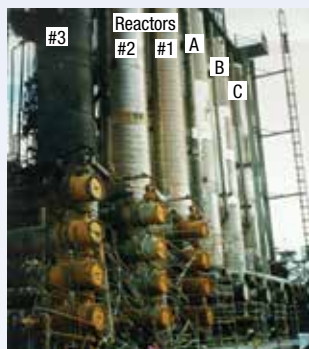


Conduct of Operations

In January 1997, a pipe in a hydrocracking unit at a refinery in California ruptured, releasing a flammable mixture of hydrocarbons and hydrogen. The gas mixture ignited, causing a fire and explosion. There was one fatality, and 46 people were injured. One of the causes of the incident was excess temperature in one of the hydrocracking reactors. The specified maximum allowable temperature in the reactors was 800°F (425°C), and operators were supposed to shut down the system if the temperature exceeded this value. The reactor and the pipe that ruptured were thought to have reached a temperature greater than 1,400°F (760°C).

Temperature excursions in excess of the specified 800°F (425°C) maximum had occurred previously, but the system had not been shut down. This led operators to believe that these excursions were acceptable. Also, some of those temperature excursions were not investigated, and recommendations from investigations that were conducted were not all implemented.



In April 1998, flammable chemicals were released from a 2,000-gal batch reactor into a building at a specialty chemicals plant in New Jersey, and an explosion ensued. The release occurred because operators were unable to control the temperature of the batch, and the runaway reaction partially vented through the reactor manway into the production building. Nine people were injured, two seriously, and chemicals were released into the surrounding community. It is believed that the initial temperature of the batch was higher than normal, making it more difficult for operators to control the batch temperature with the available cooling.

Operators had difficulty controlling the batch temperature of eight of the previous 32 batches produced. The temperature and the rate of temperature rise for individual steps of the process were beyond the limits specified by the procedure. In some cases, the temperature exceeded the limit of the reactor temperature recorder (300°F or 150°C). Operators were able to regain control of the temperature of those batches before a runaway reaction occurred. Those previous temperature excursions were not investigated, and no action was taken in response to them.



What Can You Do?

Although these two incidents occurred in completely different types of manufacturing plants, they have one important thing in common. In both, the process had exceeded specified safe operating limits before the incident. The abnormal conditions became accepted — this is called normalization of deviation. These warning signs were either not investigated, or actions recommended by the investigation were not implemented. Conduct of operations can be summarized in two simple concepts: (1) Say what you intend to do (procedures). (2) Always do what you say. This means, for example, that if your operating procedures say to shut down if a critical safety parameter exceeds a specified value, you *must always* shut down.

- Know the critical safety parameters for the process at your plant, the consequences of exceeding them, and what to do if they are exceeded.
- Always take the required actions if critical safety limits are exceeded.
- If critical safety parameters are exceeded, report it to management so an appropriate investigation can be conducted.

What are your plant's critical safety control limits?

©AIChE 2015. All rights reserved. Reproduction for non-commercial, educational purposes is encouraged. However, reproduction for any commercial purpose without express written consent of AIChE is strictly prohibited. Contact us at ccps_beacon@aiche.org or 646-495-1371.