



# Director's Corner

Inherently Safer Technology, a topic on the list of topics to explore for many industries, government entities and researchers. There is reasonable agreement among most researchers and scholars that the development and implementation on inherent safety technology and design options is a goal we all should work towards. However, when we consider alternatives for inherently safer technologies and options, we must evaluate these options carefully so that we do not create any unintended consequences.

Two examples come to mind as examples of situations where unintended consequences may result in making changes without thinking through all the repercussions of these changes. First is looking at the use of hydrogen fluoride a catalyst in refinery alkylation processes. A logical or valid question that might be asked— Is it possible to replace hydrogen fluoride with a relatively less toxic chemical? On the surface, the answer is pretty simple in that for the same alkylation process the hydrogen fluoride can be replaced by sulfuric acid as a catalyst. So, one might presume that changing the process from hydrogen fluoride to sulfuric acid is the inherently safer option. In reality, however, this may be an over simplistic analysis of the situation. Given the same amount of alkylation throughput, estimates vary between 40 times to as high as 140 times more sulfuric acid is needed, as compared to that of the hydrogen fluoride, to accomplish the same alkylation process. Thus, in changing over to sulfuric acid, the following areas would be needed to accommodate this substitution: larger storage capabilities, high capacity catalyst regeneration plants, increased number of transportation deliveries in route. So, one could argue that changing to sulfuric acid may increase the potential for terrorist attacks as well as unforeseen accidents. Conversely, a well managed alkylation plant with

hydrogen fluoride and the appropriate mitigation systems could very well represent a lower risk.

The second example is with regards to the use of chlorine for water in waste water treatment processes. Again the argument could be made that changing over to sodium hypochlorite is an inherently safer option. While that may be true, for the specific location where the chlorine is replaced with the sodium hypochlorite, the question needs to be asked: Where is the sodium hypochlorite coming from? The answer is that the sodium hypochlorite is probably being manufactured in a high capacity plant where large quantities of chlorine are stored or produced. So, again the argument could be made that instead of having several low risk targets, we have changed the problem into one high risk and high value target. Other questions then arise as to where this larger plant with large storage of chlorine would be sited. I am sure that many neighborhoods and local governments would not want that plant located in their area. Additionally, some research and recent evidence indicates that hypochlorite for water treatment processes may result in the formation of perchlorates in the water under certain conditions. Perchlorates have been known to have deleterious health effects.

These examples demonstrate the idea that while inherently safer options are something that need to be looked at very carefully, we also need to be aware of the overall risk and be mindful of whether we are actually reducing the risk or, in fact, increasing the risk or transferring the risk and in some cases aggregating the risk to one site.

We need to be mindful of the fact that while alternatives for inherent safety are something we should look at, but that inherent safety does not always mean lowest risk. Each situation is unique and each chemical,

*(Director's Corner, cont'd.)*

its usage is unique and different processes in the chemical industries require different solutions; therefore, "one size does not fit all" in terms of reducing overall risk.

However, following the events of September 11, 2001, we as a nation and a society have the responsibility to look at chemical security issues and vulnerabilities that arise. In that respect, inherent safety options should definitely be considered while being mindful that science must precede regulations otherwise we might create unintended consequences. Having stated that—What is the science needed to make the implementation of inherently safer technologies and options a success? That particular topic was the focus of a special workshop convened by MKOPSC in Houston, TX on May 9, 2008. The workshop was attended by representatives from various stakeholder groups in addition to presentations by:

- *Overview of inherently safer technology and current state-of-the-art,* **Dennis Hendershot**
- *"Industry perspective on the application of inherently safer technology,"* **Tim Overton**, Dow Chemical Company

- *"Industry perspective on inherently safer technology,"* **Dave Moore**, AcuTech Consulting
- *"New Jersey TCPA experiences with inherently safer technology,"* **Paul Baldauf**, New Jersey Department of Environmental Protection
- *"Contra Costa experiences with inherently safer technology,"* **Randy Sawyer**, Contra Costa County
- *"DHS perspective and plans for inherently safer technology,"* **Larry Stanton**, Chemical Security Compliance Division, US Department of Homeland Security
- *"CSAC research and perspectives on inherently safer technology,"* **Dr. George Famini**, Chemical Security Analysis Center, US Department of Homeland Security

Break-out groups addressed the research needs for new plants, existing plants and the chemical infrastructure. The proceedings of the workshop are now being compiled and will be published as a white paper by MKOPSC in the near future.

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