Improving Chemical Process Safety

According to OSHA's Process Safety Management Guidelines for Compliance: "Unexpected releases of toxic, reactive, or flammable liquids and gases in processes involving highly hazardous chemicals have been reported for many years. Incidents continue to occur in various industries that use highly hazardous chemicals which may be toxic, reactive, flammable, or explosive, or may exhibit a combination of these properties. Regardless of the industry that uses these highly hazardous chemicals, there is a potential for an accidental release any time they are not properly controlled. This, in turn, creates the possibility of disaster. … Although major disasters involving highly hazardous chemicals have drawn national attention to the potential for major catastrophes, the public record is replete with information concerning many other less notable releases of highly hazardous chemicals. Hazardous chemical releases continue to pose a significant threat to employees and provide impetus, internationally and nationally, for authorities to develop or consider developing legislation and regulations to eliminate or minimize the potential for such events."

OSHA has stepped up their activities regarding chemical safety awareness. For example, to help laboratory managers protect their workers from exposure to chemical, biological, and physical hazards, OSHA has released new educational materials on laboratory safety. "The chemicals and equipment that laboratory workers use present a number of serious, sometimes life-threatening hazards," said Assistant Secretary of Labor for Occupational Safety and Health David Michaels. "These educational materials will help employers identify hazards and measures to ensure safe and healthful conditions for their workers and promote a robust safety

culture in the workplace."

The increased scrutiny of potentially unsafe chemical usage has caused Senator Frank Lautenberg (D., NJ) to renew his efforts to pass his Safe Chemicals Act, which would revamp the 1976 Toxic Substances Control Act (TSCA) putting many more restrictions on chemical development and usage. The proposal is a sweeping overhaul of TSCA by granting EPA more authority to regulate chemicals and requires that manufacturers prove their substances are safe before they go on the market.

Lautenberg is joined by more than 300 health advocacy groups in trying to persuade fellow senators to pass the bill. In its current form, the proposed bill was strongly opposed in June of 2012 by Cal Dooley, president of the American Chemistry Council, who characterized Lautenberg's "Safe Chemicals Act" (S. 847 [1]) as "extreme," Dooley's position is that that the safety measures would require chemical manufacturers to perform excessive risk assessment on long term effects of exposure to the chemicals. The expense would restrict development from small, innovative companies which are the backbone of America. This debate will continue long past the November elections.

The Green Chemical Solution

For decades, businesses have been moving to more environmentally friendly chemicals. The pace accelerated after President Clinton issued Executive Order 12873 in 1993. It ordered all federal agencies to “incorporate waste prevention and recycling in the agency’s daily operations and begin to acquire and use “environmentally preferable products and services.”

As a result, 100,000 federal, state, and local agencies switched to green solvents and cleaning alternatives. Some of the new products are “drop-in” replacements for their petroleum counterparts, chemically similar enough to swap in for oil-refined products, with no effect on performance or efficiency for the end user. Others are gaining visibility through marketing efforts focusing on customers’ desire to be “green.”

As one example, organic acids and citric-based cleaners were developed and rapidly replaced the traditional volatile organic compounds and toxic additives. Recently, electrically activated water (EAW) is being used because it is a very powerful cleaning agent. Running an electric current through water creates positive and negative ions that attract dirt while killing bacteria and viruses without the use of chlorine treatment and its concomitant residual effects.

Dispensing Questions & Answers

Although many manufacturers who use chemicals have already switched to safer alternatives, there still remain many solvents and corrosive chemicals that cannot be replaced with safer ones. Regardless of the “green” characteristics of the liquids, the end user has to figure out how to get the liquid from the container and into their process.

Many companies are still using one of the several versions of an open system in which chemicals or other liquids are either poured or pumped out of a drum or container. Many industrial accidents occur while transferring liquids via open systems which are fraught with injured employees, liquid spillage, release of noxious fumes which degrade air quality, and the potential contamination of the media. Needless chemical exposure to workers and environmental safety are back burnered because it is easier to look at first costs of a system rather than the long term cost of ownership. Depending on the accident, OSHA or EPA might require substantial paperwork and impact employee productivity, to say nothing of the cost related to the loss of the chemical inventory.

The safest way to remove liquids is from the top with the container in upright position. Recent technical developments by several equipment manufacturers have brought sealed and closed liquid transfer systems to the manufacturing environment. They facilitate more effective chemical handling and improved liquid integrity and quality. The systems are investments rather than throw away expendables. As such they deliver higher reliability, lower overall total cost of ownership and improved safety for the worker. Additional benefits are reduction/elimination of dangerous spills, unplanned vapor release, and reduction/elimination of worker accidents.

A Case in Point

Bert Wilda is the safety manager at Lang Exteriors in Chicago, a major manufacturer of vinyl windows and doors which uses a solvent to degrease the vinyl.

"Several years ago we switched from chemical solvents to citrus based solvent," he said. "It's made from orange oil and it works great, but our siphon pump didn't seal the barrel and the whole place smelled of solvent. What's worse, we were losing a lot of solvent to evaporation. With the recent freezes in the orange groves, the current barrels cost more than three times what the old one did. Conserving our liquid inventory is very important to us." After switching to a sealed pump system, Wilda reported "No more smell, no more product loss."

In this age of increasing chemical regulation and enhanced environmental awareness, sealed and closed chemical dispensing systems make good sense for all types of liquids. As their names imply, these systems can deliver fluid from the barrel to point of use with minimal or no loss of chemical inventory. Wasting less chemical in any size operation is going to help reduce costs which leads to an improved bottom line. They also make good business sense because the systems are durable investments rather than throw away expendables. As such, they deliver better productivity, higher reliability, lower overall total cost of equipment and liquid inventory ownership. An added benefit of a sealed or closed dispensing system is that facilities will be practicing sustainable, environmental stewardship, while at the same time ensuring their biggest asset, their employees, are not in danger of chemical exposure.

Nancy Westcott, President, GoatThroat Pumps, is committed to bringing environmentally preferable solutions for handling chemical products to the industrial and landscape industries. A lifetime member of American Institute of Chemical Engineers, she created and launched AIChE's Institute of Sustainability's Youth Council in 2005. Nancy has an BS from Tufts University and an M.A and an M. Ed. from Columbia University. She can be reached at nwestcott@goatthroat.com *[2] or by phone at +1 646-486-3636.*

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