

# Greenlist Bulletin

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at the University of Massachusetts Lowell

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**The use and storage of methyl isocyanate (MIC) at Bayer CropScience**

[Source: The National Academies. May 2012](#)

The use of hazardous chemicals such as methyl isocyanate can be a significant concern to the residents of communities adjacent to chemical facilities, but is often an integral necessary part of the chemical manufacturing process. In order to ensure that chemical manufacturing takes place in a manner that is safe for workers, members of the local community, and the environment, the philosophy of inherently safer processing can be used to identify opportunities to eliminate or reduce the hazards associated with chemical processing. However, the concepts of inherently safer process analysis have not yet been adopted in all chemical manufacturing plants. The Use and Storage of Methyl Isocyanate (MIC) at Bayer CropScience presents a possible framework to help plant managers choose between alternative processing options-considering factors such as environmental impact and product yield as well as safety- to develop a chemical manufacturing system.

In 2008, an explosion at the Bayer CropScience chemical production plant in Institute, West Virginia, resulted in the deaths of two employees, a fire within the production unit, and extensive damage to nearby structures. The accident drew renewed attention to the fact that the Bayer facility manufactured and stores methyl isocyanate, or MIC - a volatile, highly toxic chemical used in the production of carbonate pesticides and the agent responsible for thousands of deaths in Bhopal, India, in 1984. In the Institute accident, debris from the blast hit the shield surrounding a MIC storage tank, and although the container was not damaged, an investigation by the U.S. Chemical Safety and Hazard Investigation Board found that the debris could have struck a relief valve vent pipe and cause the release of MIC to the atmosphere.

The Board's investigation also highlighted a number of weaknesses in the Bayer facility's emergency response

systems. In light of these concerns, the Board requested the National Research Council convene a committee of independent experts to write a report that examines the use and storage of MIC at the Bayer facility. The Use and Storage of Methyl Isocyanate (MIC) at Bayer CropScience also evaluates the analyses on alternative production methods for MIC and carbamate pesticides performed by Bayer and the previous owners of the facility.

[Read the report online](#)

### New study shows that workplace inspections save lives, don't destroy jobs

[Source: Harvard Business School, May 17, 2012](#)

Research published today in Science sheds light on a hot-button political issue: the role and effectiveness of government regulation. Does it kill jobs or protect the public?

The new study, co-authored by Harvard Business School Professor Michael Toffel, Professor David Levine of the Haas School of Business at the University of California, Berkeley, and Boston University doctoral student Matthew Johnson, examines workplace safety inspections conducted by California's Division of Occupational Safety and Health (Cal/OSHA). The authors carried out the first evaluation of a "clinical trial" of the state's mandated randomized inspections to discern their effect on both worker safety and companies' bottom lines.

The results overturn conventional wisdom: Workplace inspections do reduce on-the-job injuries and their associated costs, and the researchers could not detect any harm to companies' performance or profits.

"The randomized inspections provided a perfect natural experiment that uses the power of randomization just like a medical clinical trial," Toffel said. "Because Cal/OSHA typically inspects facilities following complaints or recent accidents, you can't study those inspections to get an unbiased understanding of whether they make a difference. By studying the inspections Cal/OSHA conducted at workplaces selected at random, we were able to overcome this problem to learn the actual impact of inspections."

The study found that within high-hazard industries in California, inspected workplaces reduced their injury claims by 9.4 percent and saved 26 percent on workers' compensation costs in the four years following the inspection, compared to a similar set of uninspected workplaces. On average, inspected firms saved an estimated \$355,000 in injury claims and compensation for paid lost work over that period. What's more, there was no discernible impact on the companies' profits.

"We spent several years collecting data, not just on injuries, which is very important, but also on other indicators to see whether inspections led to problems they are often accused of causing - like whether they increased costs and led to the elimination of jobs. We looked at company survival, employment, sales and total payroll to see if inspections were detrimental to the employers," said Levine.

"Across the numerous outcomes we looked at, we never saw any evidence of inspections causing harm," Toffel explained. "If OSHA inspections conducted in all 50 states are as valuable as the ones we studied, inspections improve safety worth roughly \$6 billion to employers and employees, ignoring pain and suffering. The overall message of our research is that these inspections worked pretty much the way one would hope. They improved safety, and they didn't cost firms enough that we could detect it."

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### Levi's makes life-cycle assessment part of its fabric

[Source: GreenBiz.com, May 22, 2012](#)

Author: Amy Westervelt

Life-cycle assessment (LCA) tools began increasing in popularity a few years ago as sustainability-minded companies sought ways not only to better understand their products and mitigate their impacts, but also to communicate their efforts to consumers.

These tools are data management systems that help companies measure and track the impacts of products from the design stage to end-of-life. Rather than hiring consultants who came with their own LCA software, companies such as Levi Strauss & Co. began building their own proprietary tools, enabling them to better measure their unique inputs, outputs and impacts.

Now Levi's is working to take LCA out of the sustainability silo and into the design room. The company's clothing designers are using its Evaluate tool on a daily basis to make decisions about things like fabric choices, washes and dyes.

"As designers, we only know what we know and so often the decisions we make about what we design and the materials we use are made absent of understanding the environmental impacts of those choices," says Paul Dillinger, senior director of global design for Levi's Dockers brand.

Dillinger and his team can use Evaluate to reach down to the material level to assess the impacts of various components. The design group recently went through the process of evaluating "chassis" fabrics – core fabrics from which a line is made – and were able to use Evaluate for the first time to help make design decisions.

"Typically we evaluate fabrics with respect to quality, price, and versatility, but do we know that they're sustainably made?" Dillinger explains. "Have they been woven, spun, dyed in ways that are appropriate? Before Evaluate had no insight into that. Now we have 16 core fabrics we'll put through the tool to further hone the assortment – so all that information will be available to us prior to the design process. Rather than audit our choices later, this gives us a chance to start off with the right fabrics."

[Read more](#)

#### Phthalates in PVC floors taken up by the body in infants

[Source: Swedish Research Council, May 23, 2012](#)

A new study at Karlstad University in Sweden shows that phthalates from PVC flooring materials is taken up by our bodies. Phthalates are substances suspected to cause asthma and allergies, as well as other chronic diseases in children. The study shows that children can ingest these softening agents with food but also by breathing and through the skin.

Phthalates are a group of chemical compounds that occur in construction materials and a great number of common consumer goods such as toys, cleaning solvents, packaging, etc. Phthalates are suspected of disrupting hormones and may be related to several chronic diseases in children, like asthma and allergies, as shown in earlier studies. Flooring materials using softened PVC contain phthalates and have previously been shown to be a significant source of phthalates in indoor dust. This new study was designed to investigate whether flooring materials using PVC and other housing-related factors, together with other individual factors, can be tied to the uptake of phthalates by infants.

Urine samples were taken from 83 randomly selected children between the ages of two and six months by the county council in Värmland in western Sweden. The prevalence of four types of phthalates in the urine was measured, and data were collected about flooring materials and the home, the family's lifestyle, and individual factors for the infants. The levels of certain phthalates (MBzP, a BBzP metabolite) proved to be higher in the urine of babies that had PVC materials on their bedroom floor. The levels of another phthalate metabolite related to DEHP were lower in two-month-old children if they were exclusively breastfed, with no supplements.

Earlier studies from the current group have shown that PVC flooring can be tied to the occurrence of phthalates in indoor dust, and that exposure for BBzP in indoor dust could be associated with allergic conditions in children. These new data thus show that the uptake of phthalates in infants can be related to flooring materials using softened PVC in the home. It should be pointed out that both DEHP and BBzP are banned for use in toys for small children owing to health risks.

"With this study as a basis, we can establish that there are other sources that should be taken into consideration in regard to the uptake of banned chemicals and that we do not only ingest them in our food," says Carl-Gustaf Bornehag, professor of public health at Karlstad University and leader of the study. The findings also show that phthalates can be taken up in different ways, both through food and probably through breathing and through the skin.

### Functional coatings from the plasma nozzle

[Source: Fraunhofer-Gesellschaft, May 18, 2012](#)


When manufacturing products, the coating technology is a key innovation driver for almost all areas of daily life - for example, for making scratch-proof displays for smart phones or anti-bacterial surfaces in refrigerators. Other coatings protect components from corrosion or aging, for example in a solar cell module or a car engine, without the end user noticing their existence. In industry today, wet chemical processes or vacuum plasma processes are primarily used for coating applications. Both have drawbacks. Vacuum units are expensive, limited to smaller components and applying a coating takes a relatively long time. Wet chemical processes often involve high resource and energy consumption with the corresponding environmental damage and can also cause difficulties in the handling of material combinations for lightweight construction such as plastics/ metals or aluminum/steel.

"There has to be another way", thought Dr. Jörg Ihde and Dr. Uwe Lommatzsch from the Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM in Bremen. Together with Plasmatrete GmbH, the IFAM team developed a new kind of plasma coating process that works at ambient pressure, that is to say, in an open atmosphere. "And that poses a major challenge", explains Jörg Ihde. "Because the pressure is more than 10,000 times higher and the absence of a vacuum reactor, we had to stop unwanted particles from forming and embedding in the coating. That was the key to developing robust and efficient industrial processes using the new plasma system.

The central element is a plasma nozzle. The nozzle is no bigger than a typical spray can. Yet it contains a highly complex coating system. "In the nozzle, an electrical discharge generates small flashes - a plasma that is expelled from the nozzle in the form of a jet. We systematically feed into the nozzle outlet those materials that are excited and fragmented in the plasma and then deposited out of the plasma jet as a functional nano-layer onto the surface", explains Uwe Lommatzsch. "We achieve extremely high deposition rates, enabling fast and cost-effective production processes to be realized."

The use of a nozzle allows the coating to be applied very precisely and only where it is needed, thus conserving resources. "We can control the processes so that the same nozzle can be used to apply coatings with various functionalities, for corrosion protection or for increasing or reducing adhesion, for instance", adds Jörg Ihde. Only very small amounts of coating material are required and practically all materials and material combinations can be coated. The process offers, in addition to the coating qualities and functionalities, even more benefits: it can be easily integrated into an inline production process, requires little space and is easy to automate, meaning it can be controlled via a robot. Yet another advantage: low investment costs and easy on the environment.

The positive characteristics benefit industrial production: depositing an adhesion-promoting coating on a car window edge before gluing it in, to replace environmentally damaging chemicals or as a substitute for thick protective paint on printed circuit boards, which improves heat dissipation and hence prolongs service life. The process is already employed in the automotive industry and the energy sector to provide protection against corrosion and aging.



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