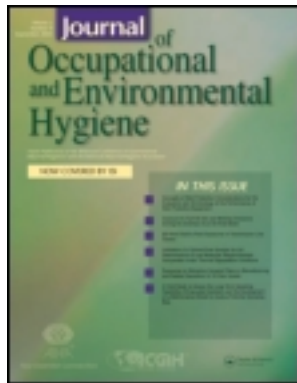


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Commentary

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Commentary

In the Arc of History: AIHA and the Movement to Reform the Toxic Substances Control Act

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Dr. Michael P. Wilson of UC Berkeley delivered his keynote address before the general assembly of the American Industrial Hygiene Conference and Exhibition (AIHce) in Portland, Oregon, in May 2011. Here, Dr. Wilson again discusses the political and economic drivers of occupational disease in the United States and proposes a role for AIHA in helping to highlight and resolve them. He proposes that until these underlying drivers are acknowledged and ameliorated, the toll of occupational disease will persist, despite the hard work of industrial hygienists in the workplace. Among these drivers, Dr. Wilson points to the decline of labor rights and unionization; economic inequality; economic insecurity; political resistance to public health protections for workers, notably the OSHA and NIOSH programs; and weaknesses in the Federal Toxic Substances Control Act of 1976 (TSCA).

Of these, Dr. Wilson calls on the AIHA to participate in the historic effort to rewrite TSCA. He points to weaknesses in TSCA that have produced a chemicals market dominated by the function, price, and performance of chemicals, with little attention given to their health and environmental effects. Under these conditions, he argues, hazardous chemicals have remained economically competitive, and innovation in inherently safer chemicals—in green chemistry—has been held back by a lack of market transparency and public accountability in the industry. TSCA reform has the potential to shift the market toward green chemistry, with long-term implications for occupational disease prevention, industrial investment, and renewed energy in the industrial hygiene profession. Dr. Wilson proposes that, like previous legislative changes in the United States, TSCA reform is likely to occur in response to myriad social pressures, which include the emergence of the European Union's REACH regulation; recent chemicals policy actions in 18 U.S. states; growing support from downstream businesses; increasing public awareness; and a social movement that reaches across traditional boundaries. Dr. Wilson urges the AIHA to involve itself in this effort by building alliances with professional associations and other groups that share similar goals.

The idea of “green chemistry” has undoubtedly caused many of us to think, “How does this possibly relate to me? I am not a chemist. My work is to protect people from exposures to hazardous substances.” Industrial hygienists don't wake up in the morning wondering, “What kinds of green chemistry innovations are going to happen at work today?”

It reminds me of a disconnect that happened between my older son and me. He is now a sophomore in college but entered kindergarten at the same time I started graduate school at UC Berkeley, and he graduated from 6th grade when I finally completed my Ph.D. 7 years later.

One day just before my graduation, he turned to me and asked, “What have you been *doing* all this time?”

I said, “Well, I've been trying to figure out how people who work in car repair shops are exposed to solvents when they fix brakes and that kind of thing, and how that can affect their health.”

He thought about that for a few seconds and then said, “I have learned *so much more* than you.”

You know he's right, of course. He had learned to read, calculate fractions, write a coherent essay, understand statistical concepts, construct those sugar cube buildings—all of that—during his seven years between kindergarten and 6th grade.

In any case, there is probably a lesson there in how to communicate effectively about your life's work so others can understand its relevance.

In broad terms, occupational disease is an outcome of political economic priorities

Green chemistry, of course, is about the design of inherently safer chemistries, so it has everything to do with industrial hygiene. As a case in point, in working with the state health department's Occupational Health Branch, we found that at least 30 different manufacturers were making aerosol degreasing products formulated with the neurotoxicant n-hexane, and these products were used in uncontrolled settings by automotive repair technicians in thousands of shops across California.^(1,2)

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This is at one level an industrial hygiene problem, and it resulted in 14 cases of automotive repair technicians whom we identified with disabling peripheral neuropathy in the San Francisco Bay Area. Professor Kathie Hammond at UC Berkeley is now engaged in a 5-year NIH-funded study to assess the extent of neurological damage and other health problems that resulted in this population as a consequence of their use of these products.

This case, of course, also points to a broader set of problems. It suggests there is a problem with the kind of hazard *information* that businesses receive from product formulators, and the kind of information that is transmitted to workers, and whether—and to what extent—workers are empowered to take action in response to that information. It points to problems in the way products are designed and in the way they are regulated.

Further upstream, it suggests there are some important gaps in the education of chemists. Why, for example, would a product chemist *choose* to use hexane as a degreasing agent? Its neurotoxic effects among workers have been documented as far back as the 1940s. Why would a chemist choose to put hexane into a product that is intended to be sprayed directly into the breathing zone of the person using it? Why would these products be made by 30 different companies, sold for less than \$3.00 a can, and promoted for use by technicians who would use 5 to 10 cans a day?

The mass production and sale of neurotoxic products certainly raises industrial hygiene issues, such as the need for appropriate worker protection; at its core, however, it points to political economic problems, which is to say, it reflects our society's political and economic priorities. Indeed, the development of disabling peripheral neuropathy among workers in the vehicle repair industry—like all occupational disease in the United States—is a keyhole through which we can understand the nature of those priorities. Armed with that understanding, we are better able to lend our expertise and our voice to efforts underway to bend those priorities toward human and environmental health protection.

I would propose to you that the time has come for the industrial hygiene profession to take a step back and assess the driving forces behind occupational diseases—the root causes, if you will—and then join with others in mitigating those forces. My thesis is that those forces are primarily political and economic, and that to affect those forces, we have to play a role in the political economic arena, that is, in the development of public policy and law.

Most directly, occupational disease is an outcome of design decisions

The problems we are up against are manifold, of course. The Centers for Disease Control and Prevention tells us that every day U.S. workplaces will see 14 traumatic fatalities, 134 premature deaths from occupational disease, 219 hospital admissions, 7000 emergency room visits, and 11,350 non-fatal injuries and illnesses that require work modification.⁽³⁾ That's over 18,000 people each day. And, each day, employers

and insurers will pay more than \$216 million in workers' compensation costs, which do not include the cost of lost wages and benefits for workers, lost productive years of life, payments made by other insurance systems, care provided by family members, or the cost of pain and suffering.

We know these figures underestimate the true rates of workplace morbidity and mortality in the United States by somewhere between a half and two-thirds. We also know that they barely scratch the surface of the health and environmental damage that can arise from many points in the life cycle of chemical substances. The U.S. EPA, for example, has projected that on the current trajectory, the United States will need 600 new hazardous waste sites every month of every year leading up to 2033, which is the end point of their forecast. China and India have been the recipients of millions of tons of hazardous electronic waste, and the list goes on.

What proportion of this damage is preventable? I think most of us would agree that companies can prevent public and environmental health damage if they make it a priority to do so at the point of design. When chemists and materials scientists consult with industrial hygienists and safety engineers at the design phase, we end up with an intelligent outcome. We can call it inherently safe, but we might also call it *smart*.

We witnessed the importance of inherent safety at two incidents in the Portland area last week. At one workplace, a sawmill, a 30-year veteran of the plant was killed and two co-workers were injured when they removed the cap of a 5-ft hydraulic accumulator chamber that is used to power the mill equipment. The chamber would normally be depressurized during this operation, but at the time it was under 800 lbs of pressure. When the workers opened the chamber, the cap became a projectile and struck all three with enough force to kill one and injure the other two.⁽⁴⁾

The immediate question in this case is, "Why are hydraulic accumulator chambers *designed* such that they can be manually opened when they are under 800 lbs of pressure?"

The same day last week, a malfunction at a precision casting plant near Portland—owned by a Fortune 500 company—caused a release of hydrogen fluoride gas that injured four workers, two of them firefighters. Portland Fire called for a half-mile, shelter-in-place order.⁽⁴⁾ Again, this incident points to the question of inherent safety, as Mike Wright of the United Steel Workers noted last week when he said, "We think we can handle even the most dangerous materials safely, but it's hard to do. It takes time and effort and it's expensive, and they still have intrinsic hazards. Safety is best around less hazardous operations and materials."

We all know the value of inherently safer design. We know it saves lives, and we know it is as applicable to industrial hygiene as it is to safety engineering. At the molecular level, inherently safe design is called *green chemistry*. As such, green chemistry is deeply applicable to the practice of industrial hygiene, it is immediately important to millions of workers across the nation, and it is a foundation for a more life-affirming form of economic growth.

Linking design with human and environmental health protection is the path to a sustainable future where economic growth is able to simultaneously *solve* rather than exacerbate health and environmental harm. The key question is, “How do we get there?” How do we build a life-affirming economy that motivates smart, health protective, inherently safe design, that in the end we can feel good about handing off to the next generation? What is the role of green chemistry in that economy, and what is the link with the practice of industrial hygiene and with AIHA®?

Changing the way things are designed requires interdisciplinary work

I have proposed that to genuinely protect workers and children and future generations from an accumulation of toxic materials, we have to transform chemical design by transforming the chemical economy, and that we will realize the transformative power of green chemistry only when the laws that shape the economy favor, rather than dampen, industrial investment in green chemistry.

I would suggest that the time to do that work is overdue. I’m worried that if we choose *not* to take up this long-term challenge, in 10 or 15 years we will be saying the same things that we’re saying today. I’m worried that many members of this community will have struggled mightily and will have made important progress in preventing some workplace diseases and injuries, but by and large, the problems will still be with us. We will still be struggling to protect people from toxic substances, whose prevalence in commerce will have increased right alongside the expected doubling of global chemical production over the next 24 years.⁽⁵⁾

Creating a different outcome, I think, will require the industrial hygiene community to do two things: (1) identify root causes of occupational disease in the United States, and (2) join with others in tackling those causes.

Both of these ideas are difficult to implement, in part, because they require the involvement of other people and other people’s knowledge. Studying root causes is an interdisciplinary endeavor; the deeper we go, the more interwoven a problem becomes with other areas of expertise. Why did the casting plant in Portland choose to use hydrogen fluoride, for example? That question could certainly be answered by a process engineer or a chemist, but to really answer the question, we would need to seek out the expertise of an economist, an environmental lawyer, a public policy analyst, and a historian. Certainly the neighbors of southeast Portland, the leadership of the union, and Portland’s environmental justice activists could tell us a thing or two.

The point is that to understand the intractable kinds of problems we face in occupational health and safety, and to come up with innovative ways of solving those problems, we need to bring people together who don’t normally interact. We have to open the doors to people with different kinds of expertise and different ways of solving problems.

The challenge of tackling root causes of problems through interdisciplinary work is captured in the story of the three

engineers who were on their way to a conference. Their rental car stalled on the interstate, and they were forced to pull over. The mechanical engineer (who was driving, of course) looked at his two colleagues and said, “Well, it’s obviously a problem in the drive train. There’s no power getting from the engine to the wheels.” The chemical engineer looked at him and said, “What, are ya kiddin’ me? It’s obviously a fuel problem. The fuel’s bad or there’s air in the lines.” The computer engineer held up his hands, looked at them and said, “All right everyone, let’s just get outta the car, get back in, and slam the doors.”

Like the three engineers, we can’t help but see things from our own point of view. And, of course, unbeknownst to us, we might have only a partial understanding of the problem and an incomplete vision of the potential solutions.

I would suggest to you that, for the first time in a generation, the industrial hygiene community has an opportunity to join with others who are working earnestly to address a common problem that is an important root cause of occupational disease in the United States, namely, the Toxic Substances Control Act of 1976, or TSCA.

Public policy can shift design decisions to better incorporate human and environmental health

TSCA is the federal statute that governs some 74 billion pounds of chemical substances produced or imported into the United States each day. It is the only major U.S. environmental health statute that has not been revised since its inception 35 years ago. The overarching goal of the movement to rewrite it is to get away from chasing toxic substances around their life cycle and, instead, focus on inherent safety; that is, in *preventing* the design, production, and use of toxic substances in the first place.

To do this in practical terms, the movement is focused on TSCA reform strategies that improve the generation and disclosure of chemical hazard information, increase the efficiency and reach of regulatory oversight, and broadly motivate the U.S. chemical enterprise to begin investing seriously in green chemistry.

Participants in this effort now include dozens of downstream businesses that purchase chemicals and products, such as Kaiser Permanente, Staples, Hewlett-Packard, and others; it includes the governments of 18 U.S. states, professional associations, faith-based groups, environmental health and justice groups, and labor unions—notably the BlueGreen Alliance, with its 14 million members in pursuit of, as they say, “good jobs, a clean environment, and a green economy.”^(6,7)

For industrial hygienists, re-crafting TSCA has the potential to instill a much higher degree of transparency and accountability into the chemical enterprise and build the foundation for investment and commercial adoption of green chemistry practices—that is, in designing chemicals that are safer for biological systems, including those systems that emerge during the period of fetal and child development.

The TSCA reform movement has argued that by introducing policies that motivate industry to *design out* the hazard, to

embrace the science and technology of green chemistry, the United States will better protect public and environmental health while also building capacity within our domestic chemical industry to respond to the growing global demand for safer chemistries.

That's an intelligent, forward-looking industrial model, and it is an approach to problem-solving that I think AIHA can and should get behind.

I would argue that, as a profession, this community has both an opportunity and a deep interest in the TSCA reform effort simply because the problem of toxic substances in the workplace is never going to be resolved until it is in the competitive interest of companies to do so—when companies are motivated to invest real dollars in green chemistry solutions.

Those kinds of changes will arise only when the competitive forces in the market fully embrace the health and environmental effects of chemicals. Health and environmental impacts need to stand on an equal footing in the market with chemical function, price, and performance. The historical records show us that market shifts of this nature will only happen through a reframing of the legal framework within which industry operates. In the case of the chemical industry, that framework is TSCA.

Until that happens, any effort to broadly address the problem of worker exposures to toxic substances—by this community and others—will be in competition with other, seemingly more pressing business needs. In the *absence* of TSCA reform, the industrial hygiene community will certainly make improvements over the next several decades on specific chemical exposure problems, but the underlying, political economic drivers of occupational disease in the United States will exert a corrosive effect on those efforts.

Changing public policy requires organization: The view from East Salinas, California

Once we understand a root cause of a social problem, how do we bring about social change in response to that understanding? During my 13 years with the fire and emergency medical services, it never ceased to surprise me to see firsthand all the ways that people can get themselves into trouble—trouble that requires the services of professional firefighters and paramedics. The fire service is a government service, and it works remarkably well. Throughout the United States, when you call 911, you will more than likely not have a highly trained crew of firefighters and paramedics come through your door—or arrive at the scene of your accident—in less than 5 minutes from the time of dispatch, tools in hand, ready to work.

Fire-paramedics are particularly busy in so many of our cities and suburbs where poverty is endemic, where people live and work with extremely narrow margins between being housed and not. Poverty increasingly defies characterization, of course. It's closer than many of us realize. It includes millions of people in lower-income and temporary jobs, it includes migrant workers and new immigrants, and it includes people whose personal circumstances have pushed them to the edge economically.

The conditions of poverty certainly characterized the east side of Salinas, California, where I spent much of my work time. The problems on the east side differed from those of the more affluent west side of Salinas and from the City of Santa Cruz, where I also worked. Our calls in East Salinas more commonly dealt with youth- or gang-related violence, fires in overcrowded and sub-standard housing, intentionally set fires, domestic violence, vehicle crashes involving alcohol and other substances, and occupational injuries and exposures—the latter mostly to chlorine and ammonia—as well as countless calls for medical emergencies in middle-aged and elderly patients suffering from the effects of untreated chronic diseases, such as diabetes, heart disease, and emphysema, as a result of poor access to primary health care services.

Like worker diseases and injuries, poverty is a lens into societal priorities. And, like worker diseases and injuries, the problems in East Salinas did not grow out of some inherent flaw in the people who lived there. Their problems were a consequence of the structural conditions of poverty that surrounded the community. People were doing the best they could against terrible odds.

How did poverty show itself on the east side? Working conditions were one way. During my time in Salinas, wages plummeted for thousands of farm workers when the United Farm Workers Union lost a lawsuit filed by one of the large growers in the Valley. The majority of people who worked in the fields and packing plants of Salinas also spoke very little English, many were migrants, many were probably undocumented. If they were aware of basic employment rights in California, they were certainly apprehensive about calling attention to themselves by contacting the state Labor Commissioner or a union organizer or Cal/OSHA, for example. They were disempowered in the workplace on many levels.

A lack of public investment was another way poverty showed itself. The main public library—presciently named after John Steinbeck—closed for several months due to lack of funds. Over several years, the fire department was forced to reduce its staffing from 120 firefighters to 80, even as the city doubled in size. Salinas High School was forced to build a wall separating its buildings from the main street to protect students from drive-by shootings. Public transit was skeletal at best; some streets were unpaved. Much of the housing for farm workers was deplorable. In addition to overcrowding and shabby construction, many farm workers housing complexes were surrounded by acres and acres of strawberry fields, which were regularly fumigated with methyl bromide. My crew responded to a medical emergency in farm worker housing one afternoon, and I watched as a helicopter applied aerial pesticides on the field adjacent to the housing complex we were working in, which was separated from the field by a dirt road. When we took patients to the emergency department of the county hospital, we found it perpetually jammed with people waiting for basic health services, not only with people experiencing medical emergencies.

Under these conditions, it's hard for people to organize and work for change. The Farm Workers Union had a tentative presence, but other community-based organizations, which have such an enduring presence in so many American communities, were simply not present in East Salinas, as if the community was too pressed trying to meet basic needs to organize themselves, to participate, and to build capacity to change their conditions.

For this, we need organizations. Organizations like AIHA are the drivers of change and of long-term solutions. To respond effectively to problems like urban poverty and occupational disease, we have to focus attention on root causes that are driving those problems. It requires organizations to do that.

Our union found, for example, that since the 1930s, the packers and shippers of millions of tons of produce grown in the Salinas Valley were exempted in the City Code from paying business license taxes, which starved the city of hundreds of millions of dollars in tax revenues. Some of the world's largest vegetable packing operations are in Salinas, after all. We could see that the tax structure was a root cause of the poverty and decaying infrastructure on the east side, and we considered it worth fixing.

The power of a root-cause approach is that the solutions that arise from it are more enduring because they re-orient the existing structure; they create a new structure. Organizations are the means by which we identify, understand, and ameliorate the root causes of social problems by making new structures possible.

Economic security and labor rights underpin worker health and safety protections

Demographic information about the United States is replete with descriptions of American poverty that sound very much like the stories of life in East Salinas. These data also tell a story of a profound shift that has occurred over the past few decades that has produced an alarmingly unequal distribution of wealth.

Before we return to TSCA, let's take a minute to reflect on the meaning of this shift for worker health and safety and for the industrial hygiene profession. Earlier this year, Nobel Prize-winning economist Joseph Stiglitz wrote that income inequality in the United States is now at a scale similar to that of Russia and Iran.⁽⁸⁾ Dr. Stiglitz described how the upper 1% of Americans is now taking in nearly 25% of the nation's income each year. When viewed in terms of *wealth* rather than income, he pointed out that the top 1% controls 40%. He noted that 25 years ago, the top 12% controlled 33% of wealth. Today, 1% controls 40%.

As with any mathematical distribution, the rise of inequality has meant there are more people in the tails: more are living in poverty and fewer are earning middle-class incomes. The result is increasingly apparent in inequities occurring in housing, health care access, employment opportunities, nutrition, educational advancement, and on and on. Worker productivity has continued to increase, but median earnings of full-time male workers reached their peak back in 1973. The median

income of white households is now 20 times that of black households, a disparity that is nearly twice the size it was in the 20-year period leading up to 2007. In 2008, more than 5.5 million children lived in extreme poverty in the United States; that is, almost 1 of every 12 children lived in a household with an income below 50% of the federal poverty line, surviving on less than \$7 or \$8 per day. Although these children belonged to households in every state, they were concentrated largely in the 15 southern states. More than 2.4 million extremely poor children (42% of the nation's total) lived in the South.⁽⁹⁾

The reality of economic insecurity for so many people is a profound social problem. For the industrial hygiene profession, however, it produces two long-term barriers. First, economically stressed workers, like the residents of East Salinas, are too preoccupied with survival (wages, food prices, health insurance, public transportation, housing) to worry about exposures on the job or even to pay attention to imminent safety hazards. Second, the top 1% has become ever more able to influence public policies in ways that maintain (and even increase) that inequality, and the record illustrates that they are convinced it is in their best interest to support people in elected office whose primary goal is to turn the clock back even farther, including rolling back basic public health programs such as OSHA and NIOSH.

The steady erosion of once-celebrated labor rights in the United States has been a critical victory for the wealthiest Americans, one that tracks closely with the rise of income inequality. The 1994 Dunlop Commission report found that without legal protections, workers are reluctant to organize or take concerted action to protect themselves. As a consequence, organized labor now represents an extraordinarily small 7% of the U.S. private sector, down from about 35% just 50 years ago. When we include public employees, the unionization rate stands at 13%, making the United States the least unionized country among the world's 21 richest economies.⁽¹⁰⁾

The decline in labor rights and unionization has profound implications for worker health and safety, as we heard from Cecil Williams, president of the United Mine Workers Union, last year when he addressed the AIHce in Denver. Organized labor has been the driving force for worker health and safety since at least the passage of the National Labor Relations Act in 1934, which gave workers the right to organize.

We have witnessed a steady contraction of reasonable governance in the United States over the past several decades, and yet, we have learned again and again—certainly during the Great Depression of the 1930s—that our society (workers, communities, businesses, families) can advance only so far without the support of a functioning government. Everyone knows this; I certainly experienced it in an immediate way in the thousands of calls I answered in the fire and emergency medical services. And yet, OSHA and NIOSH, for example, continue to be astonishingly under-resourced and under-powered relative to the burden of work-related morbidity and mortality. OSHA's budget of less than \$600 million is about 5% of EPA's budget of \$10 billion. OSHA and NIOSH have been under almost continual attack from

the moment of their inception. The forces bent on further eviscerating OSHA and NIOSH and various state programs have undoubtedly increased their ability to do so with the Supreme Court's *Citizens United* decision.

At the same time, we have also seen throughout our history that people have imagined and fought for and—remarkably—*achieved* extraordinary social gains in the face of truly staggering opposition. Think about the end of chattel slavery, of child labor, the defeat of fascism, the ascension of racial integration and the right to vote, the right to organize in the workplace, the right to safe and healthy working conditions, and the potential for dignity and economic security in old age through Social Security and Medicare. Often after a seemingly interminable struggle, when the right set of conditions have come together, lasting social change has come quickly, as if people had been waiting for that moment to arrive for decades, and when it did, they acted swiftly and decisively. History has not come to an end; we are in the midst of it.

New approaches to chemicals policy reform can drive innovation in safer chemicals and products

That brings us to TSCA reform and the AIHA. I'd like to discuss TSCA as a root cause of occupational disease in the United States and describe the connections between green chemistry, chemicals policy, and AIHA. As I noted earlier, TSCA is our nation's primary chemical statute. It covers 82,000 chemicals in commerce and 74 billion pounds of chemicals produced or imported into the country each day. It was drafted with unfortunate weaknesses that resulted in the emergence of a chemicals market that has been driven by three factors: (1) chemical function, (2) price, and (3) performance. There has been much less attention given in the market to the health and environmental effects of chemicals, including effects among workers.^(5,11,12)

TSCA is the primary reason that toxic substances (such as the hexane-based degreasing products mentioned earlier) are still *competitive* on the market today. Their function, price, and performance can overcome competition from safer alternatives because health and environmental effects have simply not been valued in the buying and selling relationship.

Why is this? Under TSCA, chemical producers have never been required to generate and disclose information on the potential health or environmental effects of their products. The survey data show that this fact often comes as a surprise to the public.

In 1976, when TSCA was passed, 62,000 chemicals on the market at the time were grandfathered—that is, they were assumed to be safe until proved otherwise by the EPA. Despite the development of an array of creative programs to deal with this basic flaw, EPA has been able to issue formal rules for only about 5 of those 62,000 existing chemicals. Not surprisingly, those 62,000 constitute some 99% of chemical substances in commercial use today, by volume.

For industrial hygienists, the fact that TSCA does not require chemical producers to generate and disclose information means that you have very sparse, non-uniform or non-existent

chemical hazard and exposure information on which to base your decisions.

On one hand, we see the implications of this skewed market in the continuing presence of toxic products on the market and the continuing burden of occupational disease; on the other hand, we see it in the way chemists are trained at our universities. At UC Berkeley, for example, as with nearly every university across the country, chemistry majors have never been required to demonstrate a basic understanding of toxicology or exposure science, much less the principles of green chemistry design.

In addition, without transparency in the market, any action to phase out a toxic substance from a manufacturing process or from the market itself faces the problem of unintended consequences—of introducing a new (or unknown) chemical hazard in the place of the old one. We face the prospect of *shifting* the risk from one population to another or from one environmental medium to another. That can be paralyzing for decision-making at all levels, from the industrial hygienist to state legislatures and agencies. This is a key barrier to using *substitution* as a prevention strategy in the industrial hygienist's hierarchy of controls.

TSCA reform is gathering momentum, and AIHA has a role to play

Can AIHA tackle the problems of economic inequality, declining governance, and TSCA reform head on and be effective? Of course not.

But helping to re-craft TSCA is an unprecedented opportunity for AIHA that is not going to come around again for many decades. It is similar in scale to what we are seeing in the energy sector, where leading thinkers are shaping markets and policies in ways that are going to drive investment in energy efficiency and cleaner energy technologies, as Robert Kennedy described at AIHce last year.

Let me suggest that there are two reasons why it makes sense for AIHA to step forward and lend its voice to the TSCA reform effort.

First, TSCA reform is highly relevant to the science and practice of industrial hygiene. One of the key features of the TSCA reform bills in Congress this year is a requirement that chemical producers generate and disclose information on the hazardous properties of chemicals. This will begin to address the chemical data gap that I've described.

It's possible that TSCA reform will require chemical producers to transmit standardized, reasonably robust chemical hazard information to end users. Like the MSDS today, much of this information will come to you for interpretation for the purpose of identifying chemicals of concern and safer alternatives. This will be increasingly important for businesses seeking to reduce risks associated with toxic substances in products.

Industrial hygienists are uniquely qualified to make these kinds of decisions and to advise companies and agencies accordingly. As information becomes increasingly available on toxicity, liabilities for companies that purchase chemicals and

chemical products are going to increase. The cost of dealing with everything from product liability, to workers' compensation, to hazardous waste, to brand damage are likely to grow as information enters the market and becomes accessible to the public and to public interest groups. The effort last year, by investors with \$35 billion in assets under management, to push Congress to implement sweeping revisions to TSCA was telling in this regard.

Second, TSCA reform is very likely going to occur. It's not clear what shape it will take in the end, but when we look at similarly large social reform efforts in the United States, the successful ones have resulted from pressures that are similar to those building in the TSCA reform movement. These include at least three:

1. *Leading businesses got behind the idea.* This was certainly true of the National Labor Relations Act of 1934, which finally gave workers the right to organize, and to this day is considered one of the most revolutionary pieces of legislation in U.S. history. Today, a growing number of companies are engaged in positive ways with the effort to reform TSCA, as I mentioned earlier, mainly because these companies will benefit enormously from better chemical information in their supply chains and from a steady reduction in the number of hazardous chemicals on the market, as well as by the expected increase in the market viability of greener chemistries.
2. *Someone else had already done it.* This happened with many of the social reforms introduced by President Franklin Roosevelt during the New Deal from 1933–1939, which his Secretary of Labor, Frances Perkins, learned about by traveling to Europe, and that we now largely take for granted. Today, the 27 nations of the European Union have written, passed, and are implementing the REACH regulation (Registration, Evaluation, Authorization, and Restriction of Chemicals), which is the world's first comprehensive approach to chemicals policy; it's the EU's response to the *identical* set of chemical management problems that we have experienced under TSCA.

REACH is requiring hazard and exposure information on chemicals sold in the EU on the basis of volume, with increasing amounts of information for higher-volume chemicals. Because many U.S. chemical companies are now complying with REACH, their resistance to TSCA reform is likely to temper over time. How that will play out in Washington is unknown, but the EU has broken the ice on chemicals policy change for the first time in 35 years, and pressure is growing as other nations turn to the EU and to REACH as potential models for their own national efforts to reform chemicals policies.

3. *Broad public support emerged, and individual states took matters into their own hands.* The Triangle Shirtwaist Fire of 1911, for example, occurred 100 years ago this year, killing 164 workers, nearly all Jewish and Italian immigrant women. The changes that people fought

for and won in the wake of that disaster are still evident today: unlocked exit doors, exit signage, occupancy requirements, fire sprinklers, and, incidentally, the 100-ft aerial ladders on the Portland Fire Department's ladder trucks, which can reach a 10th floor window. Those changes were won against vigorous business opposition after labor leaders, legislators, and citizens (who had previously never worked together) realized they had common cause in protecting people against egregious abuses by factory owners.

We are starting to see a semblance of this diversity of interests coming together in the movement to reform chemicals policies. An analysis conducted by the Safer Chemicals, Healthy Families coalition last year showed that chemicals policies introduced and passed in some 18 states in 2009 showed strikingly similar degrees of support from both Democrats and Republicans.⁽¹³⁾

When states create a patchwork of regulatory standards, of course, compliance becomes complicated for industry. This often results in calls for federal action. Independent action within the states is an indicator of public support for these changes, and historically, it's an important driver of federal change in the United States.

AIHA: Joining with others to protect worker health

I have suggested to you that the industrial hygiene community could help ameliorate a root cause of occupational disease by participating in the effort to reform TSCA, and that in doing so, the AIHA could help give rise to economic conditions that would tip industrial design decisions toward favoring green chemistry. In thinking about how to do this, I have suggested that AIHA would do best by collaborating with other organizations.

Collaboration is tough, as the story of the three engineers illustrated. On a much smaller scale, I have experienced the challenges of collaboration in helping to build the Berkeley Center for Green Chemistry, which includes the Schools of Chemistry, Public Health, Business, and Natural Resources on the Berkeley campus. It took many months, for example, for some of the faculty within these disparate schools to recognize that there were in fact other academic disciplines on the campus, and that those disciplines were actually engaged in legitimate fields of inquiry. We've made terrific progress since then, with growing engagement by students and faculty.

At the same time, it has become abundantly clear that we are going to need to come up with some creative strategies if our industrial hygiene program is going to survive. This year, there are only three industrial hygiene graduate students among the 10,296 graduate students enrolled at UC Berkeley. Are there collaborations across disciplines that might make industrial hygiene more relevant and interesting to students? I think so, but we are only just beginning to think about what those might be.

Collaboration is essential for survival, without question; more importantly, it elevates the content and standing of one's

message. There are good people and organizations involved in TSCA reform who have ties to millions of Americans, which is important for advancing occupational health in and of itself. In May 2011, for example, the Council on Environmental Health of the American Academy of Pediatrics published a sweeping consensus statement on TSCA reform, writing that TSCA “is widely recognized to have been ineffective in protecting children, pregnant women, and the general population from hazardous chemicals in the marketplace.”⁽¹⁴⁾

Time magazine covered that story, asking “How safe are the thousands of chemicals children encounter each day?” and pointing out, probably to the surprise of many readers, that there is a need—but no requirement—for chemical producers to test their products for health and safety before placing them on the market.⁽¹⁵⁾

In the same month, the National Council of Churches, representing 34 Christian, Jewish, and interfaith religious groups and millions of Americans, issued a statement on chemicals policy reform, writing that “The world’s religions affirm our duty to protect the most vulnerable. We need a chemicals policy that offers this kind of protection.”⁽¹⁶⁾

A month earlier, leaders of government agencies in California, Illinois, Oregon, Maryland, Minnesota, Vermont, and Washington issued a statement in support of Senator Frank Lautenberg’s TSCA reform bill, pointing to the cost incurred among U.S. states from the lack of transparency and accountability in the chemicals market. California EPA Secretary Linda Adams said, “In the absence of a unifying approach, interest groups and policy makers have been attempting to take these issues on one-by-one. We need a coordinated, comprehensive national strategy.”⁽¹⁷⁾

AIHA shares much common ground with these and other groups that are working to reform TSCA and resolve an underlying driver of occupational disease.

The 21st century will be largely oriented toward redirecting the trajectory we have followed over the past 60 years or so. We will be increasingly focused on sustainability as well as on regeneration to correct damage that has already occurred. TSCA reform plays a critical role in this effort, and I believe it has the potential to create new forms of economic growth in the United States that just might begin to solve, rather than exacerbate, our mounting health and environmental problems. This is the promise of green chemistry.

AIHA has an opportunity to play a role in bringing forth TSCA reforms that could re-orient the economy in ways that will allow green chemistry, as a science of innovation, to grow and thrive across society. I believe that in doing so, both the AIHA and the profession of industrial hygiene will experience

new energy and growth. This community will also be adding its voice to that of others who are working to bend the arc of history toward worker and environmental health, a legacy that is consistent with this organization’s mission.

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