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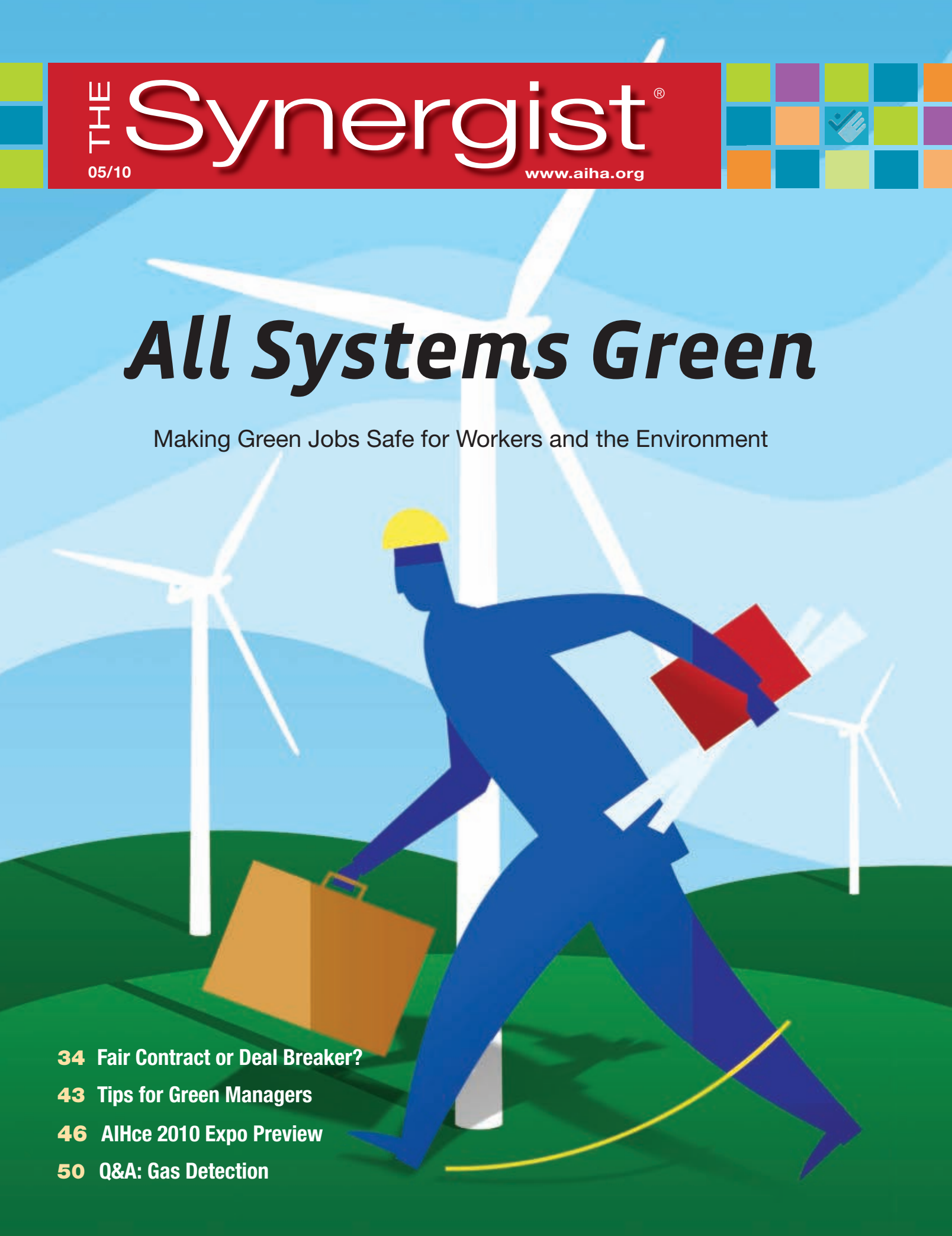

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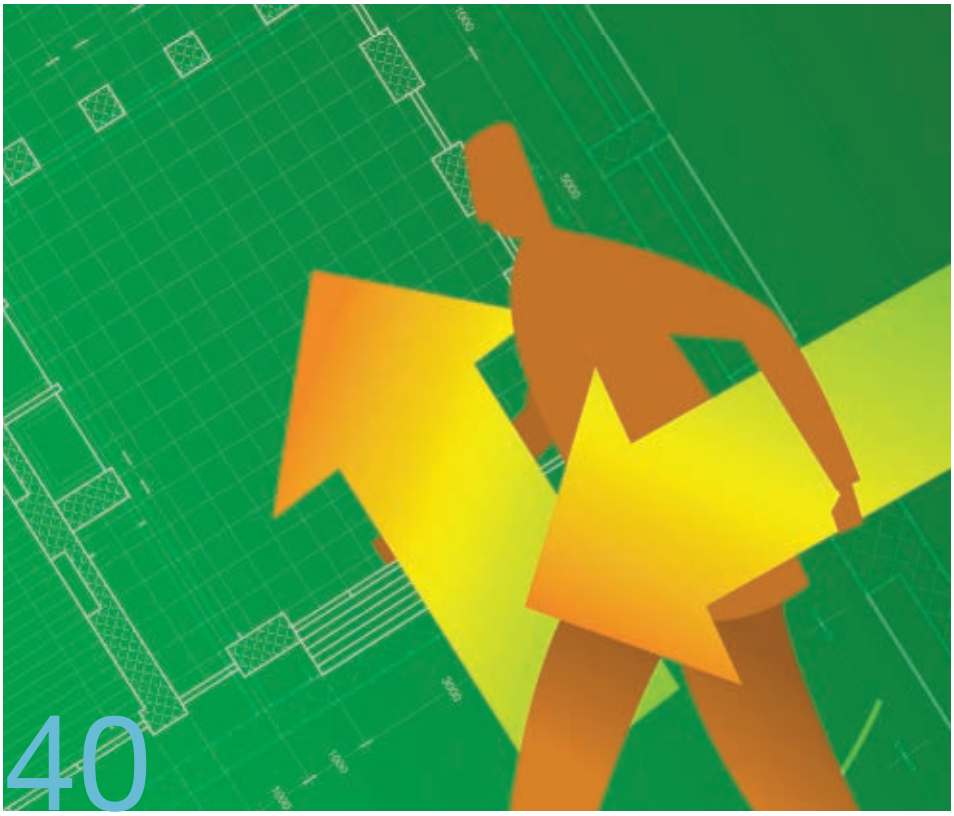

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Columns & Departments

THE Synergist®

Volume 21 ■ Number 5

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The Synergist (USPS #009-332) is published monthly except a combined June/July issue by the American Industrial Hygiene Association, 2700 Prosperity Ave., Suite 250, Fairfax, VA 22031 for $50 per year for members; nonmembers may subscribe for $275/yr. International nonmembers may subscribe for $375/yr (U.S. funds). Periodicals postage paid at Fairfax, Virginia, and additional mailing offices. POSTMASTER: Send address changes to *The Synergist*, American Industrial Hygiene Association, Attn: Customer Service, 2700 Prosperity Ave., Suite 250, Fairfax, VA 22031. ISSN 10667660.

Publications Mail Agreement No. 40039445. Return undeliverable Canadian addresses to PO Box 503, RPO West Beaver Creek, Richmond Hill ON L4B 4R6.

COMING IN JUNE/JULY ■ Nanotechnology: Occupational Risk and Control Strategies ■ Emergency Preparedness and Response ■ AIHce Wrap-up

The Synergist's mission is to provide AIHA members with news and information about the occupational and environmental health and safety fields and the industrial hygiene profession. *The Synergist* focuses on industry trends and news, government and regulatory activities, key issues facing the profession, appropriate technical information and news on association events and activities.

The Synergist's objective is to present information that is newsworthy and of general interest in industrial hygiene. Opinions, claims, conclusions and positions expressed in this publication are the authors' or persons' quoted and do not necessarily reflect the opinions of the editors, AIHA or *The Synergist*.

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GAS DETECTION

President's Message

Partners at the Summit

BY CATHY COLE, AIHA® PRESIDENT

For the past year, I've written often in this space about national AIHA's volunteer groups, and with good reason. Our volunteers' commitment to the profession of industrial hygiene forms the foundation of all that our association has accomplished.

This month, in my last column as AIHA president, I'm pleased to discuss another cornerstone of AIHA's success—our local sections. For many members, local sections are the face of AIHA. Often, a new member's first impression of AIHA is formed at a local section meeting. Our high membership retention rate is just one indication that local sections do a splendid job of welcoming new members and making them feel like valued participants in a professional community.

Multitude of Ideas

In March, representatives of AIHA local sections, the Local Sections Council, and the Board of Directors attended a Local Sections Summit at AIHA's national office to discuss ways to forge a more effective partnership between local sections and AIHA national. As many of you know, AIHA local sections are autonomous entities with their own dues, officers and professional programming. Although membership in both a local section and AIHA national is encouraged, it is not required.

Running a local section requires a significant volunteer commitment. The Summit in March—as well as a follow-up virtual town hall meeting in April that occurred too late for inclusion in this article—was intended to better align and broaden the synergy between local sections and AIHA national. Participants unearthed a multitude of ideas and shaped them into the following broad recommendations:

1. Develop a culture of expectation that AIHA members will naturally be involved in local sections. Promote affiliation with AIHA national and the value of AIHA membership at local section meetings. Expand the concept of membership to a broader audience and promote the culture of belonging. Develop ways to connect industrial hygiene to hot topics (for example, green building and sustainability).
2. Develop an online community, activities and training for local section officers. Develop and share local section best practices. Redesign the AIHA Speakers Bureau.
3. Develop and publish new measures of local section success. (Possible metrics include member involvement and member services.)

Participants also discussed the overlapping roles of the Local Sections Council and the AIHA Board Coordinators. The council's mission is to serve as a liaison between local sections, the AIHA Board of Directors, and AIHA staff. The Board Coordinators are Directors charged with supporting several local sections. As a result of those discussions, I appointed a task force to examine the current governance structure and recommend ways to better use volunteer and financial resources. The task force members are Dianne Grote Adams, CIH, CSP, CPEA; David Roskelley, MSPH, CIH, CSP; Theodore Knutson, PE; Jeff Throckmorton, CIH; and Chris Lorenzo, CIH. Elizabeth Pullen, CIH, is chair of the task force.

Ideal Community

I've had the privilege of knowing firsthand the value of local communities and the challenges of leading them. My time on the AIHA Board of Directors, and especially my year as AIHA president, has familiarized me with the similar challenges and rewards of leading a larger group. In both roles, leadership has made me feel more involved in the community; I had more at stake, I took more pride in the community's successes and consequently felt deeply rewarded and immensely supported. For these reasons, I urge members to become more involved in AIHA, whether at the local section level or the national level.

For all the buzz surrounding the word *community*—thanks to the soaring popularity of online social networking—the most effective communities are still those that provide physical forums for interaction among real people. That kind of community—where people put faces to names, shake each other's hands, engage in conversation, and share ideas for solving common problems—is priceless and will never go out of style. That's the kind of community our local sections provide.

Since I can't shake all of your hands, this will have to do: thank you, truly, for giving me the opportunity to be your president. It's been a privilege and an honor to serve this great profession.

Cathy Cole, CIH, CSP, is president of AIHA and director of corporate occupational health at The Sherwin-Williams Company in Cleveland, Ohio. She can be reached at (216) 566-3096 or cathy.l.cole@sherwin.com.

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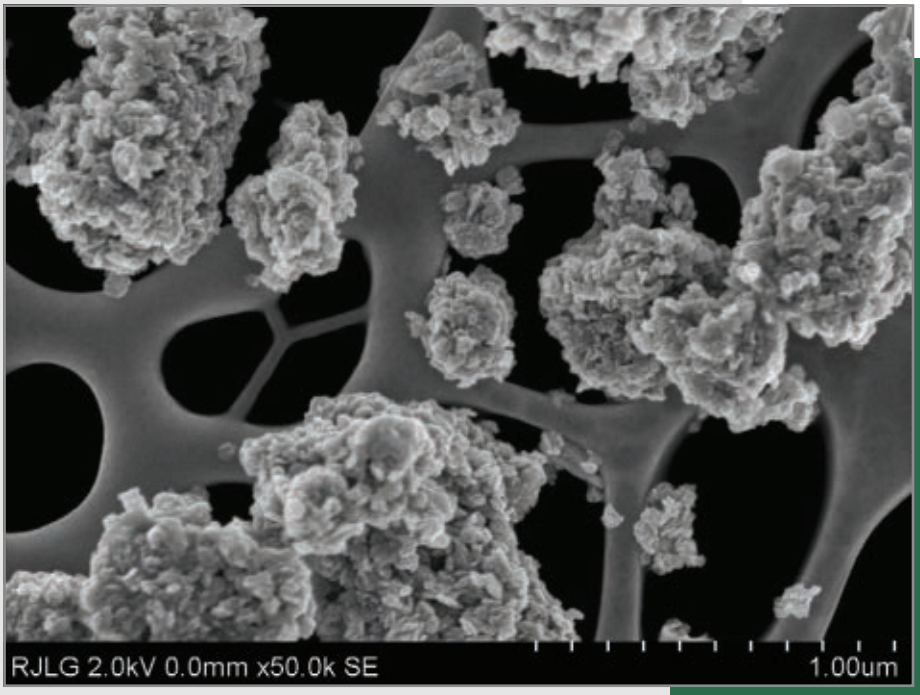

▲ 5 NANOMETER TiO_2 PARTICLES HELD ON A LACEY CARBON SUPPORT GRID
Secondary electron image acquired at 50 kX and 2.0 kV

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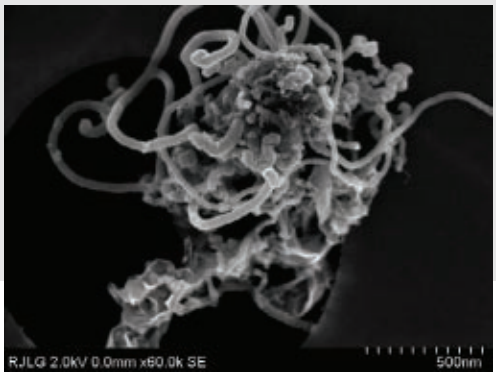
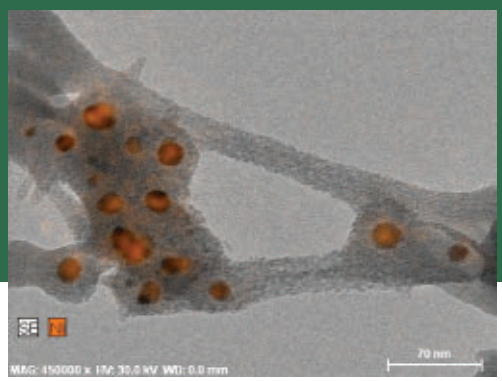


▲ AGGREGATE OF CARBON NANOTUBES HELD ON A HOLEY CARBON SUPPORT GRID
Secondary electron image acquired at 60 kX and 2.0 kV

▲ END OF A CARBON NANOTUBE
Bright-field scanning transmission electron microscopy (STEM) image acquired at 180 kX and 30 kV



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Washington Insider

With Health Care Finished, What's Next?

BY AARON TRIPPLER, DIRECTOR, AIHA® GOVERNMENT AFFAIRS

Now that Congress has completed work on health care, can we expect some activity on occupational health and safety?

After returning from spring break in early April, Congress began looking at several other priority issues for the Obama administration. First on the list was financial regulatory reform, followed by cap and trade, the economy, jobs and the 2011 budget. That doesn't leave a lot of time for other issues.

Further, it is said that leaders in the House of Representatives want to provide their members with some protection for the November elections and will not ask them to vote on any controversial issues for the remainder of this session of Congress. And since fewer than 80 days remain in this session, little time is left to move an issue through the House and Senate.

For now, then, we have to wait and see what happens next. In the meantime, here's a look at where we are with some pertinent legislative issues.

Protecting America's Workers Act

The bill has been introduced in both the House and Senate, but the only activity is taking place in the House. A few months ago, the House held a hearing to discuss a section of the bill that would raise civil and criminal penalties for employers who are found in violation of OSHA rules and regulations. This hearing was held to discuss proposed changes to the introduced version. Some changes sparked considerable debate, but the bigger question is whether Congress will reintroduce a new version of the bill or simply propose amendments to the existing bill. Either way, the chances of this legislation being enacted grow slimmer by the day—too many things in this bill will draw opposition.

State Plans

Congress has introduced legislation to provide OSHA with more oversight of OSHA state plans, some of which do not seem to operate efficiently. This bill was introduced as a direct result of the construction deaths that occurred in Las Vegas, Nevada—twelve workers died in an 18-month period over 2007 and 2008. Government review has shown that Nevada's OSHA state plan did not provide adequate protection to workers.

It is said that leaders in the House of Representatives want to provide their members with some protection for the November elections and will not ask them to vote on any controversial issues for the remainder of this session of Congress.

However, the existing law is vague on federal OSHA's options for addressing a state plan. The new legislation would allow federal OSHA to take over a state plan or require it to address its deficiencies within a certain timeframe. Additional review of state plans would also be required.

The outlook for this bill is unclear. States that want no additional federal scrutiny will probably oppose it. As of mid-April hearings had not been set, but many believe they will be held in the near future. As far as I know, OSHA has not indicated its position on the bill, but it's probable that the agency was involved in drafting the language.

Safe Patient Handling

Legislation requiring OSHA to adopt a safe patient handling standard is pending. Many states have already enacted this type of legislation and several others are considering similar bills. Federal OSHA has not indicated whether it would support the bill, but the agency agrees that the issue is important. By the time you read this, a hearing on this legislation may have begun.

One deficiency in the legislation is that it requires OSHA to promulgate a standard in 18 months. The agency will most likely examine this issue on its own.

Health-care advocates will continue to push for this standard, while industry will likely oppose it. Industry opposition will focus on the cost of the standard, but more importantly, industry will see this bill as a first step toward another attempt to enact a full ergonomics standard.

Aaron Trippler directs government affairs for more than 70 local sections and serves as AIHA's chief liaison with Congress and federal agencies. He can be reached at (703) 846-0730 or atrippler@aiha.org.

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AIHA® 2010 Election Results In

In April, AIHA announced the election results for its 2010–2011 Board of Directors. The new board members will be inducted into office at AIHA's annual business meeting on Thursday, May 27, at AIHce in Denver, Colo. This meeting will also mark the beginning of the terms of Michael T. Brandt, DrPH, CIH, PMP, as president; Elizabeth L. Pullen, CIH, as president-elect; Allan K. Fleeger, CIH, CSP, as vice president; Cathy L. Cole, CIH, CSP, as past president; Daniel H. Anna, PhD, CIH, CSP, as secretary-elect; and Harry J. Beaulieu, PhD, CIH, CSP, as treasurer. Cynthia A. Ostrowski, CIH, will continue her term as secretary.

The following candidates were elected:

Allan K. Fleeger

Allan K. Fleeger, CIH, CSP, was elected AIHA's new vice president. Fleeger served as a member of the AIHA Board of Directors from 2004 to 2007 and as treasurer since. He has been a member of AIHA since 1991 and serves as industrial hygiene manager for the Americas Division of ExxonMobil Corporation in Fairfax, Va.

Daniel H. Anna

Daniel H. Anna, PhD, CIH, CSP, was elected secretary-elect. Anna has served as a member of the AIHA Board of Directors since 2007. He has been a member of AIHA since 1993 and is a professor in the Department of Industry and Technology at Millersville University in Millersville, Pa.

William H. Bullock

William (Billy) H. Bullock, DHSc, CIH, CSP, was elected to the AIHA Board of Directors. He has been a member of AIHA since 1988 and serves as the IH director for CSX Transportation in Jacksonville, Fl.

Cheryl L. Marcham

Cheryl (Cheri) L. Marcham, PhD, CIH, CSP, CHMM, was elected to the AIHA Board of Directors. She has been a member of AIHA since 1987 and is the environment, health and safety officer at University of Oklahoma in Oklahoma City, Okla.

AIHA Board for 2010–2011

AIHA's Board of Directors for 2010–2011 includes the following officers:

President: Michael T. Brandt, DrPH, CIH, PMP
President-Elect: Elizabeth L. Pullen, CIH
Vice President: Allan K. Fleeger, CIH, CSP
Past President: Cathy L. Cole, CIH, CSP
Secretary: Cynthia A. Ostrowski, CIH
Secretary-Elect: Daniel H. Anna, PhD, CIH, CSP
Treasurer: Harry J. Beaulieu, PhD, CIH, CSP
Executive Director: Peter J. O'Neil, CAE

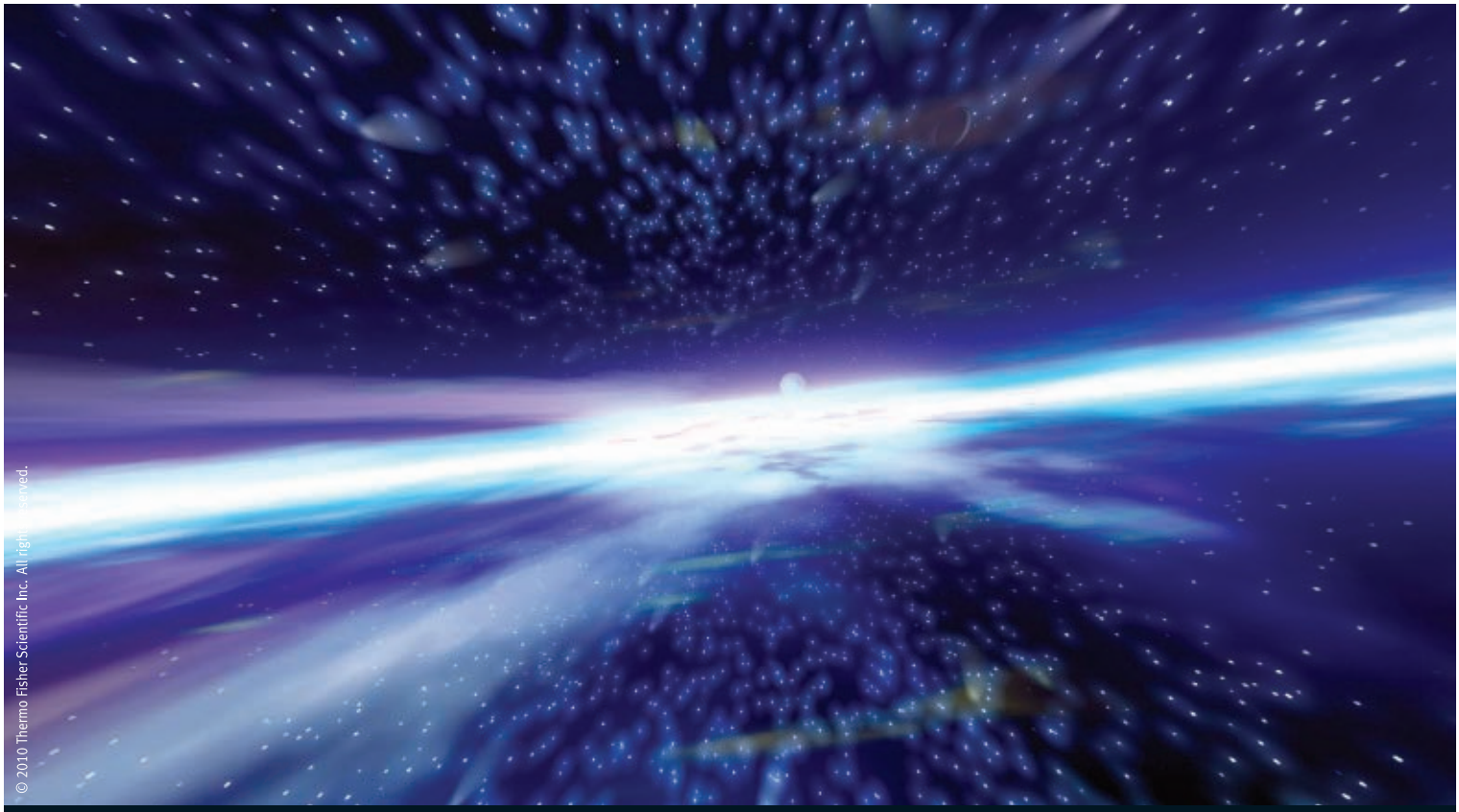
The following members will serve as AIHA directors for 2010–2011:

William (Billy) H. Bullock, DHSc, CIH, CSP
Cindy A. Coe, CIH
Barbara J. Dawson, CIH, CSP
Steven E. Lacey, PhD, CIH, CSP
Alan J. Leibowitz, CIH, CSP
Cheryl (Cheri) L. Marcham, PhD, CIH, CSP, CHMM
Charles F. Redinger, PhD, CIH, MPA
David C. Roskelley, MSPH, CIH, CSP

Bylaws Change Approved

AIHA members approved a bylaws change that reduces the number of directors on the Board from nine to six over the next three years, which resulted in the election of only two directors this year. This brings the number of directors to eight. In 2011 and 2012, three Board members will rotate off each year and the membership will elect two new directors, bringing the number of directors to seven and then six, respectively. Beginning in 2013, two directors will rotate off each year at the end of their three-year term, and two new directors will be elected—making a total of six directors on the Board in subsequent years.

For further information regarding the 2010 AIHA elections, please contact Judy Keithline at (703) 846-0702 or keithline@aiha.org.



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Member-Get-a-Member Campaign Announces 2009 Winner

Congratulations to Chandran Achutan, PhD, the grand prize winner of the AIHA® Member-Get-a-Member (MGAM) 2009 campaign! Achutan will receive complimentary registration to AIHce 2010 in Denver, Colo., as well as airfare and hotel accommodations for four nights.

Open to all members in good standing, the MGAM campaign is a way for members to promote the industry, expand the OEHS professional community, and enhance a colleague's career. Members benefit by winning valuable prizes, including an opportunity to win free registration to AIHce or PCIH, plus airfare and hotel expenses.

For more information, including rules, recruiting tips, and a list of past prizes, visit www.aiha.org/aboutaiha/AIHAMembership/Pages/MemberGet-a-MemberPrizesandWinners.aspx.

Annual Meeting Reminder

The AIHA® annual business meeting will begin at 8:30 a.m. on Thursday, May 27, at the Colorado Convention Center in Denver, Colo.

AIHce 2010 Education Information

AIHce 2010 provides attendees with a variety of ways to participate in educational opportunities. If you can't make it to Denver, you can take part in the Virtual Tech Sessions offered on Wednesday, May 26. These sessions offer the same practical information and certification maintenance points, but without the travel expense. Gain new perspectives and up-to-date research information via phone, guided presentations and abstracts online, and opportunities to interact through question-and-answer sessions. For more information, visit www.aiha.org/AIHceVirtualTechSessions.

Make the most of your time at the conference through the online AIHce 2010 Technical Abstracts. Abstracts of podium sessions allow you to review, study and print the abstracts you plan to attend. Printed abstract books will not be available on site. For abstract details, visit www.AIHce2010.org/green.

On Wednesday, June 9, the Continuing Education Committee, along with the AIHA® Education Department, will host a discussion and provide instruction on the process of submitting PDCs for AIHce 2011 in Portland, Ore. The AIHce 2011 submission portal will be open May 1 through Aug. 15, 2010.

For more conference and education information, visit www.aiha.org/education/Pages/default.aspx.

New AIHA® Ethics TeleWeb Meets ABIH Ethics Requirements

AIHA will host a new ethics TeleWeb on Aug. 4, 2010. This TeleWeb meets ABIH ethics requirements and will provide participants with eligibility requirements to sit for the CIH exam or points necessary to maintain a CIH. Train yourself, your

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In Memoriam: Paul E. Toth, 1920–2010

BY SARUNAS MINGELA AND FRED W. BOELTER

AIHA® Past President Paul E. Toth, CIH, CSP, died on Feb. 27, 2010. He was 89.

Born in Welland, Ontario, Canada, to Hungarian immigrants, Paul was the youngest of eight children. In 1922, Paul's family moved to Detroit, Mich., where he later became a naturalized U.S. citizen. He graduated from Cass Technical High School's Chemistry-Biology Curriculum in 1939. He began work as an assistant chemist at the Ethyl Corporation, then moved on to Ford Motor Company, where he worked as an analytical chemist. Later, he accepted a position with Briggs Manufacturing Company as a quality control chemist.

Paul enlisted in the U.S. Navy during World War II and served as an Aviation Electronics Technician's Mate from 1944 to 1946. He was honorably discharged, and he returned to Briggs Manufacturing to work in its health and safety operations. He resumed his studies and took college classes in the evenings, graduating from Lawrence Institute of Technology in 1949 with a Bachelor of Science degree in chemical engineering.

Upon graduating, Paul was named director of Briggs Manufacturing's newly formed industrial hygiene department. After Chrysler Corporation assumed control of Briggs Manufacturing in 1954, he became assistant director of the IH department. He later held positions as an industrial hygienist with the Michigan Department of Public Health, manager of the Ford Motor Company Industrial Hygiene and Toxicology Department, and founder of Paul E. Toth and Associates.

Paul served as AIHA treasurer from 1967 to 1970. During his presidency in 1978–1979, the American Industrial Hygiene Foundation was established, and AIHA purchased its first property and building.

A long-time member of the Michigan Industrial Hygiene Society (MIHS), Paul was secretary-treasurer of MIHS in 1955 and president in 1957. He was awarded MIHS Life Membership in 1988. He also served as chair of the American Board of Industrial Hygiene (ABIH) in 1975. He was active in Kiwanis, Elks, American Legion, Boy Scouts

of America and The Hungarian-American Cultural Center, where he was treasurer.

Paul was preceded in death by his wife of 50 years, Margaret. He is survived by their three children, Alan, Lawrence and Kathleen; five grandchildren, David, John, Michael, Lindsey and Kevin; and two great-grandsons, Benjamin and Noah.

Memorial contributions can be made to the Pulmonary Fibrosis Foundation, 1332 North Halsted Street, Suite 201, Chicago, IL, 60642. Your personal wishes may be expressed to the family at toth@blclinks.net.

Sarunas Mingela, PhD, is associate professor of occupational and environmental health sciences at Wayne State University in Detroit, Mich.

Fred W. Boelter, CIH, PE, BCEE, is a principal with Environ in Chicago, Il. He can be reached at fboelter@environcorp.com or (312) 822-3820.

Winners Announced in Local Section Membership Recruitment Campaign

Congratulations to the winning local sections in the AIHA® Local Section Membership Recruitment Campaign! For persuading local section members to become members of AIHA national, the Gulf Coast, Indiana, New England, Northern California, Pacific Northwest, Rocky Mountain, and Utah local sections all receive a free or archived AIHA TeleWeb for 2010.

To be counted in the competition, a completed AIHA membership application and dues payment had to be received by Dec. 15, 2009. Recruited individuals had to enter both the name of the local section and the person who recruited them on the application.

For information about how to get involved in an AIHA local section, visit www.aiha.org/insideaiha/localsections/Pages/default.aspx.

Show Your Support for AIHF

Lace up your tennis shoes and support the work of the American Industrial Hygiene Foundation (AIHF) by participating in the 26th Annual AIHF Fun Run/Walk at AIHce 2010. Run 5K or walk 2K along the picturesque Cherry Creek and Platte River bike paths, which stretch from the Colorado Convention Center to Elitch Gardens Amusement Park. By participating in the Fun Run/Walk, you contribute to scholarships for students studying industrial hygiene and related disciplines. In addition, your participation will help further the Foundation's mission to ensure enough highly trained and skilled industrial hygienists to continue to develop the science of industrial hygiene and protect workers.

On-site registration is $40 and must be completed by Monday, May 24. All registrants must stop by the registration booth at the Colorado Convention Center to sign a waiver form and receive a shirt and race number.

You can also show your support of AIHF by purchasing the AIHce 2010 conference pin for a $10 donation. Order it on the AIHce registration form or stop by the AIHA® booth or Volunteer Collaboration Café. Show your support throughout conference week!

For further details on the AIHF FunRun/Walk, visit www.aihce2010.org/aihce10/events-activities/fun-run.htm. For more information on AIHF, including ways to contribute, visit www.aiha.org/foundations/Pages/default.aspx.

ORC-NIOSH Host Conference in Cairo

NIOSH and ORC Worldwide, an international EHS consulting firm, will sponsor a conference in Cairo, Egypt, Dec. 7–10, 2010, that will focus on workplace injury and illness prevention and safety promotion. The conference will draw on the knowledge, skills and expertise of occupational health and safety researchers, policymakers and industry professionals primarily from countries in the Eastern Mediterranean region.

Proposed topics for discussion include nanotechnology and nanomaterials, Prevention through Design concepts and practices, sustainability, corporate social responsibility, IH, and health promotion and wellness.

For further conference details, contact Mary Ann Latko, AIHA® Director of Scientific and Technical Initiatives, at mlatko@aiha.org.

New York Times Labor and Workplace Reporter to Give Upton Sinclair Lecture

New York Times reporter Steven Greenhouse will present this year's Upton Sinclair lecture at AIHce 2010 in Denver, Colo. Since 1995, the New York City-based journalist has examined workplace issues and is one of the few reporters who still cover this topic. Greenhouse has investigated labor unions, immigrant workers, child labor, and the treatment of employees by major corporations.

The Upton Sinclair Memorial Lecture for an Outstanding Occupational Safety and Health News Story of the Year was established in 2000 by the AIHA® Social Concerns Committee. Named for the political activist Upton Sinclair, who is best known for authoring *The Jungle*, the Upton Sinclair Memorial Lecture highlights the investigative efforts of reporters who explore occupational health and safety matters—a topic that is rarely probed by the press. The lecture is presented by the winning journalist annually at AIHce.

After joining the *New York Times* in 1983, Greenhouse began covering the steel industry and other industries as a business reporter. During this time, he wrote about the plant closings and extensive layoffs occurring in the Midwest. Greenhouse was the newspaper's European economics correspondent from 1987 until 1992. He later covered the Federal Reserve and economic policy and the State Department and foreign policy as a correspondent in the *Times* Washington Bureau until he was asked to cover labor and workplace issues.

Greenhouse has been featured on PBS, National Public Radio, CNN, BBC and MSNBC. He is the author of *The Big Squeeze: Tough Times for the American Worker* (Knopf, 2008).

For more information on Steven Greenhouse and his book, visit www.stevengreenhouse.com. To learn more about the Upton Sinclair Memorial Lecture, visit www.aiha.org/insideaiha/volunteergroups/Pages/UptonSinclair.aspx.

AIHce Speaker Spotlight: David Michaels and John M. Howard

At the AIHce general session on Wednesday, May 26, David Michaels, PhD, MPH,

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and John M. Howard, MD, MPH, JD, will present a discussion about current and future trends in occupational and environmental health and safety.

Michaels, the assistant secretary of labor for OSHA, is an epidemiologist, author and former professor of Environmental and Occupational Health at the George Washington University School of Public Health and Health Services, where he directed the department's Project on Scientific Knowledge and Public Policy. During his tenure as assistant secretary of energy for environment, safety and health (1998 to 2001), Michaels guided efforts to establish the Energy Employees Occupational Illness Compensation Program, which compensated nuclear weapons workers who became ill due to exposure to radiation, beryllium and other hazards in the workplace.

Howard has served as director of NIOSH in the U.S. Department of Health and Human Services since July 2002. Prior to this appointment, he served as chief of the Division of Occupational Safety and Health in the California Department of Industrial Relations from 1991 to 2002. The author of many articles on occupational health law and policy, Howard is board certified in internal medicine and occupational medicine. He is also a member of the U.S. Supreme Court bar and is admitted to the practice of medicine and law in the District of Columbia and the State of California.

Questions for Michaels and Howard to address at the general session can be submitted to AskDrMichaelsDrHoward@aiha.org. Discussion will continue afterward in an open "Ask the Expert" forum.

For more information about AIHce 2010 keynote speakers, visit www.aihce2010.org/aihce10/education/opening-general.htm.

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BYU-Idaho Student Local Section Stages Mock Dorm Room Fire

In an effort to recruit more members to their local section, attract students to the occupational health and safety major, and teach fire safety, the AIHA® local section at Brigham Young University-Idaho took some drastic measures—they set the place on fire.

Last fall, the AIHA BYU-Idaho Student Local Section conducted a mock dorm room fire on their campus to demonstrate how easily a fire can spread in the typical college dorm room. A few hundred students gathered to watch the blaze, which quickly grew soon after it was set.

Michael Watkins, former AIHA BYU-Idaho President, asked the BYU-Idaho Construction Management Society to build a small structure duplicating a three-walled, 8' x 8' dorm room. The structure was furnished with an old couch, desk, computer, old clothes, posters and pizza boxes to give it a realistic dorm-room feel.

With the impending winter, Watkins felt this exercise was a useful way to show students and others how common items used during this time of the year (e.g., space heaters, holiday decoration lighting, and candles) can contribute to residential fires.

In addition to the significant turnout, the event was also covered by a variety of media outlets, including a few local newspapers.

For more information on the BYU-Idaho Local Section, visit http://aihabyui.blogspot.com. To find out more about AIHA student local sections, including how you can get involved, visit www.aiha.org/insideaiha/Studentsection/Pages/default.aspx.

AIHA® Participates in GHS Public Hearing

On March 5, AIHA participated in a public hearing hosted by OSHA to discuss modifications to the Hazard Communication Standard (HCS) to conform to the United Nations' Globally Harmonized System of Classification and Labeling of Chemicals (GHS). In response to OSHA's proposal, AIHA released a document containing comments and recommendations to the proposed modifications. This document was presented at the hearing by AIHA President Cathy Cole, CIH, CSP.

"AIHA shares the concerns that inaccurate, incomplete and outdated Material Safety Data Sheets (MSDSs) can increase risks of illnesses and injuries and environmental consequences arising from the handling, storage, transportation and use of hazardous chemicals," the document states. "Industrial hygiene, safety, emergency response and environmental health professionals rely on MSDSs as a source of information to help employers and employees properly manage hazardous chemicals."

AIHA is concerned by the OSHA proposal's elimination of a requirement for MSDSs to include the ACGIH® Threshold Limit Values (TLV®s). AIHA supports adding a non-mandatory appendix to

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the HCS to incorporate the TLVs and other occupational exposure limits, such as AIHA's Workplace Environmental Exposure Levels (WEELs).

AIHA also requests that OSHA work with stakeholders to address the issue of updating PELs. In its conclusion, the AIHA document highlights the parts of OSHA's proposal that AIHA supports, including the proposed implementation schedule.

To read AIHA's comments, visit www.aiha.org/news-pubs/govtaffairs/Pages/PublicPolicyComments.aspx.

AIHA® Releases Position Statement on Restoring MSD Column to OSHA 300 Log

In early March, AIHA released a position statement supporting restoration of the musculoskeletal disorder (MSD) column on the OSHA 300 log and including it on future OSHA 300 logs. The OSHA 300 log is a summary of injuries and illnesses sustained in a workplace throughout a year. Documentation of these injuries and sicknesses helps keep employees and OSHA informed of various workplace hazards.

Although the OSHA 300 log has not incorporated a column for recording musculoskeletal injuries since 2001, many organizations still track MSDs because they are very costly, as well as physically and emotionally exhausting for employees who suffer them.

The AIHA position statement acknowledges that insurance companies frequently classify sprains and strains, overexertion and cumulative trauma in their Loss Control/Risk Management reports. However, relying solely on insurance company reports for tracking MSDs can create inaccuracies because this data lacks consistency. States differ on how workers' compensation bureaus define and compensate for MSDs, and there are great disparities in how insurance companies compile, analyze and supply this data to the companies they insure.

[Continued: 26]

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AIHA contends that reinstating the MSD column on the OSHA 300 log would make it easier to track this type of injury and relieve companies of the burden of creating an MSDs tracking system. Because the OSHA 300 log is intended to identify the rate of illness and injury, as well as the job or industry section in which it occurs, AIHA argues that the inclusion of the MSD column is essential for targeting areas where intervention is necessary to combat MSDs.

To read the AIHA position statement on restoring the MSD column to the OSHA 300 Log, visit www.aiha.org/news-pubs/govtaffairs/Pages/PublicPolicyComments.aspx.

AIHA® Announces 2010 Fellows

In March, AIHA released the names of 27 members who have been named 2010 Fellow Award winners.

"The Fellow Award has become a mark of excellence and achievement for AIHA members," said AIHA Past President Lindsay E. Booher, CIH, CSP. "It is both a privilege and pleasure to confer the Fellow Awards and to congratulate this year's recipients on behalf of President Cathy Cole and the Awards Committee."

Members chosen to be Fellows have been nominated by colleagues in the profession for their significant contributions to the practice of industrial hygiene or related disciplines. The Fellow classification is limited to no more than 5 percent of the AIHA membership.

The 2010 AIHA Fellows are listed below:

Thomas L. Blank, CIH, CSP
Denese A. Deeds, CIH
Stephen J. Derman, CIH
Donna M. Doganiero, CIH
Barbara L. Epstien, CIH, MPH
Neil A. Feldscher, CIH, CSP, Esq.
Matthew D. Finucane, CIH
Sheree L. Gibson, PE, CPE
Matthew Gillen, MS, CIH
Steve M. Hays, PE, CIH, FACEC, QEP
Donna S. Heidel, CIH
Ronald P. Hutton, CIH, CPEA
David Kahane, MPH, CIH
Wesley S. Lashbrook, MS, CIH, CSP
Robert G. Lieckfield, CIH
William S. Marras, PhD
Daniel C. Maser, CIH, CSP, ROH
Gary W. Olmstead, PhD, CIH, CSP, CPEA
George R. Osborne, CIH, CSP
Stephen J. Reynolds, PhD, CIH
James W. Skrabak, CIH
Erica J. Stewart, CIH
J. Michael Taylor, CIH
Frederic J. Tremmel, PhD, CIH
James L. Woodring, MPH, CIH, LIH, CHO, MBA
David M. Zalk, CIH, MPH
Neil J. Zimmerman, PhD, PE, CIH

Nominations for the AIHA Fellow Award are accepted annually from AIHA local sections, committees and special interest groups. At-large nominations

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also are accepted. The Awards Committee evaluates the nominations and makes recommendations to the AIHA Board of Directors for final approval. Candidates must be AIHA members in good standing with at least 15 years of continuous membership.

The nomination process for next year's Fellows begins in September. For more information, please contact Judy Keithline at (703) 846-0702 or keithline@aiha.org.

New Student Local Section Off to Impressive Start

In just over a year since the University of Cincinnati Student Local Section was established, the group has made great strides to connect with the IH community and promote the profession on the UC campus. The local section has created its own quarterly newsletter, *The Direct Read*; coordinated an annual networking dinner with local industrial hygienists; attended Ohio Valley Local Section meetings; and organized a trip to the Kentucky Bourbon Trail. The members also plan on attending AIHce 2010 in Denver, Colo.

"I am confident we will continue to keep the ball rolling now that a solid foundation has been laid for future years," says UC Student Local Section President Heather Hochstetler.

This year, the local section is planning joint activities with the UC student sections of the American Association for Aerosols Research (AAAR) and the NIOSH Education and Research Center (ERC), and with the industrial hygiene students of Wright-Patterson Air Force Base. Educational outreach, career-building events, fundraising and competing for Student Local Section of the Year are also on the horizon.

If you're interested in bringing a student local section to your college or university, visit www.aiha.org/insideaiha/Studentsection/Pages/default.aspx for details.

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Seeking New AIHA-LAP, LLC Volunteers

AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC is seeking qualified volunteers to fill positions on the Analytical Accreditation Board (AAB) and the Technical Advisory Panel (TAP). New members will begin their terms in January 2011. Applications for these positions are due by June 30, 2010.

The AAB oversees the governance and processes related to laboratory accreditation, including responsibility for approving applications submitted for accreditation and reaccreditation once site assessments are conducted. AAB members are also responsible for approving policy changes and participating on ad hoc task forces.

TAP members advise the AAB on technical laboratory matters and review 20 percent of all accreditation applications for the major programs: industrial hygiene; environmental lead; and environmental microbiology. TAP members conduct a thorough assessment of the accreditation process steps to ensure conformance with policies and technical requirements. See www.aihaaccreditedlabs.org/Pages/VolunteerLeadership.aspx for AAB and TAP applications. For additional information, please contact Margie Breida at mbreida@aiha.org.

AIHA® Member Nominated to Chair CSB

Rafael Moure-Eraso, CIH, PhD, was recently nominated to chair the Chemical Safety and Hazard Investigation Board (CSB) by President Obama. As chair, Moure-Eraso will be responsible for investigating industrial chemical accidents and advising the Obama administration on how to respond in order to avoid incident reoccurrences. Regulatory recommendations made by CSB are often implemented by occupational health and safety stakeholders, namely OSHA and the EPA.

For the last five years, Moure-Eraso has worked as a professor and graduate coordinator at the University of Massachusetts Lowell, Department of Work Environment in the School of Health and Environment. He was also a visiting lecturer teaching occupational health at the Harvard School of Public Health. He received considerable experience in the chemical and petrochemical industry while working as an industrial hygiene engineer at the Oil, Chemical and Atomic Workers Union (OCAW).

Moure-Eraso has served as a member of the National Advisory Committee on Occupational Safety and Health for OSHA,

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Journal of Occupational and Environmental Hygiene

May *JOEH* Addresses Lead Exposure, Insertion Loss of Noise Barriers

The May issue of the *Journal of Occupational and Environmental Hygiene* is now available and features the following articles:

Identifying Sources of Lead Exposure for Children, with Lead Concentrations and Isotope Ratios
By P. Glorennec, C. Peyr, J. Poupon, Y. Oulhote, and B. Le Bot

Inter-Worker Variability in Lower Body Postures During Assembly Line Work: Implications for Exposure Assessment
By W. Monroe Keyserling, Neal Wiggermann, Robert A. Werner, and Nancy Gell

Insertion Loss of Noise Barriers on an Aboveground, Full-Scale Model Longwall Coal Mining Shearer
By Daniel D. Sweeney, Jeremy M. Slagley, and David A. Smith

Metalworking Fluid-Related Aerosols in Machining Plants
By Yan Gilbert, Marc Veillette, Anne Mériaux, Jacques Lavoie, Yvon Cormier, and Caroline Duchaine

Validity Assessment of Self-Reported Construction Tasks
By Katherine L. Hunting, Elizabeth Haile, Lisa Nessel, and Laura S. Welch

Exposures and Physiological Responses in Power Tool Operations: Fastening vs. Unfastening Threaded Hardware
By Jia-Hua Lin, Raymond W. McGorry, and Jacob Banks

Accuracy of the Borg CR10 Scale for Estimating Grip Forces Associated with Hand Tool Tasks
By Raymond W. McGorry, Jia-Hua Lin, Patrick G. Dempsey, and Jeffrey S. Casey

Members can access the full text of *JOEH* articles via the AIHA® website at www.aiha.org. Abstracts are available to everyone at http://oeh.informaworld.com. Members can also access the full-text archives of the *AIHA Journal* from 1940 to 2003. Full-text archives of *Applied Occupational and Environmental Hygiene* from 1999 to 2003 are also available.

Committee Spotlight

Risk Assessment Committee: Seeking Solutions for Hazards Old and New

BY G. SCOTT DOTSON

Today's workplace is a dynamic and ever-changing environment. Occupational and environmental health and safety (OEHS) professionals are responsible for addressing the risks associated with traditional hazards, such as lead and asbestos, while racing to assess the potential risks posed by newly recognized hazards ranging from nanomaterials to flavorings. Whatever the nature of the hazard, the goal of the OEHS professional remains the same: ensure that workers are protected against unreasonable risks and can therefore work safely. To help achieve this goal, OEHS professionals turn to the principles of risk assessment to estimate the potential adverse outcomes and health effects and to find safe ways for people to work with and/or be protected from hazardous conditions and agents.

Since 1995, the AIHA® Risk Assessment Committee has sought to advance the use of human health risk assessments within the practice of modern industrial hygiene and demonstrate its benefit in refining risk management decisions. The Risk Assessment Committee comprises individuals recognized as experts in the fields of exposure assessment, risk assessment, toxicology and engineering, who hail from government, industry, academia, unions and consulting. Highlighted contributions of the Risk Assessment Committee and its members include:

Risk Assessment Symposiums at PCIH: These technical sessions are intended to present a group of integrated approaches designed to illustrate the use of human health risk assessment from new and emerging perspectives to aid in the anticipation, recognition, evaluation and control of hazards. The next risk assessment symposium is currently being planned for PCIH 2011.

Professional Development Courses at AIHce: These continuing education courses cover a wide spectrum of topics designed to teach the application of the principles of risk assessment in critically evaluating workplace hazards and making professional judgments.

AIHA White Paper on Risk Assessment and Risk Management: This position paper outlines AIHA's policy on the practice of human health risk assessment techniques in regulatory decision-making, public health policy and in the allocation of government and private sector resources to occupational and environmental issues. The paper is available at www.aiha.org/news-pubs/govtaffairs/Pages/PositionStatements.aspx.

Risk Assessment Principles for the Industrial Hygienist: A comprehensive guide for conducting, interpreting and applying risk assessment principles within the practice of

industrial hygiene. Available through the AIHA Marketplace at www.aiha.org/marketplace/Pages/default.aspx.

"Exposure Reconstruction": Chapter 17 of *Mathematical Models for Estimating Occupational Exposures to Chemicals*, 2nd Edition (2009): Available through the AIHA Marketplace at www.aiha.org/marketplace/Pages/default.aspx.

Human Health Risk Assessment Chapter in the 6th Edition of *Patty's Industrial Hygiene and Toxicology*: The 6th edition of *Patty's* is expected to be published in 2010.

As the OEHS community moves further into the 21st century, many old hazards persist, new ways of looking at and judging old hazards develop, and new hazards arise with the development of new technologies. OEHS risk assessment models and techniques need to evolve to keep pace with changing conditions, views, and expectations in order to answer increasingly complex questions regarding what it means to be safe in the workplace and in society at large. The Risk Assessment Committee strives to aid OEHS professionals in meeting the challenges of our profession through continued contributions to the advancement of risk assessment methods used by industrial hygienists. For additional information on the Risk Assessment Committee and its activities at AIHce 2010, visit www.aiha.org/insideaiha/volunteergroups/Pages/RiskAssessment.aspx.

G. Scott Dotson, PhD, CIH, is an industrial hygienist with NIOSH in Cincinnati, Ohio. He can be reached at scott.dotson@cdc.hhs.gov or (513) 533-8540.

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the NIOSH Board of Scientific Counselors, the National Advisory Environmental Health Sciences Council and the Board of Scientific Counselors to the National Toxicological Program for the National Institute of Environmental Health Sciences at the National Institute of Health (NIEHS). He holds BS and MS degrees in chemical engineering and MS and PhD degrees in environmental health. In addition to AIHA, Moure-Eraso is a member of the American Institute of Chemical Engineers (AIChE), ACGIH® and the American Public Health Association (APHA).

FOR CONSULTANTS

Fair Contract or Deal Breaker?

Be Aware of Key Provisions in Service Contracts

BY DAVID KUDLINSKI

Disclaimer: This article is meant to point out problematic language in contracts that industry professionals should be aware of. The author is not an attorney and is not providing legal advice. You should consult your legal counsel with respect to any specific terms in your contracts.

Let's face it: contracts are as exciting as watching grass grow. Yet consultants, and the company safety managers who hire them, must be familiar with basic contract terms and conditions. Legal negotiations of a services agreement have the potential to idle project plans, so allow as much time as possible for contract review.

Typical contracts range from one page to 30 or more. Most industrial hygienists don't have dual careers as contract law attorneys, so they rely on the expertise of a private legal consultant or a contract specialist within their company for review and potential negotiation of the terms and conditions.

Although the whole contract needs to be read carefully, four key provisions of a standard IH contract—indemnification, limit of liability, reliance, and performance—tend to be more critical or contentious than others.

Indemnification

Black's Law Dictionary defines "indemnify" as "to save harmless; to secure against loss or damage; to give security for the reimbursement of a person in case of an anticipated loss falling upon him." Neither party to a contract wants to pay for the other's negligence, so it is common sense—and commonplace—for indemnity clauses to be included in contracts to protect the company hiring the industrial hygienist from his or her negligence or negligent performance of services.

But many contracts contain clauses that are unfair and burdensome to the industrial hygienist. Some proposed indemnification clauses require a consultant to completely indemnify the client under any and all circumstances, even for the client's own negligence. This type of contractual obligation is enforceable in some states and not in others. Either way, the consultant will incur legal expenses litigating the underlying allegations of negligence as well as the contract terms.

The following hypothetical scenario illustrates the perils of complete indemnification. A consultant is retained to test for *legionella* in a building. She requests a list of hot water tanks but is not told about a hot water tank in a particular storage area. As a result, this tank is not tested. Thereafter, workers in the building are exposed to *legionella* and sue. If the consultant signed a contract agreeing to indemnify the client against its own negligence, the consultant is liable, regardless of the fact that she did not receive complete information. To make matters worse, the consultant's insurance company may not cover injuries resulting out of other parties' negligence.

A contract can specify that the consultant indemnifies the client except in cases where the client's sole negligence is to blame. Yet the presence of this clause alone is not a bulletproof defense for consultants. Let's consider the case of a consultant hired to perform a Phase I environmental assessment of a client's site prior to excavation to erect a building. Suppose the client didn't maintain records of a fuel oil tank buried at the site. The assessment doesn't identify the undisclosed tank, and the tank is struck during construction, leading to damages. Are the damages a result of the client's sole negligence? The client could argue that the consultant should have discovered the tank fill cap, despite the client's lack of disclosure. If that argument carries the day in court, the consultant will be responsible for damages.

Indemnity can work both ways, of course. Consultants like to have indemnity in cases where their actions are not the direct or proximate cause of a loss or injury. If a worker is injured at a multiemployer construction site, the worker's attorney will likely cast a wide net for major companies associated with the project. Even if the consultant's activities were unrelated to the injury, without indemnity, the consultant must spend time and money for a legal defense.

A hypothetical scenario of this type could involve a consultant who specifies the cleanup procedures of materials contaminated with pigeon guano for a group of subcontracted hazmat workers. Suppose one of the workers removes wallboard and exposes a hidden beehive, the worker is stung in the neck, he develops an allergic reaction, and his attorney sues the property owner and the consultant. If the consultant specified cleanup procedures

that conform to generally acceptable standards, he shouldn't be named as a litigant. If the consultant is named, but has indemnity, he should be able to call on that contractual protection.

Indemnification clauses can also be written so that the employer must cover all injuries and losses to its employees and property, no matter who is at fault. But this indemnity also has risks for a consulting company, which could end up paying twice for the same injury—once through its workers' compensation insurance expenses, and again through the expense of litigating a lawsuit (and potentially paying damages) that results from the client's negligence.

Be on the lookout for hidden indemnification clauses, which can appear anywhere in a contract. For example, a contract might propose that no further claims can be made against a party after the final report is issued or after the final payment is made. Such a clause may not be acceptable because many injuries, damages, and claims have a latency period before manifesting themselves. Further, most claims are not made until well after a project ends.

Limit of Liability

Limiting liability is a means for a company to cap its exposure to potential claims made by the other party to a contract. As much a business decision as a legal one, limiting liability enables the consultant to keep the potential risk involved in performing services in line with the value of the contract. Limiting liability is also a way for companies to stimulate competitive bidding.

Let's say a chemical factory hires a consultant to test the air in a process area where a highly flammable and carcinogenic chemical is made. The consultant will receive $2,000 for one day of air testing. With a 10 percent profit margin after expenses, the consultant can expect to make $200. If the consultant's contract doesn't limit his liability, he is open to any and all claims related to the safety of this dangerous chemical—for a mere $200.

A clause limiting the consultant's liability is beneficial for the client, too. A consultant who is concerned about the language in the contract is planning to be around to defend his interests if a claim is made. But an IH firm that readily signs an agreement with unlimited liability may be likely to go out of business in the event of a catastrophic loss.

Contracts might also require either the consultant or the client to pay attorney fees in the event that either party's negligence results in a third-party lawsuit. If such a clause exists, it should specify that the responsible party will be required to pay "reasonable" attorney fees.

Reliance

Ordinarily, an industrial hygiene consultant submits a report of findings for the client's use, with specific limitations. The consultant wants to make clear that only the client may rely on the report for its intended purpose.

What could happen if the contract doesn't specify this condition? Let's say an employee expresses concern that offices in his building have ceilings that might contain asbestos. The office manager hires a consultant to test accessible surface areas of the building interior for asbestos. Two years later, the office manager, pressured by a contractor for asbestos inspection information days before a gut remodel of the same offices, e-mails the consultant's earlier inspection report of "no asbestos-containing materials identified" to several tradesmen involved in the project. Unfortunately, asbestos-containing pipe wrap in the demolished wall cavity is shredded during renovation activities. Routine work in the area continues for days before a tradesman recognizes what has happened.

A third party shouldn't have relied on the consultant's report of limited testing at a different time for a different purpose. Therefore, consultants must ensure that language limiting reliance goes into our contracts and reports.

Performance

What would an industrial hygiene consultant have to do to exhaust every possible means of performing a service? Consider the example of a mold survey in a typical 12-by-15-foot office. The consultant uses a CIH mold expert who has a PhD and 50 years of experience. The expert proposes cutting a 1-by-1-foot inspection hole in every wall; air sampling each wall cavity for spore testing (after inspecting through a boroscope); collecting spore samples on the desk with scotch tape or vacuum pump; using both penetrating and nonpenetrating moisture meters; checking every wall surface with a surface temperature meter and infrared camera; running triplicate impactor air samples with a variety of growth-specific agars and spore traps at different times of day and/or week; bulk- and/or vacuum-testing carpet, drapery, and upholstered chairs for direct microscopic examination, culture, and DNA mold analysis; disassembling and swab-testing the ductwork above the lay-in ceiling; running a 24-hour summa canister test for mold VOCs; testing the air with a particle counter; running 24-hour temperature and humidity data-log tests for a week; and bringing in the mold-sniffing dog.

This survey design is too expensive, overly aggressive and not the generally accepted standard for a typical mold survey of a 12-by-15-foot office. When presenting a bid for this type of work, the consultant should explain that she will utilize commercially reasonable best efforts to perform the job in accordance with standard-of-care language. This also means that the consultant will not perform negligently by proposing services less than the standard of care or commercially reasonable best effort to win the bid (for example, relying solely on one spore trap air sample inside a building to identify or rule out a mold concern).

The consultant operates inside the context of commercial and competitive realities to bid or propose industrial hygiene surveys. She should propose generally accepted industry practices, such as those published by AIHA®, ACGIH®, ASHRAE, or others as applicable. Based on an initial consultation and actual circumstances surrounding the issue at hand, the consultant may offer additional service options after discussing cost versus benefit with the client.

Reaching Agreement

Review of industrial hygiene services contracts, although sometimes tedious and time-consuming, is an important part of a business's risk control. More often than not, in my experience, parties to a contract reach acceptable agreements on critical or contentious areas of contracts and proceed with the services successfully.

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RISK ASSESSMENT

Risky Business: PERCs at the National Academy

NAS Review of Perchloroethylene Risk Assessment Reveals Need for Lower PEL

BY FRANKLIN MIRER

Perchloroethylene—also known as tetrachloroethylene, PCE, and PERC, among other names—is the sweet smell in the dry cleaners. PERC also contaminates ground water and enters homes via vapor intrusion—and, likely, through evaporation from dry-cleaned clothing.

In 1995, the International Association for Research on Cancer (IARC) classified PERC as "probably carcinogenic to humans." The IARC summary of human studies noted the existence of

> evidence for consistently positive associations between exposure to tetrachloroethylene and the risks for oesophageal and cervical cancer and non-Hodgkin's lymphoma. These associations appear unlikely to be due to chance, although confounding cannot be excluded and the total numbers in the cohort studies combined are relatively small.

Thirteen years later, in 2008, EPA published an updated draft risk assessment for PERC on its Integrated Risk Information System (IRIS). The National Academy of Sciences (NAS), at EPA's request, reviewed the draft in February 2010; URLs for the full texts of both documents appear in the sidebar. The NAS and EPA documents are evidence that PELs and TLV®s allow dangerous exposures and should wake industrial hygienists to the lack of protection for workers against PERC.

The NAS review provides a teachable moment for industrial hygienists regarding current methods of risk assessment. Methods aside, industrial hygienists are called on to integrate work exposures with community exposures, which requires knowledge of EPA reference values. An EPA reference concentration (RfC) is an estimate of inhalation exposure to a substance that is likely to be without harmful effects during a lifetime; an EPA reference dose (RfD) is the maximum acceptable oral dose of a toxic substance. In addition, the European Union's REACH legislation requires chemical suppliers to calculate and publish Derived No Effect Levels (DNELs) by methods very similar to that used by EPA to calculate RfC and RfD.

The NAS Review

The NAS committee agreed with EPA's conclusion that PERC was "likely to be a human carcinogen" according to existing criteria. EPA had estimated "a range of inhalation unit risks of 2×10^{-6} to 2×10^{-5} per microgram per cubic meter" based on extrapolation from leukemia in rats in a National Toxicology Program (NTP) bioassay. At the top end of the estimate, this equates to an 0.14 chance of cancer (after 24/7/365/70 exposure) at 1 ppm. The NAS committee questioned EPA's reliance on the leukemia results, and estimated five-fold lower range of risk for kidney cancer and eight-fold lower for liver cancer. Regardless of the extrapolation, 100 ppm (six hours per day, five days per week) was an effect level for increased liver tumors in mice in laboratory studies. The OSHA PEL for PERC is 100 ppm. No extrapolation is needed for cancer risk.

Regarding neurological effects, the NAS committee opined that EPA should extrapolate from different studies than those EPA chose, which would relax its RfC from the recommended 2 ppb to somewhere between 6 and 50 ppb (not ppm).

EPA took decades to get to this point. In 1988 the agency published its first IRIS assessment, with an oral RfD of 0.01 mg/kg/day and no RfC. In 2001, EPA started updating the risk assessment on the IRIS system. But in 2007, EPA's then-assistant administrator for its Office of Research and Development, George Gray, reportedly overruled his staff and contracted with NAS (rather than the EPA Science Advisory Board) to review the draft risk assessment, which was not public. Gray had come to EPA from the Harvard Center for Risk Analysis, which is considered an anti-regulatory think tank. NAS convened a study committee, but work couldn't begin until the draft risk assessment was released in 2008. The first of four committee meetings was held in November 2008. Now that the report has been released, it has to cycle back through EPA.

PERC Reviews Outside of EPA

An NTP inhalation bioassay showing clear evidence for cancer from PERC was released in 1986. The Japan Industrial Safety Association published similar results in 1993.

In 1997, the Agency for Toxic Substances and Disease Registry (ATSDR) published a "minimal risk level of 40 ppb (in air)" for PERC. This level has no legal force, but some state and local public health agencies use it in regulations for dry cleaners.

Compared to the slow-moving EPA timeline, occupational developments were glacial. The 100 ppm OSHA PEL for PERC is nearly 50 years old. ACGIH® adopted a TLV of 200 ppm in 1946 and lowered it to 100 ppm in 1961, which OSHA adopted as the PEL in 1972. ACGIH dropped the TLV to 50 ppm in 1982 and then to 25 ppm in 1992 (with the notation, "confirmed animal carcinogen with unknown relevance to humans") where it remains today. The NIOSH Pocket Guide, which states that PERC is a carcinogen, lists no recommended exposure limit.

Strength of Evidence

My observations from a review of the history of PERC risk assessment follow:

The NAS conclusions blow the doors off the 100 ppm OSHA PEL for PERC. That PEL is a license to kill. I was not aware of the strength of the evidence until I started reviewing the two recent documents, especially the low levels of exposure that caused cancer in the animal studies. As a reviewer of the 1986 NTP inhalation bioassay of PERC, I had proposed the motion that identified leukemia in rats as "clear" evidence for carcinogenicity. (The wording proposed by NTP staff was that the rat leukemia represented "some" evidence. You can read the discussion at http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr311.pdf). The estimated cancer risk at 1 ppm is far more than the canonical 1-in-1,000 reference for "significant risk" derived from the 1980 United States Supreme Court ruling vacating OSHA's then-standard for benzene. Even skipping the extrapolation, risk increases were found at the PEL. The least protective EPA RfC is 1,000-fold below the OSHA PEL and 250-fold below the ACGIH TLV, taking into account the 8-hour (occupational) versus 24-hour (RfC) daily exposure. The 25 ppm TLV also leaves workers at risk.

The volume of work in these reviews staggers the mind. The EPA draft risk assessment is 550 pages and is based on multiple detailed calculations as well as extensive literature review. I couldn't count the references conveniently. The NAS report was 140 pages, including 12 pages of references. It occupied nearly two dozen respected scientists over three years. The IARC monograph, a lightweight at 63 pages, included 17 pages of references.

The EPA document isn't a complete risk assessment. Even though I've referred to it as a risk assessment, it's actually a "hazard identification" followed by an "exposure-response assessment." A canonical risk assessment also includes exposure assessment followed by a risk characterization, essentially multiplying risk rate by exposure levels to get a body count. However, a regulation could be based on a perception of an unacceptable rate of risk for any exposed population, without detailed compilation of exposure levels. ACGIH sets TLVs without a quantitative risk characterization—but also without any explicit reference to an acceptable risk.

It's time to introduce RfCs and benchmark doses into IH practice. RfCs are applied to non-cancer effects assumed to have a threshold. EPA selects a target health effect and the studies showing the level of exposure or dose associated with that effect. For PERC, that effect was neurotoxicity rather than reproductive, liver and kidney toxicity. The point of departure for the evaluation may be the No Observed Adverse Effect Level (NOAEL) or its statistical equivalent, a benchmark dose. The NOAEL is therefore a dose at which 10 percent of the population suffers the adverse effect. The risk rate at the NOAEL is 100-fold above the Supreme Court's 1-in-1,000 reference for significant risk. Generally, uncertainty factors are applied: 10-fold each for variability in the human population, subchronic to chronic exposure, and animal to man, with an additional factor of 10 for the Lowest Observed Adverse Effect Level (LOAEL) to NOAEL and database uncertainty. For PERC, EPA applied a factor of 300 to neurological effects in studies of people.

The IRIS system is a result of the general perception that different programs within EPA—air, water, toxic substances—should rely on the same potency values. This was the opinion of the 1983 NAS Risk Assessment Committee on which I served. However, the committee also believed that it was improper to centralize full risk assessments because considerations—especially exposure considerations—were medium-specific. As far as I can tell, IRIS and its development process, inference rules and review procedures are policies implemented by EPA rather than regulations or implementation of legislation.

No exposure scenario has been regulated based on all this work. More work will occur and more time will pass as EPA responds to the NAS report. After that, the potency assessment will have to be factored into specific regulations. The justification for those regulations will probably double the volume of paper at EPA alone. This work could support OSHA rulemaking, but nothing is in prospect.

Lessons for Controlling PERC

Some progressives will say that this scientific detail is a waste of time, forget about a PEL, PERC should just be banned from dry cleaning—in fact, forget about PELs altogether; let's do substitutions and control banding. But "bans" are going to be phase-outs at best, as small businesses are given time to adjust (while they keep exposing workers and communities). How are we going to evaluate the interim exposures? Control technology directed by control banding also has to be defined and evaluated based on expected exposure reductions, which come back to a reference level. Regarding substitution, remember, PERC was a less toxic alternative to carbon tetrachloride and a less flammable alternative to Stoddard solvent. That said, the NAS report is an authoritative statement that gives the industrial hygiene community a foothold in controlling PERC.

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Resources

Environmental Protection Agency: "IRIS Toxicological Review of Tetrachloroethylene." [Online] Available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=192423 (2008).

National Academy of Sciences: *Review of the Environmental Protection Agency's Draft IRIS Assessment of Tetrachloroethylene.* [Online] Available at www.nap.edu/catalog.php?record_id=12863 (2010).

REGULATORY OUTLOOK

Voluntary vs. Mandatory

Employers' Experiences with NFPA 70E Raise Concerns about OSHA's Intended Use of Consensus Standards

BY PAUL WATERS

As an attorney who advises clients about how to comply with occupational safety and health laws—and helps when they are accused of violating those laws—I have fielded numerous questions over the last year and a half about NFPA 70E, the National Fire Protection Association's standard for electrical safety in the workplace. The questions range from "What is it?" to "Why should we follow it?" These concerns, while specific to NFPA 70E, have broader implications, reflecting employers' anxiety about OSHA's potential use of voluntary standards to support citations.

The Purpose of NFPA 70E

The original NFPA 70E was published in 1979 to address perceived problems in OSHA's electrical safety standards, such as those in construction (subpart K, 29 C.F.R. § 1926.400, *et seq*.) or general industry (subpart S, 29 C.F.R. § 1910.301, *et seq*.). One important purpose of NFPA 70E was to provide a speedier and more streamlined guide to safe work practices that could not be matched by the procedures required of OSHA to amend its standards (as described in section 6(b) of the Occupational Safety and Health Act). Another purpose was to explain safe work practices in ways that average employers could understand and apply in their workplaces.

Thus, by 2004, NFPA 70E had expanded in scope to cover topics such as personal protective equipment (PPE) and safe work practices in a level of detail far exceeding OSHA's standards. By this time, NFPA 70E served as guidance for OSHA, employers and employees about the latest developments in electrical work practices. Topics such as electrical system design and installation were removed and left to the National Electrical Code (NEC).

Even before the release of the latest NFPA 70E in 2009, employers were calling me with urgent questions about the new standard. What did it mean? What force of law would it have? The new standard contained significant revisions to prior versions, including provisions setting forth calculations of such things as an arc flash protection boundary for workers, the contents of electrical safety programs, procedures for evaluating the hazards and risks of electrical work and analyses on the permissibility and practices for energized electrical work. Employers committed, and continue to expend, significant resources trying to ascertain what is required of them under the new standard.

Voluntary Standards

As a voluntary consensus standard, NFPA 70E has no independent legal force. It is not an OSHA standard, nor has it been adopted as law by OSHA through the proceedings set forth in section 6(b) of the OSH Act. Thus, on one level, NFPA 70E is only a guide for employers to use when making decisions about safe work practices, programs, and personal protective equipment. An employer cannot be cited by OSHA merely because it does not follow the provisions of a consensus standard like NFPA 70E.

The answer, of course, is not that simple. Voluntary consensus standards from organizations such as NFPA, AIHA®, and other professional associations play an important role in protecting workers. Without these voluntary standards, knowledge about preventive methods and OEHS best practices would be much poorer.

A consensus safety standard meant to be broad in application will sometimes be over-inclusive.

In addition, although NFPA 70E is not law, OSHA can use provisions of the standard to support citations of OSHA regulations and the General Duty Clause of the OSH Act. But OSHA's ability to use violations of consensus standards to support citations is worrisome to employers in cases where requirements are not specific. For example, certain OSHA PPE standards are written in very general terms: section 1910.132(a) requires PPE "when necessary by reason of hazards"; section 1910.132(c) requires equipment to "be of safe design and construction for the work performed"; and section 1910.132(d) requires employers to provide equipment that will "protect the affected employee from the [identified] hazards."

These general standards do not specify which equipment to use under particular circumstances. Therefore, OSHA could cite an employer for not providing suitable PPE for the work being performed and use the provisions of NFPA 70E as evidence to support that violation. Similarly, if a specific standard does not apply, OSHA could issue a citation for a violation of the General Duty Clause, and use NFPA 70E as evidence that the alleged hazardous condition was recognized by industry and that a feasible method of controlling the hazard existed.

Because OSHA can utilize NFPA 70E to support certain citations, employers cannot blithely ignore it simply because it does not seem relevant to their work. This is especially so given OSHA's recent emphasis on using its egregious or instance-by-instance penalties for violations in areas such as PPE or training. An employer of even modest size faced with penalties based on each instance of an employee who allegedly did not receive proper PPE or training could be fined hundreds of thousands of dollars.

Questions about Compliance

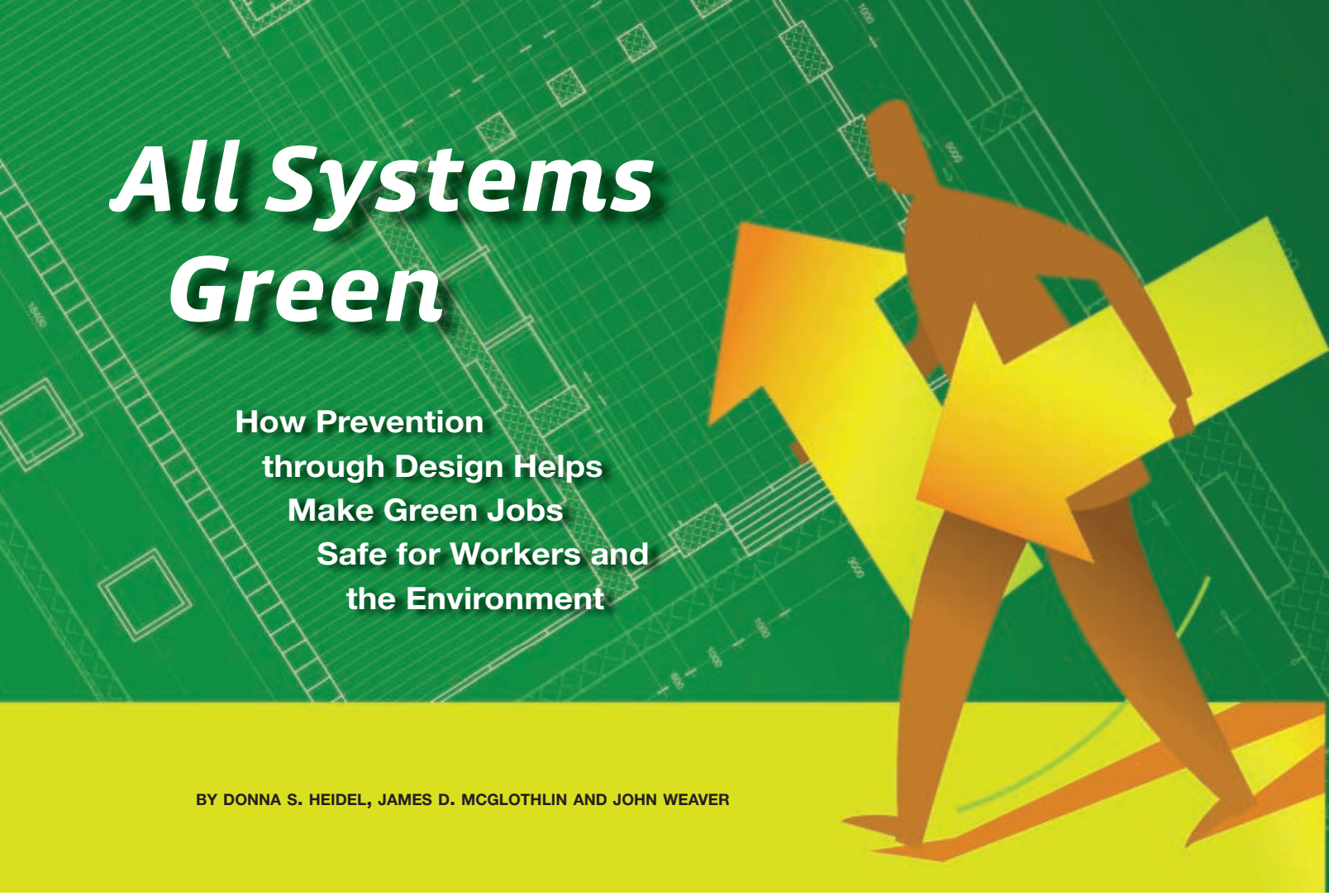
Employers who contacted me about NFPA 70E repeatedly expressed concern that the standard's apparently sweeping application could mean millions of dollars in purchases of new PPE. Applying the NFPA's key tables, such as table 130.2(c) (Approach Boundaries to Live Parts for Shock Protection) and table 130.7(c)(9)(a) (Hazard/Risk Category Classification), suggests that work tasks previously thought to present only minimal risks now fall into elevated hazard/risk categories. Table 130.7(c)(10) (Protective Clothing and PPE Matrix) and table 130.7(c)(11) (Protective Clothing Characteristics) seem to imply that this work requires specialized PPE that was previously considered unnecessary.

These concerns did not come from employers who were looking to shirk their responsibility to protect workers—they were already spending millions on various types of PPE nationwide, they consistently put safety first, and they tried their best to protect workers. However, these companies were in industries where employees had repeatedly performed certain tasks on energized electrical equipment for decades, with

[Continued: 54]

All Systems Green

How Prevention through Design Helps Make Green Jobs Safe for Workers and the Environment



BY DONNA S. HEIDEL, JAMES D. MCGLOTHLIN AND JOHN WEAVER

Some people define green jobs as those whose aim is to reuse, repurpose, and/or recycle. Others insist that, to be considered green, jobs must provide decent wages and job security. Still others maintain that green jobs must be part of carefully designed environments where workers use nontoxic, safe-to-handle materials to create products that are beneficial for consumers and the environment.

The NIOSH Prevention through Design (PtD) initiative puts this last definition into practice. Since 2007, PtD has promoted ways to eliminate hazards and minimize risks through the design of safe workplaces. Recently, PtD methods have been adopted to make green jobs safe for workers and the environment. These projects are examples of ways to address occupational health and safety (OHS) challenges in the coming green economy—an economy based on an environmentally stable and socially just marketplace.

Green and Safe

According to the United Nations Environment Programme (UNEP), green jobs involve "work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality." To prepare for the green economy, UNEP, through its Green Jobs Initiative, is facilitating a "just transition that reflects the environmental, economic and social pillars of sustainable development," including decent wages and conditions for workers in green jobs.[1]

But does our current thinking of the social pillar of sustainable development include health and safety protections for these workers? How can OHS professionals ensure that green jobs, green technology and even green products are safe for workers?

To begin to answer these questions, NIOSH convened a three-day workshop in December 2009 intended to engage stakeholders in a discussion of the safety and health of workers in green jobs. Participants at the workshop agreed that green jobs can be made safe by applying PtD principles and methods to the development of green products and technologies.

During breakout sessions, participants compiled lists of activities they considered essential for ensuring the safety of workers in green jobs. Participants were asked to rate the importance of each activity; the sidebar on page 41 lists the 10 activities that received the highest ratings. In addition to these activities, NIOSH proposes six recommendations for improving workers' health and safety in green jobs:

1. Define, categorize and track green jobs. This effort includes identifying the hazards of green jobs and tracking injuries and illnesses associated with these hazards.
2. Evaluate green jobs for hazards and

Figure 1. The Birck Nanotechnology Center (BNC) at Purdue University, West Lafayette, Ind.

risks to worker safety. The same risk assessment methods used for other jobs should be applied to the hazards associated with green jobs. Evaluations should consider raw materials, equipment, practices, processes and products.

3. Integrate worker safety and health, energy conservation and environmental protection efforts. Energy conservation and environmental protection goals should not impede the achievement of worker health and safety goals. Truly sustainable designs are those that protect the safety and health of workers.
4. Plan early for prevention. PtD concepts—including elimination of hazards and reduction of risk to workers during the design, redesign and retrofit of facilities, equipment, processes, products and work methods—should be applied to green jobs.
5. Make safety and health part of training for green jobs. Include safety and health topics in the skills development training that will prepare workers to transition to jobs in the green economy or to use green products or technologies in their existing jobs.
6. Add safety and health to green benchmarks. Current metrics and benchmarks for gauging the success of sustainable design efforts rarely include occupational safety and health impacts. Developing appropriate metrics and tracking OHS interventions will contribute to a more comprehensive view of sustainable design.

The OHS challenges created by new, green technologies include the adaptation of work activities to perform green jobs. For many green jobs, we can apply the same methods of occupational injury and illness prevention that have succeeded in traditional jobs. For example, wind turbine construction and maintenance can place a worker at risk for falls from height, entry into confined spaces, and contact with energized parts. Existing methods for mitigating these risks and educating employers and workers on appropriate interventions need to be adapted to the wind turbine industry. In other cases, research is needed to characterize hazards, anticipate risks, and include the appropriate risk-minimization techniques into the design of these green jobs.

PtD and Nanotechnology

The emerging science of nanotechnology demonstrates the urgency for effective PtD design interventions that integrate OHS and environmental goals. While research in nanotechnology at Purdue University has been ongoing for many years, a state-of-the-art facility was needed to advance these research activities, especially in the areas of nanobiotechnology and nanomedicine,

Green Jobs Must Be Safe Jobs

From Dec. 14 through Dec. 16, 2009, NIOSH hosted a workshop, "Making Green Jobs Safe," in Washington, D.C. Topics included the challenges of making green jobs safe, sustainable building, sustainable production, and chemical hazards in green jobs. Participants included representatives from industry; labor; academia; environment, health and safety (EHS) organizations; consultancies; and government and nongovernment agencies.

Participants were divided into groups that discussed green products and technologies in various economic sectors. These groups developed lists of activities needed to ensure the safety of workers in green jobs. The following are participants' top ten recommended activities, listed in order of importance:

- Include worker health and safety requirements in federal grants and contracts.
- Promote consistent OHS codes for wind/solar and other green energy construction.
- Include OHS in green and sustainable standards as they are being updated.
- Initiate federal sustainability efforts to include OHS in procurement and construction.
- Ensure OHS is in green initiatives via government grants.
- Integrate safety and health into green elements of contractor specifications.
- Develop index of "green" chemicals and exposure risks.
- Establish best practices and PtD processes for green energy categories with emphasis on small businesses.
- Develop, validate and disseminate a LEED®-like OHS rating system.
- Investigate safer green products (cradle-to-cradle/life cycle analysis).

For more information about the workshop, including video of remarks by NIOSH Director John Howard and OSHA Administrator David Michaels, visit www.cdc.gov/niosh/topics/PtD/greenjobs.html.

Figure 2. PtD hazardous chemical containment system at Birck Nanotechnology Center (BNC). Hatches such as the one shown here are strategically placed throughout the BNC subfab area. These hatches are connected to a duct system containing elephant trunks that workers can use to exhaust the accidental release of hazardous chemicals or gases.

energy conservation and heat transfer, and nanomaterials and nanofabrication. Approximately five years ago, Purdue's Birck Nanotechnology Center (BNC) opened its doors in West Lafayette, Ind. (see Figure 1). But before this state-of-the-art facility could be put into operation, its design had to ensure the safety and health of the work force and the surrounding community.

The BNC is just one of dozens of new nanotechnology research centers around the world. Safety, health and engineering experts share concerns that workers or the public could be put at risk if these facilities are not designed with prevention in mind. Even the experts are sometimes confounded by nanoparticles, and little is known about the ways that chemicals or their byproducts at the nanoscale will react with the human body or the environment.

The PtD program from NIOSH is proactive, not reactive. As nanotechnology centers spring up across the United States, now is the time to ensure that the best design principles are implemented in these facilities to protect workers, the environment and end users.

The BNC at Purdue has "designed-in" protections for the environment and for the health and safety of the occupants, including research scientists, students, professors and administrative staff. For example, because much of the danger within a nanotechnology facility is related to accidental exposure to hazardous chemicals, the BNC incorporates a drop-down exhaust system in the basement (known as the subfab area). Nested inside the ductwork that runs the length of the ceiling is a network of "elephant trunks" that workers can use in the event of a chemical spill (see Figure 2).

The elephant trunks are made of wire-reinforced neoprene-coated polyester. If a hazardous chemical, solvent or gas is spilled, workers pull on a chain to open a hatch and allow the elephant trunk to drop to the floor. The exhaust end of the elephant trunk immediately begins to evacuate the hazardous chemical. Strategically placed personal protective equipment (including protective clothing, respirators, face shields, gloves and boots) can be donned in an instant by trained workers and safety personnel so they can immediately position the elephant trunk in the area where the chemical was released. The hazardous chemical is collected in a scrubber that removes harmful gases and chemicals.

Sustainable Design

The BNC incorporates other sustainable design features. Most importantly, the design engineers recognized that to make the building, laboratories and work products truly sustainable, the work itself must also be sustainable. The design of the building and laboratory protects the researchers, the surrounding environment, and, ultimately, the people who will use the future products of the research. This use of PtD principles and methods to achieve sustainable design is a model for ensuring that green jobs, green technologies and green products are safe for workers.

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The authors thank students Michael White, Carly Dykstra, Anna Menze, Genevieve Viduya, Michael Wibel, Ian Patterson and Chelsea Johnson of Purdue's School of Health Sciences for their assistance in researching the Birck Nanotechnology Center.

Resources on Prevention through Design

More information about the NIOSH PtD initiative appears on these NIOSH websites:

- www.cdc.gov/niosh/topics/ptd/
- www.cdc.gov/niosh/programs/PtDesign/
- www.cdc.gov/niosh/topics/PtD/greenjobs.html

Reference

1. **United Nations Environment Programme:** "Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World," September 2008. [Online] Available at www.unep.org/labour_environment/features/greenjobs-report.asp.

Green Managers

EHS Professionals Are Well Positioned to Contribute to Corporate Sustainability Efforts

BY ENRIQUE MEDINA

Most leading global enterprises have accepted the business case for sustainability. Companies with extensive supply and demand networks in sectors such as semiconductors, electronics, communications, pharmaceuticals, automotive, chemical and aerospace are looking for standardized metrics and indicators of sustainability performance that can be applied across the supply chain.[1]

Environmental health and safety (EHS) professionals, although well positioned to contribute to their company's sustainability efforts, are often left out because they aren't familiar with the management tools used in sustainability initiatives. This article introduces EHS professionals to some of the sustainability-related processes and metrics used by leading companies and offers advice on how to get sustainability efforts up and running.

Three Stages of Sustainability

Sustainability programs, which incorporate EHS management systems and corporate social responsibility programs, vary greatly in scope. Each organization's sustainability goals should be based on its position in the "green spectrum" (the three stages of sustainability).

Using EHS programs as a benchmark for sustainability, we see that enterprises generally fall into one of three developmental stages:

Stage 1: Compliance-related implementation. At this stage, EHS activities focus on meeting compliance obligations with respect to air and water pollution, hazardous waste, hazardous materials, and worker health and safety. Some companies may add recycling programs or set goals to reduce energy and water consumption. For companies in Stage 1, the EHS function is managed at the plant level by a facilities or human resources manager and at the corporate level by a coordinating position or directorship. Typically, accountability for EHS performance is not formally incorporated into management objectives or board-level review.

Stage 2: Systems implementation. Companies at this stage have implemented environmental management systems, occupational health and safety management systems, or both. These systems could have been implemented through internal corporate initiatives or by means of third-party certified programs, such as ISO 14001, OHSAS 18001, OSHA's Voluntary Protection Program, or Mexico's Industria Limpia (Clean Industry), to name a few. Some companies also have corporate citizenship programs in the communities where they operate. Companies at this stage tend to establish goals to reduce energy consumption, carbon footprints, water use, and hazardous and solid waste generation, as well as increase recycling efforts and employee volunteerism. Some use key indicators to track their performance in environmental, worker health and safety, and community involvement. Accountability is formally established at both facility and corporate levels and is usually supported by a formal audit program managed by the corporate legal department, which reports results to the board of directors.

Stage 3: Strategic implementation. Companies in this stage have robust EHS management systems that develop and implement sustainability strategies with defined goals and objectives. These companies focus on life cycle analyses, design for environment, green procurement, supply chain sustainability benchmarks, and corporate social responsibility (CSR) programs. Performance and accountability are clearly defined throughout the organization, with internal or third-party auditing and certification, and board-level reporting and responsibility. These companies tend to be industry leaders with transparent sustainability and CSR

performance reporting and disclosure to employees, shareholders and the general public.

How to Get Started with Sustainability

The commitment of a company's top management is essential for a successful sustainability program. According to a 2009 study of Fortune 500 companies, those that manage their sustainability efforts at a higher level within the organization received more external recognition for their efforts.[2] The sustainability leader in these companies was no more than one or two levels removed from the chief executive and was usually located in the legal or public affairs departments or in a dedicated sustainability department. These individuals reported directly to the board of directors.

But even if a company has a corporate-level sustainability leader, it still needs to convince managers at the facility and business unit levels of the benefits of a sustainability effort. You can establish the value of sustainability through these steps:

1. Conduct a baseline sustainability assessment (BSA) at the facility level (or, in the case of a business unit assessment, at a representative number of facilities). The BSA will evaluate a range of business functions to establish the company's stage of green development, identify opportunities for improvement, and estimate the sustainability effort's costs and benefits. Management can use the BSA results to decide whether to proceed.
2. Develop a sustainability vision. The vision should be aligned with the organization's values and integrated into manufacturing and core business functions. One example of this approach is the "green and lean" strategy described below. The vision will guide strategic planning and help define goals, objectives, performance indicators and metrics.
3. Educate all employees about the vision and train them on their roles. Select employees to help develop the company's sustainability strategy.
4. Select a strategic planning team. This team establishes the organization's sustainability objectives and sets benchmarks for assessing performance. Development of metrics can begin in this step.
5. Develop an implementation action plan. This effort involves team leaders, supervisors, and managers. It assembles multifunctional teams representing production, facilities, maintenance, logistics, EHS, quality control, engineering, purchasing, sales, human resources, and other areas as needed. The plan should identify specific priority projects, implementation teams, and timelines.

Implementation must include follow-up activities, evaluation, feedback, standardization, and training to ensure continual improvement. For a list of key implementation activities, see the sidebar on page 45.

Sustainability and Lean Manufacturing

A recent survey of supply chain professionals found that "economic, social and regulatory dynamics are putting real pressures on global companies to be both 'lean and green' in their product sourcing, logistics, transportation, distribution and operational practices."[1]

Many organizations are implementing methods such as lean manufacturing to improve production processes, increase efficiency and reduce costs throughout the value chain. Lean manufacturing, also known simply as "lean," seeks to eliminate all waste from a production system.

Unfortunately, improvements in the name of lean are often pursued by different departments with little communication or coordination, which can lead to inefficiencies and missed opportunities. In this economic climate, companies can benefit from leveraging their lean production implementation plans to support their sustainability efforts.

The "lean to green" movement in manufacturing capitalizes on the similarities between these strategies. The lean goals of improving quality, eliminating waste, reducing time to complete a task, and lowering total costs are compatible with the sustainability goals of eliminating waste and pollution,[3] improving energy efficiency, increasing utilization of renewable resources, and lowering the costs to the planet of conventional material sourcing, production and distribution practices. In addition, both lean and sustainability emphasize the importance of stakeholder education, employee teamwork, and application of analytical tools and metrics to drive performance.

Sustainability and lean management are both processes-oriented activities. The core principle of lean production is continual improvement. Not surprisingly, the best environmental management and sustainability systems also reflect this principle.

Applying Lean Tools to Sustainability

The lean process uses a number of tools to identify and evaluate waste reduction opportunities, from the management team to the shop floor. Some of the more familiar tools are described below, along with suggested green applications:

6S (Six S). Sometimes referred to as 5S + Safety, this tool is a technique for creating an orderly, clean (and safe) work environment consistent with the motto of "a place for everything, and everything in its place." Commonly one of the first tools used in lean implementation, 6S is applied on the shop floor and may involve training, inspections, checklists and periodic audits. Green opportunities include segregating hazardous from non-hazardous waste, reducing lighting and

Lean and Green Resources

The following resources are available to help EHS professionals become familiar with lean and green concepts:

- EPA's "Lean Manufacturing and the Environment" website (www.epa.gov/lean/leanenvironment.htm) contains useful information on lean manufacturing methods, case studies, publications and related links on opportunities for environmental improvements through lean processes.
- The Society of Manufacturing Engineers' Lean to Green Sustainability Work Group sponsors the annual "Lean to Green Manufacturing Conference" (www.sme.org/leantogreen) and presents webinars to advance learning and collaboration among lean and green practitioners.

air-conditioning costs by saving space, reducing accidents by keeping work areas orderly, and reducing hazardous waste by eliminating spills.

Kaizen events. These team efforts are intended to identify and eliminate waste from one part of a process and quickly make process changes. From analysis to implementation, kaizen events may last up to one week. The word "kaizen" is Japanese for continual improvement. This tool works well at the process level and involves people at various levels of the organization. For sustainability efforts, kaizen events can train workers and supervisors on environmental impacts of proposed process or material changes, such as air emissions from volatile organic compounds and wastewater discharges from water-intensive processes.

Value Stream Mapping (VSM). VSM involves developing maps of current and future conditions, including those encompassing suppliers and customers, to illustrate the effects of process changes. The objective of VSM is to look at an entire process and identify the changes needed to make it more efficient—that is, to "lean" it—and obtain the most significant improvement. This tool is applicable to the supply chain level and can be used to pursue sustainability goals, such as lowering carbon footprints by local sourcing of materials, increasing recycled content of products, or developing zero-wastewater discharge processes.

Six Sigma. A tool of continual improvement, Six Sigma is a detailed statistical control and data analysis method used to identify variation in a process, diagnose root causes of performance gaps, and improve quality control of a product or process. Green opportunities that may be uncovered by Six Sigma include reduction of raw materials and packaging costs by eliminating defective products, and consideration of the impacts of discarded products.

Key Performance Indicators. These metrics are used in manufacturing, supply chain management, and sustainability to relate outcomes from two separate activities. Common examples include linking business metrics—such as sales, inventory levels, transportation costs or production units—to energy use, water or fuel consumption, accident rates, or environmental aspects.

Other lean tools aimed at reducing wasted space, unnecessary inventory, and transportation costs can indirectly improve resource utilization, energy efficiency, and carbon footprints. These tools can also help promote the use of local materials, green procurement policies, improvements to worker safety, and other elements of an effective sustainability strategy.

The EPA Lean and Environment ToolKit suggests the following five-step approach for using lean tools to implement a green strategy:

1. Commit to the elimination of environmental waste through lean implementation.
2. Recognize new improvement opportunities by incorporating EHS icons and data into VSM.
3. Involve staff with EHS expertise in planning and implementing lean events that have environmental opportunities.
4. Eliminate environmental waste in specific processes by asking key questions and using new process improvement tools.
5. Empower and enable workers to eliminate environmental waste in their work areas through 6S training, workplace evaluation checklists, and colored tags to identify EHS hazards and issues.

EHS Professionals' Role

EHS professionals have the training and experience to contribute to sustainability efforts. They have knowledge of the manufacturing environment, cross-disciplinary training, the ability to communicate effectively with different stakeholders, and professional experience in risk reduction strategies, auditing, and program development, as well as essential regulatory knowledge. With a better understanding of lean concepts and tools, EHS professionals can become key contributors in their company's lean and green initiatives.

This article was originally published, in different form, in Pulse Point*, a newsletter published by Alliance Consulting International.*

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Key Steps for Your Green Pilot Project

You never get a second chance to make a first impression. Similarly, the first project in a sustainability effort will go a long way toward determining its success. Successful green pilot projects are the best way to generate momentum toward implementing the larger sustainability strategy.

Implementation of sustainability pilot projects should include the following steps:

- Select leaders to develop goals and objectives.
- Form a multidisciplinary Green Implementation Team (GIT).
- Train the GIT on sustainability tools.
- Choose your first green project—6S, energy efficiency, waste reduction, carbon footprint, etc.—and develop initial indicators and metrics.
- Implement the pilot project, evaluate outcomes, develop benchmarks and revise.
- Implement the green project across the facility or organization.
- Evaluate and measure outcomes. Test and refine metrics.
- Train supervisors in green practices.
- Introduce a new element of green strategy.

References

1. **BPM Forum:** Acceleration of Eco-Operation: Achieving Success and Sustainability in the Supply Chain. [Online] Available at www.eco-ops-center.com/ report.php (2009).
2. **Framework:CR:** "Where Sustainability Lives: Linking External Recognition to the Organizational Structures that Support Sustainability." [Online] Available at www.frameworkcr.com/wp-content/uploads/2009/07/Where-sustainability-lives.pdf (2009).
3. **EPA:** "The Lean and Environment Toolkit." [Online] Available at www.epa.gov/lean/toolkit/ (2007).

It's All Happening at the Expo

New Features Enliven the Expo at AIHce 2010

BY BROOKE MORRIS

With more than 300 exhibitors, the Expo at AIHce 2010 brings the leading products and services in the OEHS industry to conference attendees, in addition to networking and learning opportunities. This year's Expo also includes an array of new offerings, including valuable tools to help attendees enhance their careers.

The exhibition hall will open at 9 a.m. on Monday, May 24, in the Colorado Convention Center in downtown Denver, Colo. A cocktail reception will begin at 4 p.m. To help attendees manage their time efficiently, the AIHce 2010 website offers a floor plan of the Expo hall and a convenient exhibitor locator. To access the virtual Expo, go to www.aiha.org/expo2010.

The exhibition hall will be open Tuesday, May 25, between 9 a.m. and 3 p.m.; and Wednesday, May 26, between 9 a.m. and 1:30 p.m.

Among the new features offered at the Expo are the Product Demo Theater, Soap Box Talks, and the photo display *Holding Mother Earth Sacred*. Expo mainstays such as the cyber café, message centers, lunch discussions and technical poster sessions will also be offered. Attendees will have a variety of networking opportunities in the Expo hall's many lounges and restaurants. Publications and information on member and volunteer opportunities will be available at the AIHA® and ACGIH® booths. AIHA will also hold daily drawings for exciting prizes, including complimentary registration to AIHce 2011 in Portland, Ore.

This year's Expo has something for everyone

New Features

One of the new features at the Expo is the Product Demo Theater, sponsored by the Colorado Safety Association. Eighteen organizations will present an assortment of products and services in 20-minute demonstrations, followed by 5-minute Q&A sessions. Product demonstrations will be held Monday through Wednesday, from 9 a.m. to 1:30 p.m.

Product Demo Theater items include air quality monitors, gas and vapor dectors, MSDS software, personal monitoring devices, PID detectors, personal dosimeters, TDI/MDI detection tools, and microbial testing instruments. Services and products involving ergonomics techniques, LEED testing, carbon filter demonstrations, and an explosion proof/dust ignition proof vacuum cleaner system will also be demonstrated.

Conference attendees can share their thoughts, ideas and opinions about current and emerging industry topics during the Soap Box Talk Sessions. Participants will be given five minutes to discuss their topics and five minutes to address questions from attendees. Soap Box Talks will be held on Monday, May 24, from 2:30 p.m. to 4 p.m. To participate, submit topics to AIHce2010soapbox@aiha.org.

An exciting new addition to this year's Expo is the photo display created by photojournalist Earl Dotter in collaboration with Cindy A. Becnel and four tribal communities. *Holding Mother Earth Sacred* depicts the significant contributions these independent nations have made in enhancing energy resources, creating jobs, and preserving worker safety. The photo exhibit also illustrates the tribal beliefs and values that help sustain their communities. For more details about the photo display, visit www.aihce2010.org/aihce10/pdf/MotherEarth.pdf.

Enhanced Expo

New activities and exhibits aren't the only expansions to the Expo—luncheon discussions will offer greater opportunities for attendees to engage one another and increase their knowledge. Luncheon discussions will be held Monday to Wednesday, with a new focal point each day.

Share your OEHS expertise or improve your industry knowledge at the luncheon discussion facilitated by the Students and Early Career Professionals Committee on Monday, May 24, at 12:30 p.m. to 1:30 p.m. On Tuesday, May 25, from 12:30 p.m. to 1:30 p.m., NIOSH representatives will lead a discussion on implementation of strategic plans for the NIOSH National Occupational Research Agenda (NORA). Members of the AIHA Technical Committee and staff from NIOSH will host the "Tech Talks" luncheon discussion on Wednesday, May 26, from noon to 1 p.m. Tech Talks will focus on current issues surrounding research and technical content. Seating for each luncheon discussion is available on a first-come, first-served basis.

This year's Expo has something for everyone. Be sure to take advantage of all the Expo has to offer—start by planning your Expo schedule using the AIHce Virtual Expo. For more information, visit www.aihce2010.org/aihce10/expo2010/default.htm.

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AIHce 2010 Exibitors

Exhibitor	Booth #
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Aerobiology Laboratory Associates, Inc.	923
Affygility Solutions	935
AIDII–Italian Industrial Hygiene Association	635
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Air Systems International	817
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AirLab	940
AliMed	1522
Alliant	1626
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Argus-Hazco	1602
Arizona Instrument, LLC	619
ART Corporate Solutions, Inc.	510
Ashtead Technology Rentals	707
Assay Technology, Inc./AT Labs/MNR Services	803
Austin Pure Air	1330
Baseline-Mocon	517
BGI Instruments	913
Bios International Corporation	1610
Board of Certified Safety Professionals (BCSP)	802
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Brush Wellman Inc.	624
Bullard	1011
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Concentra Inc.	818
Contour Design Inc.	640
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Synergist® Q&A: Gas Detection

An Interview with Industrial Scientific's Dave Kuiawa

Synergist Q&A's are edited excerpts of conversations with OEHS vendors that participate in AIHA's Professional Partner Program. This month, *The Synergist* speaks with Dave Kuiawa, Director of Training and Field Services with Industrial Scientific Corporation, a leading manufacturer of gas detection equipment. The entire conversation is available as a podcast from www.aiha.org/news-pubs/synergist/Pages/SynergistPodcasts.asp.

Which kinds of gas detectors does Industrial Scientific make?

Industrial Scientific manufactures a wide variety of gas detectors, and they usually fit into several categories of detection. We have gas detectors that monitor oxygen content, combustible gases, also toxic gases, which can include VOCs.

How accurate are the readings?

Accuracy varies according to the temperature at which the gas detector was calibrated. All of our instruments have a plus or minus five percent accuracy if used at the temperature at which they're calibrated, and a plus or minus fifteen percent accuracy over the entire temperature range of the instrument.

How often should gas detectors be calibrated?

If you are putting yourself potentially in harm's way by having a gas detector determine the environment you're working in, you want to make sure you can rely on that calibration. We recommend a monthly calibration on our gas detectors and even more frequent bump tests.

What's the difference between a bump test and a full calibration?

A bump test is placing a small amount of gas across the sensors of the instrument to determine how that instrument is going to respond. Everybody's bump test definition varies slightly. Some companies want an 80 percent accuracy verification on a bump test. Others just want alarm activation. So it really comes down to what that company is looking to achieve.

A full calibration is completely different. We put an instrument into a calibration mode, expose it to that calibration gas, and then adjust the readings to that particular standard. In all the gas detectors that Industrial Scientific and other manufacturers produce today, those calibration routines are done automatically. The instrument is programmed to know what the calibration source is, so that when you place that gas onto the instrument in a calibration mode, it detects the gas, begins to calibrate, and then when that reading is seen to be stabilized—generally at about a two-minute exposure—it adjusts those gases to exactly what's in the cylinder. So that's really the difference between a bump test, which is just verifying instrument operation, and a calibration, which is setting an instrument to a known standard.

What should a user do in the field if the gas detector gets wet?

The first thing you need to do is return to a safe location and evaluate the amount of wetness that the instrument has been exposed to. If the openings of the sensor become wet, and that would prevent gas from diffusing into those sensors, then you're carrying around a useless instrument. So I advise everybody to take the instrument to a safe location and perform a bump test. Make sure the instrument is responding properly to a known concentration of gas. If it passes a bump test, there's no reason why it can't go back out in the field.

If water encroaches into the case, that could result in an instrument failure. But what's more important is, are those sensors breathing and seeing gas?

How quickly do gas detectors respond to a change in concentration?

Gas detector response is divided into several levels of percentage, which we call "T-response." A T-50, for example, would be a response to fifty percent of the concentration, a T-90 would be a response to ninety percent of the concentration, and a T-100 would be a response to one hundred percent of that concentration.

We focus on T-90s. If we're ninety percent of the way there, that's a good indication of the environment we're in. Industrial Scientific's instruments generally have a T-90 of 30 seconds, so within 30 seconds it's going to respond to 90 percent of the concentration around it. To get from T-90 to T-100 is about another minute and a half. So if we wanted to get all the way from an exposure to a 100 percent response, it's about a two-minute period.

For information about AIHA's Professional Partner Program, contact Ben Ledyard at bledyard@networkmediapartners.com.

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HEXAVALENT CHROMIUM

OSHA Final Rule on Hex Chrome to Become Effective in June

OSHA's final rule for occupational exposure to hexavalent chromium is finally nearing the end of its long road to legality.

On March 17, OSHA published a revision to the final rule in the *Federal Register*. The revised rule requires employers to notify employees when they have been exposed to hexavalent chromium, no matter how significant the exposure. Unless OSHA receives significant adverse comment about the rule, it will become effective June 15.

When it was originally published on February 28, 2006, the rule required employers to notify employees of hexavalent chromium exposures only when the exposure exceeded OSHA's permissible exposure limit (PEL) for the substance (5 $\mu g/m^3$). Several groups took OSHA to court, claiming that the standard was not protective enough.

In 2009, the United States Court of Appeals for the Third Circuit ruled against the groups on every issue, with the exception of employee notification. The court directed OSHA to explain its decision to limit the notification to instances where the PEL was exceeded or to take other appropriate action.

The *Federal Register* notice states, "After reviewing the rulemaking record on this issue, and reconsidering the provision in question, OSHA has decided to propose a revision of the notification requirements . . . that would require employers to notify employees of the results of all exposure determinations" for hexavalent chromium.

Court decisions have been inextricably tied to OSHA's rulemaking for this substance. Hexavalent chromium was not among the substances for which OSHA established PELs in the 1970s. By 1990, NIOSH and the International Agency for Research on Cancer had classified hexavalent chromium as a known human carcinogen.

OSHA did not attempt to establish a PEL until a 2002 suit by the Steelworkers Union resulted in a court order compelling OSHA to commence rulemaking for hexavalent chromium. That effort eventually produced the 5 $\mu g/m^3$ standard proposed in 2006.

The NIOSH recommended exposure limit for hexavalent chromium is 1 $\mu g/m^3$.

APPOINTMENTS

Obama Fills CSB Positions

In March, President Obama nominated Rafael Moure-Eraso, CIH, PhD, to be chair of the Chemical Safety and Hazard Investigation Board (CSB). The President also appointed Mark A. Griffon to the CSB.

The CSB is an independent, federal agency that investigates incidents involving industrial chemical accidents. Although the agency cannot issue fines or citations, it offers suggestions to industry stakeholders, organizations, and regulatory agencies such as EPA and OSHA.

Rafael Moure-Eraso is a professor and graduate coordinator with the University of Massachusetts-Lowell's Department of Work Environment in the School of Health and Environment. He is also a member of the American Institute of Chemical Engineers, AIHA®, ACGIH® and the American Public Health Association.

Mark A. Griffon is founder of Creative Pollution Solutions, Inc., an EHS consulting firm. He has served on the Federal Advisory Board on Radiation and Worker Health, the Federal Advisory Committee on External Regulation of Department of Energy Nuclear Safety, and the Advisory Board for the U.S. Transuranium and Uranium Registries.

For more information on these appointments, visit www.whitehouse.gov/the-press-office/president-obama-announces-more-key-administration-posts-32210.

TOXIC SUBSTANCES

EPA Makes TSCA Inventory Public

In March, EPA announced that its inventory of toxic substances is now available free of charge to the public. The Toxic Substances Control Act (TSCA) Chemical Substance Inventory, a consolidated list of thousands of industrial chemicals, is accessible at www.epa.gov/oppt/newchems/pubs/invntory.htm and at data.gov.

Previously, access to the public portion of the inventory was available only for a fee.

More than 84,000 chemicals are listed in the TSCA inventory. However, EPA is prohibited from identifying approximately 17,000 chemicals because their manufacturers have claimed that the names of these chemicals are confidential business information. TSCA allows companies to conceal certain proprietary information as confidential.

In January, EPA announced that it would no longer allow companies to claim confidentiality for the identity of a chemical.

WORKER PROTECTION

OSHA Notifies 15,000 Workplaces of High Injury and Illness Rates

Approximately 15,000 workplaces were notified by OSHA in March that their injuries and illness rates were considerably higher than the national average. The agency sent letters to workplaces with the highest numbers of injuries and illnesses that resulted in days away from work, restricted work activities, or job transfers.

In an agency press release, Assistant Secretary of Labor for

OSHA David Michaels stated, "Receipt of this letter means that workers in that particular establishment are being injured at a higher rate than in most other businesses of its kind in the country. Employers whose businesses have injury and illness rates this high need to take immediate steps to protect their workers."

Employers were also provided copies of their injury and illness data, as well as a list of the most frequently cited OSHA standards for their industry. A list of employers that received the letter is available on the OSHA website at https://www.osha.gov/as/opa/foia/hot_16.html.

RISK ASSESSMENT

EPA Launches New Risk Assessment Database

Recently, EPA established Health and Environmental Research Online (HERO), a public database that features major studies used by EPA to make scientific risk assessments. Included in the database are over 300,000 scientific articles that are searchable by categories.

HERO covers topics on pollutants, chemicals, and health and environmental issues. Many of HERO's articles are used to establish particular risk assessments, which in turn are used to support policy decision making within the agency. HERO also features peer-reviewed literature used by EPA to create its Integrated Science Assessments that support the National Ambient Air Quality Standards (NAAQS) review, as well as references and data from the Integrated Risk Information System (IRIS), a database containing agency policymaking for chemical regulation.

For more information on HERO, visit www.epa.gov/hero.

MEETING

OSHA Conducts Public Forum

On March 4, OSHA held "OSHA Listens," a public meeting aimed at gathering recommendations from environmental, health and safety stakeholders on important issues affecting the agency. Prior to the meeting, OSHA published several questions that the agency planned to address during the open forum. Participants were encouraged to come to the meeting with comments to these questions and other suggestions on how to improve the agency. The updating of Permissible Exposure Limits (PELs), improvements that could increase the effectiveness of OSHA's compliance assistance efforts, and new tools that the agency could use to reach at-risk employers and employees were a few of the topics discussed during "OSHA Listens."

Among the speakers at the meeting were citizens advocating for family members injured or killed while performing their jobs and representatives from EHS organizations, such as the American Public Health Association, American Society for Safety Engineers (ASSE) and the National Council for Occupational Safety and Health. AIHA® Government Affairs Director Aaron Trippler also provided comments from the association.

For more information on "OSHA Listens," visit www.osha.gov/as/opa/osha-listens.html.

GREEN BUILDING

International Green Construction Code Launched

In March, the International Code Council (ICC), the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), the Illuminating Engineering Society of North America (IEDS) and the U.S. Green Building Council (USGBC) announced the creation of the International Green Construction Code (IGCC). IGCC brings together organizations involved in building safety, energy and lighting engineering, green building design, and the facilitation of technical standards to develop codes used in the construction and maintenance of green buildings.

The launch of the IGCC provides the construction industry with enforceable building codes intended to aid in the creation of safe, sustainable green buildings.

The technical content of IGCC includes the ANSI/ASHRAE/USGBC/IES Standard 189.1, "Standard for the Design of High Performance, Green Buildings Except Low-Rise Residential Buildings"—a standard that compels green building to follow certain technical requirements in areas such as energy efficiency and indoor air quality.

For more information about the IGCC, visit www.iccsafe.org/cs/IGCC/Pages/default.aspx.

ENVIRONMENTAL REGULATIONS

EPA Website Provides Public Access to Rulemaking

A new EPA website allows the public to access information about agency rulemakings as they are being developed. Visitors to the EPA's "rulemaking gateway" at http://yosemite.epa.gov/opei/RuleGate.nsf can search for rules by phase (pre-proposal, proposal, final rule), topics (including air, waste, pesticides, and water), and effects (children's health, environmental justice, small businesses, etc.).

According to an EPA press release, information about rules development is posted to the rulemaking gateway site as soon as work begins. Time-sensitive information is updated daily; other updates are monthly.

A link from the site's home page leads visitors to a discussion forum where the public can suggest improvements to the site. The forum will be available through mid-July. More information on the site can be found at www.epa.gov/rulemaking/.

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virtually no incidents. But the guidelines in the new NFPA 70E suggested that those tasks were potentially far more hazardous than extensive industry-wide field experience had shown them to be.

Other employers raised concerns about the difficulty of applying broad consensus standards in certain settings. For example, employers that service equipment at a host employer may have multiple employees who perform diagnostic work on energized control panels. Some of these employees may make service calls at several locations in a single day, with little to no advance notice. Most panels would contain parts operating at less than 240 volts, which is one of the thresholds that determines whether workers should wear more protective PPE. Lines into the panels that were greater than 240 volts would be reduced to 240 or less in the area of the box on which work was to occur; still, the employee would likely be within the 48-inch NFPA 70E arc flash boundary for the higher voltage part. There could be multiple transformers serving circuits, as well, which the employees would not know beforehand. Under the new NFPA 70E, such conditions would probably require a detailed arc flash hazard analysis even if industry-wide experience suggested that injuries were highly unlikely.

Certain tables in the NFPA 70E standard are meant to help employers determine whether an arc flash hazard analysis is necessary. However, in some instances, using these tables requires knowledge of short-circuit current and fault clearing times—information that is unlikely to be available to employees on service calls. Thus, work previously thought to present no extraordinary electrical hazards—where PPE could consist of appropriate gloves, boots, safety glasses, natural fiber pants and long-sleeved shirts—could now require calculation of an arc flash hazard analysis, an arc flash suit hood or balaclava and face shield, coveralls with an arc rating of at least eight, and the like.

No Surprises

Obviously, the intent of consensus safety standards like NFPA 70E is to prevent accidents before they occur. Even if an industry hasn't experienced a certain kind of accident, that alone does not mean that a provision in a standard is unnecessary.

Unfortunately, a consensus safety standard meant to be broad in application will sometimes be over-inclusive. OSHA's procedures for promulgating rules exist to minimize surprises on the regulated community and provide opportunities for rules to reflect the concerns of industry and workers. But if OSHA intends to use NFPA 70E to support citations issued for violations of the General Duty Clause, the agency and employers may end up debating what constitutes appropriate PPE in court. It would be better for all concerned to settle this argument during the rulemaking process.

Paul Waters, JD, is with Akerman Senterfitt. He can be reached at (813) 223-7333 or paul.waters@akerman.com.

CONNECT FOR CREDIT

CareerAdvantage Development Fair 2010

May 24–26, 2010

AIHce Attendees

In today's job market, it is important to be equipped with the knowledge and skill to position yourself as a strong candidate—whether as an active job seeker or a currently employed IH professional.

Stop by the *CareerAdvantage* Development Fair 2010 at AIHce and get the tools you need to help you take the next career step.

Informative Seminars

Come listen to expert advice and get helpful tips on building a consulting practice and job searching in various industries.

Speed Networking

Created for busy professionals like yourself, speed networking is a fun, new way to connect with many peers and possible job contacts in a short period of time.

Mock Interviews

Schedule your personal session with an experienced HR professional and learn great interviewing techniques that result in job offers.

Résumé Critiquing

You will get helpful feedback on your résumé directly related to appearance, style, length, focus, use of accomplishments, use of keywords/action verbs, and much more.

Employers

Want to make hiring easy this year?
Visit the *CareerAdvantage* Development Fair, where you can network with talented OEHS professionals.

It's easy!

Simply purchase the Development Fair Package for just $350 and get:

- Up to three job postings
- 60-day access to nearly 1,000 résumés
- Access to employers lounge

Job packages with résumé access typically start at $599. Even if you aren't planning to attend AIHce, you should still get the Development Fair Package just for the savings.

Limited space is available, so hurry! Contact AIHA Career and Employment Services at (703) 849-8888 today.

CareerAdvantage
Development Fair
Building Careers for Life

AIHA®
Protecting Worker Health

Opportunities

MEETINGS ■ CONFERENCES ■ COURSES ■ DISTANCE LEARNING ■ CALLS FOR PAPERS

Send information about OEHS events to synergist@aiha.org. For a complete list of events, visit www.aiha.org/education/Pages/CalendarofEvents.aspx.

Continuous Enrollment
AIHA's Distance Learning Program offers a variety of topics in convenient and cost-effective formats such as TeleWeb virtual seminars, self-study workbooks, webcourses, DVDs and videos. Visit: www.aiha.org/content/CE/DL/dl.htm.

AIHce 2009 Technical, General and Keynote Sessions are available as DVDs and downloads. Contact: (703) 849-8888; EduAssistant@aiha.org; www.conferencemedia.net/store/stores/aihce.

May 3–6
Chapel Hill, North Carolina
Certified Hazardous Material Manager (CHMM) Review. CMs: 3.5; CHMMs: 25.3. Contact: (888) 235-3320; osherc@unc.edu; http://osherc.sph.unc.edu/ce/courses/chmm_rev.htm.

May 4–7
Louisville, Kentucky
2010 Governor's Safety and Health Conference and Exposition. Contact: www.kshn.net.

May 4–7
Osage Beach, Missouri
2010 Mid-America Safety, Health and Environmental Conference and Expo: Seeking Sustainable Solutions. Contact: www.missourisafetycouncil.org/conference.php.

May 7–11
Baltimore, Maryland
The American Association of Immunologists: Immunology 2010. Contact: www.immunology2010.org.

May 10–14
Boston, Massachusetts
Guidelines for Laboratory Design: Health and Safety Considerations. Contact: (617) 384-8692; contedu@hsph.harvard.edu; https://secure.sph.harvard.edu/ccpe/programs.cfm?CSID=GLD0510&tpg=logistics.

May 11
Augusta, Maine
Safety is Elementary course. Contact: Register@LabSafetyInstitute.org; www.LabSafetyInstitute.org.

May 12
Augusta, Maine
Safety in the Laboratory course. Contact: Register@LabSafetyInstitute.org; www.LabSafetyInstitute.org.

May 12
Cincinnati, Ohio
Quantitative Fit Testing. Contact: (513) 558-1234; www.drmckay.com.

May 12–14
Minneapolis, Minnesota
Minnesota Safety and Health Conference. Contact: www.minnesotasafetycouncil.org/conf/10index.cfm.

May 13
Augusta, Maine
How to Be a More Effective Chemical Hygiene Officer course. Contact: Register@LabSafetyInstitute.org; www.LabSafetyInstitute.org.

May 13
Sacramento, California
Sacramento Valley Local Section meeting and tour of Sacramento County Airport. Contact: www.aiha.org/localsections/html/SVS/calendar.htm.

May 17–19
Boston, Massachusetts
Effective Risk Communication: Theory, Tools, and Practical Skills for Communicating about Risk. CMs: 4.81; CEUs: 1.6. Contact: (617) 384-8692; contedu@hsph.harvard.edu; https://secure.sph.harvard.edu/ccpe/programs.cfm.

May 18
Milwaukee, Wisconsin
OSHA 2225 Respiratory Protection course. Contact: https://uw-whitewater-web.ungerboeck.com/reg/reg_p1_form.aspx?oc=10&tct=FULLREG&teventid=5210.

May 18
Natick, Massachusetts
Safety in the Secondary School Science Lab course. Contact: Register@LabSafetyInstitute.org; www.LabSafetyInstitute.org.

May 18–20
Chapel Hill, North Carolina
Short Courses in Occupational Safety: Hazard Recognition and Fixing the Problems. Contact: (888) 235-3320; osherc@unc.edu; http://osherc.sph.unc.edu/ce/courses/shortcourses.htm#iv.

May 18–21
Salt Lake City, Utah
Trainer Course in Occupational Safety and Health Standards for the Construction Industry. Contact: (801) 581-4055; http://medicine.utah.edu/rmcoeh/ContEdProg/May%200SHA-PC.pdf.

May 19
Natick, Massachusetts
Lab Waste Management course. Contact: Register@LabSafetyInstitute.org; www.LabSafetyInstitute.org.

May 19–20
Morgantown, West Virginia
International Conference on Fall Prevention and Protection. Contact: (304) 285-5904; DSR-PAA@cdc.gov; www.cdc.gov/niosh/topics/falls/ICFPP/2010.

May 20
Houston, Texas
Gulf Coast Local Section meeting: Software Application. Contact: www.aiha.org/localsections/html/gulf/meetings.htm.

May 20
Natick, Massachusetts
Biosafety in the Laboratory course. Contact: Register@LabSafetyInstitute.org; www.LabSafetyInstitute.org.

May 22–27
Denver, Colorado
AIHce 2010: New Frontiers in Science and Practice. Contact: www.aihce2010.org.

May 28–29
Toronto, Ontario, Canada
Canadian Association for Research on Work and Health (CARWH) Conference: Worker Health in a Changing World of Work. Contact: carwh2010@iwh.on.ca; http://carwh2010.iwh.on.ca.

June 1–4
Lansdowne, Virginia
15th Annual Virginia Occupational and Health Conference. Contact: (804) 786-5873; coopprog@doli.virginia.gov; www.doli.virginia.gov.

June 7–11
Boston, Massachusetts
Radiation Safety Officer Training for Laboratory Professionals. Contact: (617) 384-8692; contedu@hsph.harvard.edu; https://secure.sph.harvard.edu/ccpe/programs.cfm?CSID=RSO0610&tpg=cluster&tCLID=1.

June 8
Milwaukee, Wisconsin
OSHA 2264 Permit-Required Confined Space Entry course. Contact: https://uw-whitewater-web.ungerboeck.com/reg/reg_p1_form.aspx?oc=10&ct=FULLREG&eventid=5211.

June 10
Natick, Massachusetts
How to Be a More Effective Chemical Hygiene Officer course. Contact: Register@LabSafetyInstitute.org; www.LabSafetyInstitute.org.

June 13–16
Baltimore, Maryland
Safety 2010. Contact: (630) 434-7779; safety@heiexpo.com; www.asse.org/education/expo10/about.php.

June 13–18
Sudbury, Ontario, Canada
U.S./North American 13th Mine Ventilation Symposium. Contact: www.mirarco.org/minevent.

June 14–15
Cambridge, Massachusetts
Preventing and Treating Biological Exposures: A Colloquium for Occupational Medicine, Infectious Disease and Emergency Medicine Professionals. Contact: (207) 490-1076; www.eagleson.org; eagleson@eagleson.org.

June 14–18
Boston, Massachusetts
Comprehensive Industrial Hygiene: The Applications of Basic Principles. CECs: 16; CEUs: 3.4; CMs: 5.51. Contact: (617) 384-8692; contedu@hsph.harvard.edu; https://secure.sph.harvard.edu/ccpe/programs.cfm?CSID=CIH0610&tpg=cluster&tCLID=1.

June 14–18
Chapel Hill, North Carolina
Supervising Asbestos Abatement Projects. CMs: 5.0. Contact: (888) 235-3320; osherc@unc.edu; http://osherc.sph.unc.edu/ce/courses/ahera_super.htm.

June 17–18
Toronto, Ontario, Canada
Industrial Noise Exposure Evaluation Workshop. Contact: (416) 759-9579; info@alara.ca; www.alara.ca.

June 17–20
Milwaukee, Wisconsin
Hearing Loss Association of America (HLAA) 2010 Conference. Contact: www.hearingloss.org/convention/index.asp#register.

June 21–25
Anaheim, California
TechConnect World Conference and Expo 2010. Contact: www.techconnectworld.com/World2010.

June 26–30
Albuquerque, New Mexico
ASHRAE 2010 Annual Conference. Contact: giometti@ashrae.org; www.conferencetoolbox.org/ASHRAE2010.

June 28–July 2
Shanghai, China
Measurements of Hazardous Substances. CMs: 5.34. Contact: Mark Katchen; (310) 474-3937; mkatchen@phylmar.com; www.aiha.org/education/ce/roadcourses/Pages/MeasurementofHazardousSubstances.aspx.

July 11–15
Baltimore, Maryland
Institute of Nuclear Materials Management (INMM) 51st Annual Meeting. Contact: (847) 480-9573; inmm@inmm.org; http://inmm.org/meetings/index.cfm.

July 12–15
Orlando, Florida
CIH Review Workshop: Four-day Intense Review. CMs: 4.68; COCs: 4.0. Contact: (866) 264-5852; www.BowenEHS.com.

July 12–16
Chicago, Illinois
Inter/Micro 2010 Microscopy Symposium. Contact: intermicro@mcri.org; www.mcri.org/home/section/101-523/inter-micro-2010.

July 15
Houston, Texas
Gulf Coast Local Section meeting: Basic Electrical Safety with NFPA 70E. Contact: www.aiha.org/localsections/html/gulf/meetings.htm.

July 21–23
Keystone, Colorado
Nanomaterials and Worker Health: Medical Surveillance, Exposure Registries, and Epidemiologic Research. Contact: www.cdc.gov/niosh/topics/nanotech/keystone2010/default.html.

July 26–30
Norfolk, Virginia
33rd Annual Occupational Safety and Health Summer Institute. Contact: (888) 235-3320; osherc@unc.edu; http://osherc.sph.unc.edu/institutes/summer10/index.htm.

July 27–29
Berkeley, California
6th Annual Laser Safety Workshop. Contact: Martha Condon; (510) 486-4182; MHCondon@lbl.gov; www-afrd.lbl.gov/lsow/index.html.

August 17–19
Atlanta, Georgia
Fourth National Conference on Health Communication, Marketing, and Media. Contact: www.cdc.gov/healthmarketing/NCHCMM2009.

Product Features

ABSA—Booth 716
Health, Safety and Environmental Services

ABSA was founded in 1984 to promote biosafety as a scientific discipline and serve the needs of biosafety professionals. ABSA's goals are to provide a professional association that represents the interests and needs of practitioners of biological safety, and to provide a forum for the timely exchange of biosafety information.

Circle Fax-back Card No. 42

Aerobiology Laboratory Associates, Inc.—Booth 923
Analytical Laboratory Services

Aerobiology Laboratory Associates, Inc. is an AIHA EMLAP -accredited environmental microbiology laboratory and a NVLAP-accredited asbestos PLM laboratory with locations in the Washington, D.C. area, Atlanta, Ga., and Denver, Colo. Aerobiology supports the IH community by providing quality and timely environmental microbiology analytical services in addition to PLM asbestos analysis.

Circle Fax-back Card No. 43

ALS Laboratory Group—Booth 1229
Industrial Hygiene Analytical Services

ALS Salt Lake City, formerly DataChem Laboratories, is a premier provider of industrial hygiene analytical services in the United States. ALS consistently delivers quality data to assist our clients in promoting human health. ALS has been accredited by AIHA® since 1974.

Circle Fax-back Card No. 44

American Heart Association—Booth 615
First Aid, CPR and AED Training

As part of the mission of the American Heart Association, we are dedicated to providing first aid, CPR, AED and bloodborne pathogens training for employees in the workplace at small and medium businesses, and Fortune 1500 companies. We offer courses online, in a classroom setting, and in Spanish.

Circle Fax-back Card No. 45

A.P. Buck, Inc.
Personal Sampling and IAQ Products

In 1980, Al Buck designed the first bubble calibrator. Thirty years later, AP Buck, Inc. continues its "Tradition of Innovation" with state-of-the-art IAQ samplers, personal air samplers, asbestos and lead samplers and calibrators for IH, IAQ, occupational health, and safety disciplines. For product information, visit www.apbuck.com or call (800) 330-2825.

Circle Fax-back Card No. 46

Argus-Hazco—Booth 1602
Industrial Hygiene, Health and Safety Equipment Rental, Sales and Service

Exceeding your requirements in IH, health and safety solutions—specializing in air sampling, IAQ, noise/heat and respiratory fit testing. We sell, rent and repair! U.S. locations in Detroit, Grand Rapids, Dayton, Chicago, Denver, and Anaheim, and Sarnia and Toronto in Canada. For more information, visit www.argus-hazco.com or call (800) 332-0435.

Circle Fax-back Card No. 47

To obtain further information on the listed products and companies, please circle the numbers on the fax-back card (p. 65) that correspond to the new products.

Assay Technology, Inc.—Booth 803
Personal Monitoring Badges

Assay Technology manufactures personal diffusive samplers, offering the broadest range of OSHA-regulated chemicals including organic vapors, aldehydes, amines, anesthetics and inorganic gases. Best value on badge with AIHA®-accredited lab analysis. Receive 10 percent off Internet orders. Badges meet OSHA requirements. For more information, visit www.assaytech.us or call (800) 833-1258.

Circle Fax-back Card No. 48

Bios International Corporation—Booth 1610
Bios Defender® 500 Series Primary Flow Standard

The Defender™ Series is the calibrator of choice for industry professionals—a primary standard known for its ruggedness, dependability and ease of operation. The Defender has 3 models, all offering 1 percent volumetric accuracy. The 520 simultaneously records temperature and pressure conditions. For more information, visit www.biosint.com or call (800) 663-4977.

Circle Fax-back Card No. 49

Casella USA—Booth 809
CEL-600 Series

The CEL-600 series real-time anaylzers measure noise in full color. A wide, single-range real-time analyzer with octave band analysis, datalogging storage and USB interface to Casella Insight software makes every measurement a breeze. Everything is measured in every run; no need to choose beforehand. Come and see us in Denver.

Circle Fax-back Card No. 50

DataChem Software, Inc.—Booth 1126
Computer-Based Certification Training

DataChem Software just released CIHprep V9.0. The computer-based training program helps professionals prepare for the current CIH exam. The questions were reviewed and re-aligned with the current exam outline. This resulted in updating hundreds of questions, deleting inapplicable questions, and adding new questions. For more information, visit www.CertiStep.com.

Circle Fax-back Card No. 51

EMLab P&K—Booth 823
IAQ Testing Laboratory

EMLab P&K is recognized as one of the leading commercial indoor air quality (IAQ) testing laboratories in North America. We specialize in analyzing air and surface samples for fungi, asbestos, bacteria, allergens, radon and USP 797.

Circle Fax-back Card No. 52

EMSL Analytical, Inc.—Booth 1317
Health, Safety and Environmental Services

EMSL products division will once again be exhibiting at AIHce 2010 as part of EMSL Analytical, Inc. The products division will be displaying cutting-edge environmental equipment with hands-on demonstrations. Stop by the EMSL booth and take advantage of the knowledgeable staff and AIHce special on-site equipment pricing.

Circle Fax-back Card No. 53

To obtain further information on the listed products and companies, please circle the numbers on the fax-back card (p. 65) that correspond to the new products.

Product Features

Entech Instruments, Inc.—Booth 1511
Bottle-Vac™ Glass Canisters

Revolutionary micro-valve technology transforms deactivated glass bottles into inexpensive, disposable whole air sampling canisters suitable for OSHA PV2120. Significantly improved precision over tubes, badges or Tedlar bags, but comparably priced. Ideal for environmental monitoring, industrial hygiene (STEL, TWA), indoor air/vapor intrusion, mold investigation. For more information, visit www.entechinst.com.

Circle Fax-back Card No. 54

Euro Safety and Health—Booth 637
EHS Consulting

We perform REACH compliance assistance, air sampling, noise measurements, vibration assessments, ergonomic evaluations, indoor air quality studies, due diligence evaluations, regulatory reviews, and training. Located in the middle of England with an American principal, we provide quick and cost-effective services anywhere in the UK, Europe or the world.

Euro SAFETY & HEALTH www.eurosh.com

Circle Fax-back Card No. 55

Galson Laboratories—Booth 903
Laboratory Services

You'll always get the best sampling options available with results in five days or it's free. Galson offers superior value with its FreePumpLoan™, FreeSamplingBadges™ and equipment rental programs. Get the best option of state-of-the-art lab testing, comprehensive detector tube technology, and cutting-edge, real-time instrument monitoring. For more information, visit www.galsonlabs.com.

GALSON LABORATORIES

Circle Fax-back Card No. 56

GrayWolf Sensing Solutions—Booth 1603
WolfSense® 2010 Application Software

GrayWolf introduces a revised and redesigned version of its environmental instrumentation operating software. WolfSense 2010, in conjunction with GrayWolf sensors, transforms Windows XP/VISTA/7 notebook PCs and Windows Mobile Pocket PCs into sophisticated, air-quality measurement instruments. An improved user interface makes operation of this advanced instrumentation easier to use than basic units.

Circle Fax-back Card No. 57

iNet—Booth 1213
Gas Detection

iNet is a software-based service. It increases safety, providing visibility into alarms, exposure and usage. It also keeps gas detectors working without costly and time-consuming maintenance. And iNet subscribers do not have to buy the gas detectors. Instead, they receive gas detection as a service.

Circle Fax-back Card No. 58

Interactive Safety Products—Booth 1525
Industrial Hygiene, Health and Safety Products

Designed for the pharmaceutical industry, our new P-Series PAPR is a complete, head top PAPR for increased worker comfort. Eliminates the disposal of paper hoods, saving money. ESM systems monitors flow rate, battery and filter life for added safety. For more information, visit www.helmetsystems.com or call (800) 251-7377.

Circle Fax-back Card No. 59

To obtain further information on the listed products and companies, please circle the numbers on the fax-back card (p. 65) that correspond to the new products.

Kinetics Noise Control—Booth 705

Outdoor Fiberglass Absorbers/Barrier Composites

KFA and KBC-ENV fiberglass absorber/barrier composites are a cost-effective solution to controlling outdoor noise. They are UV-, flame-, tear- and rot-resistant; easily cleaned; unaffected by humidity, dirt, oils and most chemicals; and easy to install, and they have extremely long service lives.

Circle Fax-back Card No. 60

Mettler Toledo—Booth 706

Powder Weighing

Quantos improves safety and efficiency when weighing out hazardous or potent powder compounds. The system automatically doses powders at 10mg or higher and reduces aerosol formation, improving occupational safety. Quantos improves speed, safety and savings of analytical sample preparation, filling, and capsule prep (or within a glove box) and more!

Circle Fax-back Card No. 61

Mycometer, Inc.—Booth 511

Mycometer® test

Sample, test and report fungal or bacterial contamination on site in 30 minutes with Mycometer's award-winning technology. Analyze air, surface or bulk samples to delineate contamination or verify remediation. Interpret data with objective, scientifically documented criteria that provides consistency. Exceed customer expectations—improve data reliability with this rapid, repeatable method.

Circle Fax-back Card No. 62

Nextteq LLC—Booth 1012

Gastec Detector Tubes

Nextteq's complete line of pumps and detector tubes precisely measure gases and vapors. The pump's easy-to-pull handle and one-stroke precision piston action provides field-proven, foolproof operation with no partial samples. Gastec Detector Tubes offer accurate and reliable analysis with lower standard deviation. For more information, visit www.nextteq.com or call (877) 312-2333.

Circle Fax-back Card No. 63

Open Range Software LLC—Booth 1135

Industrial Hygiene Software

IH database software for sampling (air, noise, bulk, wipe, direct-reading, water, light and specialty areas), employee notification, lab interface, statistics, chain of custody, action tracking, health risk assessment, exposure groups, medical interface, equipment calibration, job hazard analysis, confined space, local exhaust, laser inventory, and much more.

Open Range SOFTWARE
Simply the Best IH software available.

Circle Fax-back Card No. 64

Prism Analytical Technologies, Inc.—Booth 603

CDScan™ Air Quality Test

CDScan determines the presence of contaminated (Chinese) drywall in a home or building. The two-part test measures for low ppb levels of airborne chemicals (COS and CS2) and the source of corrosion on exposed copper HVAC coils. Together, these markers provide a high level of certainty that contaminated drywall is present.

CDScan™

Circle Fax-back Card No. 65

To obtain further information on the listed products and companies, please circle the numbers on the fax-back card (p. 65) that correspond to the new products.

Product Features

Raeco Rents—Booth 1340
Raeco Rents

Short-term rentals available! RAECO offers the latest in particulate monitors, respirator fit testers, noise and sound level meters, and portable gas detectors from TSI, Quest Technologies, Testo, Sensidyne Gilian, Honeywell Analytics, MSA and more. Save 5 percent automatically when you rent at RAECO.com! For more information, call (866) RENT-EHS.

Circle Fax-back Card No. 66

RJ Lee Group, Inc.—Booth 618
Particulate Matter (PM) Passive Sampler

The RJLG-UNC passive PM air sampler represents a cost-effective way to obtain information about air quality in industrial, indoor, outdoor and personal environments. Direct collection (days to weeks). Provides estimates of PM concentration (mg/m3). For more information, contact Keith Rickabaugh at (724) 387-1841 or info@rjlg.com.

Circle Fax-back Card No. 67

Schneider Laboratories, Inc.—Booth 1604
Laboratory Services

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Thermo Scientific—Booth 1017
ADR1500 Dust Monitor

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TSI Incorporated—Booth 1003
Qfit™ Respirator Fit Tester

The Qfit™ Respirator Fit Tester is the only OSHA (29CFR1910.134)-approved automated nebulizer for BITREX® and Saccharin to qualitatively test respirator integrity. The Qfit™ fit tester generates a consistent test agent with a pump-driven nebulizer utilizing pre-filled cartridges. The Qfit™ fit tester reduces solution clogging and minimizes repetitive stress disorders.

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To obtain further information on the listed products and companies, please circle the numbers on the fax-back card (p. 65) that correspond to the new products.

University of South Florida—Booth 1716
Industrial Hygiene Training

The Sunshine Education and Research Center is dedicated to training professionals on how to treat and prevent occupational illnesses, why illness occurs in the workplace, and how to make the workplace a safer environment, using an interdisciplinary approach.

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Voluntary Protection Programs Participants' Association, Inc. (VPPPA)—Booth 1239
Health, Safety and Environmental Services

The VPPPA is the leading member-based nonprofit organization dedicated to cooperative occupational safety, health and environmental management systems, providing networking and educational opportunities to over 2,100 companies and work sites that are involved in OSHA and DOE's VPP Program.

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Zefon International—Booth 909
Air Sampling Equipment and Supplies

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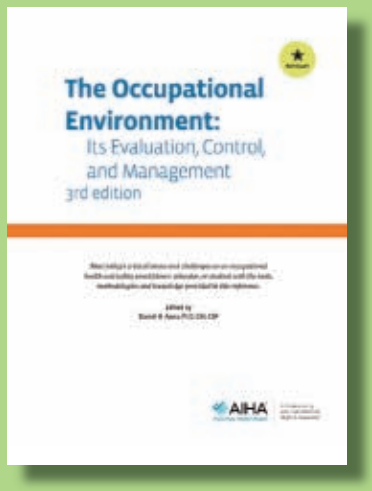

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B ❑ Marketing/Sales
C ❑ Industrial Hygienist
D ❑ Physician
E ❑ Nurse
F ❑ Environ. Specialist
G ❑ Safety Specialist
H ❑ Health Specialist
I ❑ Res./Development
J ❑ Purchasing Agent

3—Purchasing authority:
1 ❑ Recommend
2 ❑ Specify
3 ❑ Approve

4—Number of employees:
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B ❑ 100 to 500
C ❑ 500 to 1,000
D ❑ Over 1,000

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7—Please have a salesperson contact me
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E ❑ Protective Clothing
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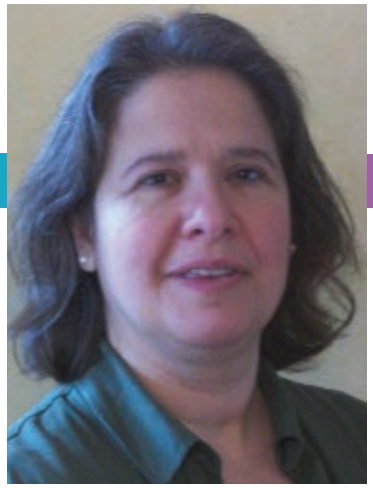

Introductions

Introductions presents profiles of industrial hygienists working to protect worker health worldwide. This month we feature Mary A. Zmuda, CIH, CSP, senior manager of HSE programs at Quaker Foods and Snacks, a division of PepsiCo. As senior manager, Zmuda developed a long-term strategic plan for Quaker's HSE programs and directed the implementation of widespread management systems to improve processes and methods. She also guided the application of operations aimed at understanding the influences of workplace injuries and illnesses and environmental disturbances. She is a member of Quaker's division Supply Chain Leadership Team (SCLT) as well as PepsiCo's Health and Safety Leadership Council and Environmental Council.

Zmuda holds a BS in biological sciences from Indiana University and an MS in environmental engineering from Illinois Institute of Technology (IIT). She previously worked as an assistant biologist and environmental health and safety officer for IIT Research Institute in Chicago, Ill. She can be reached at Mary_Zmuda@quakeroats.com.

Mary A. Zmuda

How did you become interested in environmental health? Working in a research lab while in college reinforced my desire to focus on prevention of environmental and occupational exposures that can lead to negative health outcomes. I was fortunate to work at a research organization that was affiliated with IIT, so I quickly learned about the graduate program in environmental engineering, which paved the way for my transition into EHS.

What is the function of Quaker's Supply Chain Leadership Team? Quaker's SCLT represents all key functions and focal points within the supply chain—namely operations, engineering and sustainability, planning, quality, cost management, contract manufacturing, finance, logistics, innovation, and, of course, HSE. Our role is to set and evolve the supply chain strategy, and to ensure consistent improvement in results. Quaker's SCLT is pivotal for ensuring that the HSE function is well-integrated with our key stakeholders, especially operations, engineering and sustainability, and supply chain planning.

How has Quaker's HSE program helped reduce workplace injury and illness? The cornerstone of Quaker's HSE program is prevention. We apply the principles of IH (anticipation, recognition, evaluation and control) to the entire realm of HSE risks. We saw that the majority of our adverse outcomes—both those with relatively high frequency and those that occurred less frequently but came with significant severity—were related to relatively few risk areas—like machine safety, walking/working surface, ergonomics, etc. Since 2000, Quaker's injury/illness frequency and lost-time frequency rates have declined significantly because of this focus.

What strategies does Quaker use to promote proactive risk management systems? Our overall HSE strategy can be summarized with three words: risk, systems and culture. Our focus on risk allows us to get out in front of HSE losses and prevent them. Our management systems—known internally as Organizational Practices (OPs)—represent the marriage of HSE culture and HSE processes. Our success in driving the OPs is mostly related to the fact that we have devised a consistent way to measure and assess them. Therefore, our HSE metrics go well beyond the traditional lagging indicators and give leadership a good understanding of our entire HSE journey.

What HSE compliance-related tools have you developed and what have they done to improve the HSE program? We've developed several tools to assist with both corporate (or division) and regulatory compliance. For example, we have a Lockout/Tagout (LOTO) tool that specifies the information needed before an energy control procedure can be developed. This information can be rolled into an overall energy control procedure that meets OSHA requirements but also provides meaningful information to our LOTO-authorized employees. Since we've used these tools and processes to implement LOTO, our LOTO-related injuries have dropped tremendously—all while the overall number of injuries/illnesses has also dramatically declined. We have similar tools for machine safety, ergonomics, powered industrial trucks and walking/working surfaces.

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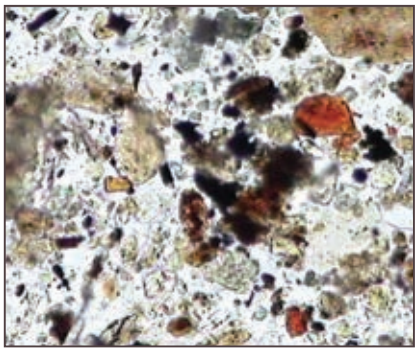
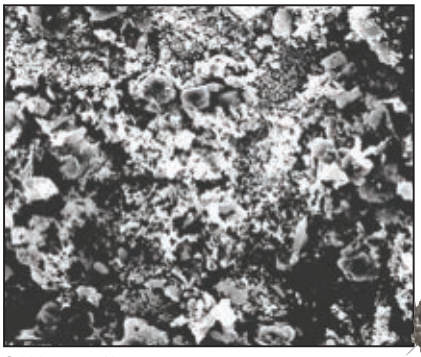
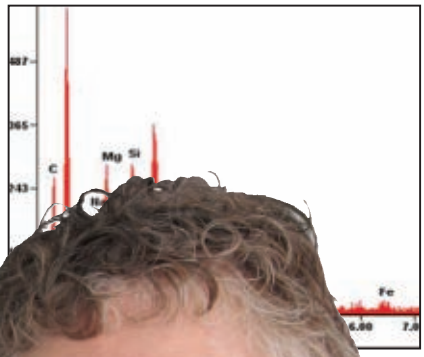


Optical Microscopy ~400X
Sample reveals fire-soot opaque particles and lofted soil dust.



SEM ~2510X
Reveals presence of soot-like opaque particles and confirms high concentrations of mineral dust and clay material.



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