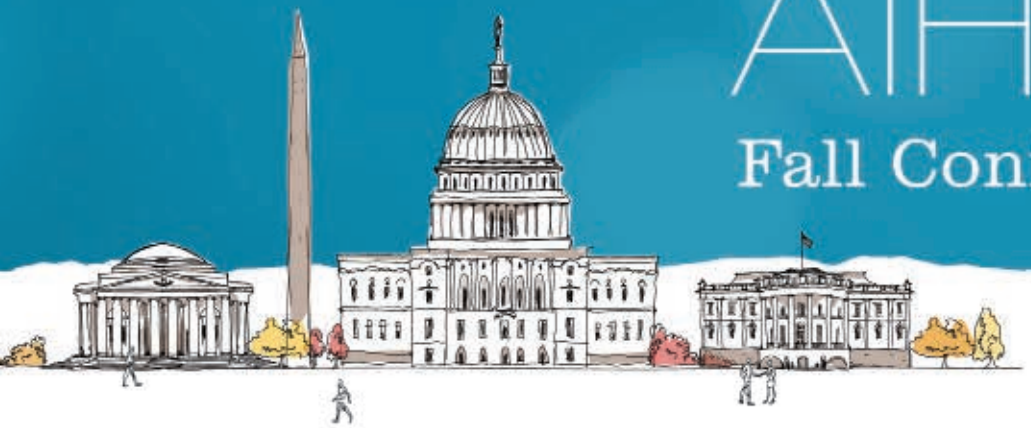

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September 2014

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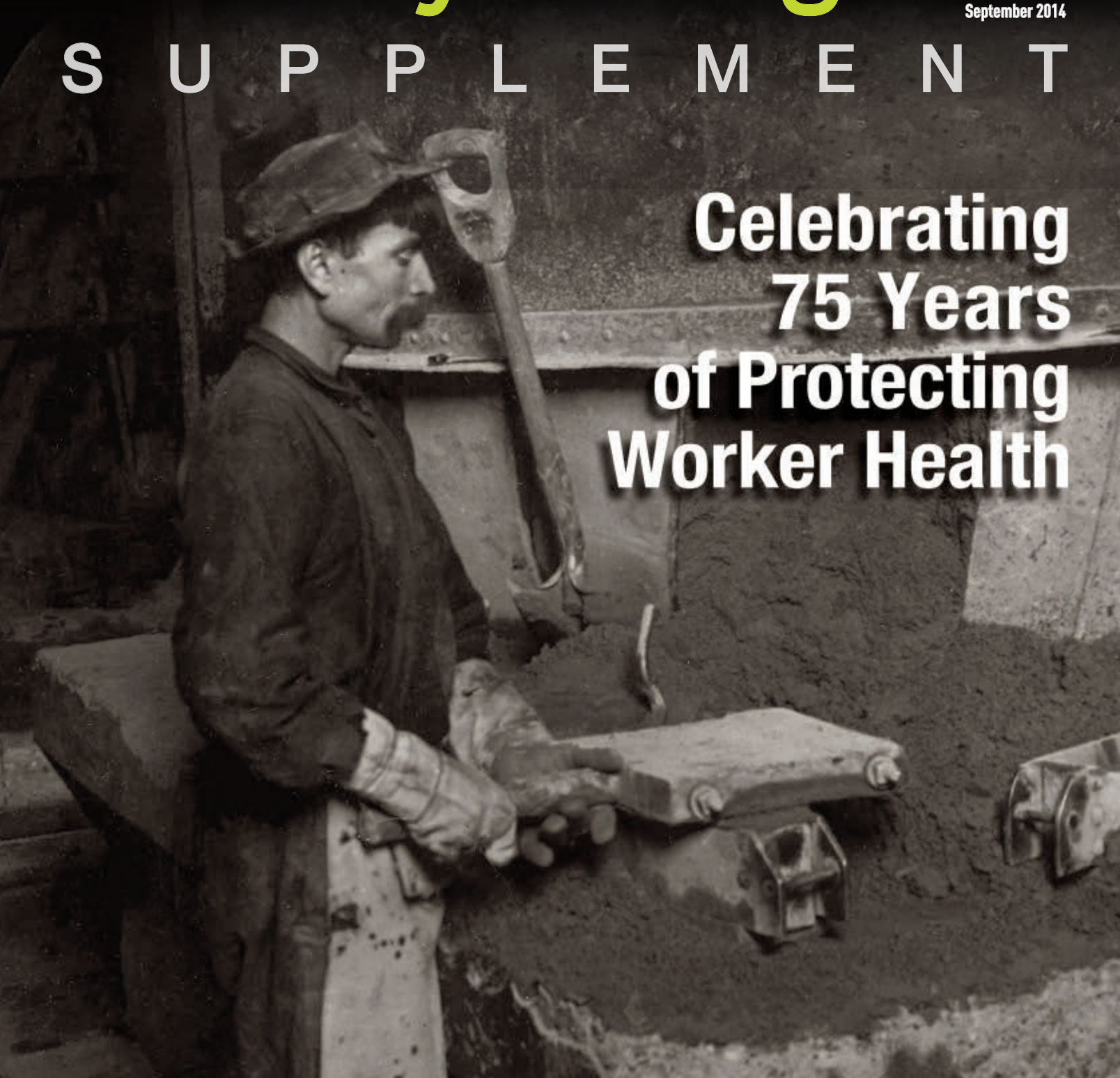

Celebrating 75 Years of Protecting Worker Health

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75 Years of AIHA and Partners Protecting the Health and Safety of Workers

BY DEBBIE DIETRICH, CIH

In an average person's lifespan, the American Industrial Hygiene Association (AIHA) has accomplished the work of many lifetimes in protecting workers worldwide. AIHA's 75th year is a time for reflection on progress made in worker health and safety through the collective efforts of AIHA members, government agencies, academic institutions, labor unions, and equipment manufacturers.

STEPPING STONES TO INDUSTRIAL HYGIENE AND REGULATIONS

The early 1900s saw industrial hygiene taking shape. **Dr. Alice Hamilton, M.D.** and others worked diligently, resulting in the passage of a landmark law requiring Illinois employers to limit worker exposures to toxic chemicals. This legislation led to national industrial health surveys.

Founded in 1939, **AIHA** established its mission to achieve and maintain the highest professional standards for its members through published resources, professional development, advancement services, insurance, advocacy/representation in government affairs, and recognition.

AIHA began its legislative trek in the 1940s, advising the U.S. government to label solvents as hazardous materials. AIHA member **Warren Cook** published a list of occupational exposure values (Maximum Allowable Concentrations, or MACs) in 1946 that became the basis for the first **ACGIH Threshold Limit Values (TLVs®)**. **AIHA Quarterly** entered publication.

The year 1970 was pivotal with passage of the Occupational Safety and Health Act that created **OSHA** for regulation/compliance and **NIOSH** for research/recommendations. OSHA adopted its first **PELs** in 1971 (based on ACGIH TLVs).

OF METHODS AND MEDIA

Regulations and inspections created a need for air sampling methods. At the 26th annual ACGIH meeting (1964), researchers Otterson and Guy presented a contaminant collection method using activated charcoal and gas chromatography. Subsequently, the first comprehensive sorbent tube method for multiple contaminants was presented at the 31st annual ACGIH conference (1969) by White, Taylor, Mauer, and Kupel of the Bureau of Occupational Safety and Health (NIOSH predecessor). The method was published in the *American Industrial Hygiene Association Journal* (1970).

NIOSH successively developed validated sampling/analytical methods for each of the 400 chemicals in the new OSHA standard as part of the Standards Completion Program. The first *NIOSH Manual of Analytical Methods* (1974) included NIOSH Method P&CAM 127 for 13 organic solvents using charcoal tubes.

SAMPLING MEDIA AND PUMP AVAILABILITY

Air sampling methods brought a need for commercial tube and pump suppliers. Physical Chemist Dr. Lloyd Guild noted this new demand. Living and working in industrially polluted Pittsburgh, Pennsylvania inspired Dr. Guild, owner of the Scientific Kit Corporation precision laboratory glassware, to seek ways of protecting workers from occupational air hazards. Guild's passion, expertise, legislative focus, and manufacturing abilities culminated in the Scientific Kit Corporation (now SKC Inc.) producing the first commercial charcoal tubes for NIOSH in 1973. SKC also produced one of the first low flow pumps for tube sampling. Today, SKC manufactures over 100 varieties of 226 Series sorbent tubes and sample pumps for many applications.

AIHA'S CORE MISSION IS STRONG—NOW AND INTO THE FUTURE

AIHA has not deviated from its core mission in 75 years. It has steadily cultivated its growing publications, continuing education, community, advocacy, and good science. Recently, AIHA has made strides in industrial hygiene title protection and impacted legislative efforts while increasing its reach worldwide. Now is the perfect time to salute the supportive industrial hygiene community AIHA has created and its partnerships with ACGIH, OSHA, NIOSH, and manufacturers such as SKC. A toast to the future of AIHA and industrial hygiene!

DEBBIE DIETRICH HAS BEEN AN AIHA MEMBER SINCE 1985 AND HAS SERVED AS PRESIDENT OF THE GULF COAST LOCAL SECTION, DIRECTOR OF THE NATIONAL AIHA BOARD, AND MEMBER OF SEVERAL COMMITTEES.

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On June 14, 2014, MSA Safety Inc. celebrated its 100th anniversary. Former United States (U.S.) Bureau of Mines mine rescue engineers John T. Ryan and George H. Deike established MSA with the hope of saving lives.

An average of 1,000 miners had died on the job in the U.S. each year between 1880 and the early 1900s, and nearly 100,000 were injured annually. Many of the explosions were caused by the open-flame cap lamps miners wore to provide illumination.

Ryan and Deike convinced Thomas Edison to develop a battery-operated lamp. In 1915, MSA's first significant product, the "flameless" Edison Electric Miners Cap Lamp, was introduced. It reduced mine explosions and miner deaths by more than 75 percent over the following 25 years. Later in life, Edison called this lamp the one invention of his that did the most for humanity.

Along with the development of subsequent generations of cap lamps, MSA continued with the design and manufacturing of a broad range of safety products protecting all those in danger.

As is evident, there have been many highlights in the company's history, but MSA is most proud of what it accomplishes every day, year in and year out, for workers in more than 140 countries around the world: the development and manufacturing of products that help protect men and women every day who work in any and all occupations where hazards exist.

Listed below are just a few of MSA's significant accomplishments, milestones and key products that helped to shape the company we are today:

1914 – 1919: Ever Ready First Aid Packets; Sterile Compress Bandages; Edison Flameless Electric Miners' Cap Lamp; Gibbs Breathing Apparatus; Battle Ready Gas Mask; Carbon Monoxide (CO) Detector

1920 – 1929: MSA custom-built the Standard Rockdust Distributor for mine applications, which helped reduce explosive coal dust in the air; Hopaclite-based monitors controlled ventilation fans in the Holland Tunnel in New York City (NYC) when CO levels got too high

1930 – 1939: Skullgard® Hard Hat (withstood radiant heat loads up to 350°F); first Bureau of Mines approval for a dust respirator was for MSA's Comfo® Respirator; Topgard® Fireman's Helmet

1940 – 1949: MSA went global; produced 300 products for the US military during World War II, including first chemical oxygen breathing apparatus; Demand Masks

1950 – 1959: Shockgard Hat; Single-Lens Facepiece

1960 – 1969: Military gas masks were produced for US forces in Vietnam; Topgard® Hard Hat; V-Gard® Helmet; designed filter system for Apollo moon spacecraft; Apollo 12 Astronauts wore Custom Comfo® Aerosol Filter Respirators

1970 – 1979: Long-life, lithium-iodine pacemaker battery was developed by MSA/CRC to power the first heart pacemakers; fiberglass-wrapped self-contained breathing apparatus (SCBA) cylinders; Model 401 Pressure-Demand Air Mask; supplied respirators, filters and room-sized High-Efficiency Particulate Air (HEPA) scrubbers were sent to aid in Three Mile Island clean-up

1980 – 1989: Three "Firsts" for SCBA Products: Custom 4500 Air Mask, Ultralite® Air Mask; and Composite II air-cylinder; MCU-2/P Military Gas Mask; Quick-Fill® System

1990 – 1999: Exclusively distributed Argus Thermal Imaging Camera (TIC); GME Super Cartridge for ten specific gases and vapors

2000 – 2009: On June 14, 2000, MSA began trading on the New York Stock Exchange; Evolution® 4000 TIC; in response to 9/11, assisted at Ground Zero in NYC; FireHawk® Air Masks

2010 – 2014: Acquired General Monitors and together launched six cross-branded product platforms including GM PA4000/MSA Chemgard® Monitor and Flamegard® 5 Flame Detection System; XCell® Sensor Platform for ALTAIR® 4X Gas Detectors; V-Gard Accessory System; Fas-Trac III Ratchet Suspension; MSA G1 SCBA; ALTAIR 2X Gas Detector with a stand-alone bump test

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NOTE ON PHOTOGRAPHY

This supplement to the September 2014 *Synergist* features historical photos from AIHA's archives and images from Earl Dotter's collection *Working in the U.S.A., 1885–1935.* The image on the cover portrays a worker in the clay industry molding a silica brick used to insulate steel mill ladles. The raw material of the brick is almost pure silica. For more information about Earl Dotter's work, see the photo essay beginning on page 16.

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SUPPLEMENT TO VOLUME 25 NUMBER 08

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AIHA®
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Legacy of Achievement

BY BARBARA J. DAWSON

Although the roots of industrial hygiene run deep (think Hippocrates, Pliny the Elder, Agricola and Percivall Pott), it was AIHA that nourished it and tended its growth into the vibrant profession it is today. AIHA began in 1939 when a group of non-physician members of the American Association of Industrial Physicians and Surgeons decided to form their own association to prevent workplace illness. Over the years, the definition of industrial hygiene has evolved to its present formulation—the anticipation, recognition, evaluation, and control of health hazards in the workplace—but the mission hasn't changed. I've had the privilege of being involved in AIHA for the past 35 years, and even though I didn't know our forefathers personally, I certainly know them by their reputations and their contributions to the field. Most of you, regardless of your age, have probably read articles or books written by them, used equipment invented by them, or benefited in some way by work they performed.

For 75 years, our collective vision has steadily expanded worker health protection.

This legacy has continued through the 75 years that AIHA has been in existence. New hazards, new exposures, new research, new controls, new monitoring methods—all have made industrial hygiene a dynamic field, and AIHA has evolved to help members meet new challenges. From its original 160 members to the more than 10,000 members today, AIHA has provided a home for industrial hygienists to serve on technical committees, author publications, present courses, and learn together at conferences and local section meetings. More importantly, the work we've done has protected workers and prevented occupational illnesses.

SEMINAL MOMENT

Some of our most effective contributions as an organization have been our support for legislation. The most prominent example is the 1970 Occupational Safety and Health Act, which was intended, as its preamble states, to assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health; and for other purposes.

The OSH Act was the seminal moment for our profession in the United States and a giant step toward protecting workers. It created OSHA to carry out standard-setting and enforcement responsibilities, and NIOSH to conduct research, information, education, and training activities. AIHA has partnered with both agencies to provide education and tools to help employers comply with OSHA regulations. Four of our members—Morton Corn, Eula Bingham, and past presidents John Pendergrass and John Henshaw—have served as Assistant Secretary of Labor for Occupational Safety and Health.

But legislation and government action can accomplish only so much. In the end, workers rely on our knowledge and skill, and for 75 years AIHA has helped expand the profession's frontiers.

Some of the successes in controlling exposures have been achieved through elimination of the hazard. For example, the manufacture of asbestos-containing thermal system insulation is now banned in the U.S., and controls have been instituted for removal of previously installed materials to prevent exposure to airborne asbestos fibers. We've learned about the hierarchy of controls—in particular, that designing a process to minimize exposure is more effective than trying to add controls later or putting people into personal protective equipment. We are now applying these concepts in ergonomics and nanotechnology.

VISION AND VERSATILITY

AIHA has proven itself adept at anticipating trends and meeting the evolving needs of its members. Perhaps the best example of this versatility is the creation of the AIHA Laboratory Accreditation Program in 1972, which gave laboratories that analyzed industrial hygiene samples a means of demonstrating proficiency and quality control. Today, the AIHA Laboratory Accreditation Program, LLC has achieved international recognition and remains one of the association's most successful and important ventures.

In the preface to the fourth edition of *Patty's Industrial Hygiene and Toxicology*, two of our IH luminaries—former AIHA Executive Secretary George Clayton, and his wife, Florence—wrote that the future of industrial hygiene is limited only by the narrowness of vision of its practitioners. For 75 years, our collective vision has steadily expanded worker health protection. Our anniversary provides occasion for us to reflect on our accomplishments, but as long as people become ill from exposures in the workplace, we still have work to do.

Barbara J. Dawson, CIH, CSP, is past president of AIHA and occupational health competency leader at DuPont in Wilmington, Del. She can be reached at (302) 774-3985 or *barbara.j.dawson-1@usa.dupont.com*.

The Future of Industrial Hygiene

BY JOHN HOWARD, D. GAYLE DEBORD, AND MARK HOOVER

Congratulations to the American Industrial Hygiene Association on its 75th anniversary. All of us at the National Institute for Occupational Safety and Health (NIOSH) place great value on our long-term partnership with AIHA to prevent the human tragedy of death, injury, and illness on the job. Much has been accomplished in the last 75 years, but much remains to be done.

Our future success requires a continued evolution of industrial hygiene science and practice from a compliance-based focus to a more proactive approach to promote safety, health, well-being, and productivity. New generations of men and women are entering the work force. New industries are emerging, and new technologies such as nanotechnology and demographic trends are transforming the economy. New tools are needed to drive innovative prevention for emerging hazards, as well as for historical hazards such as falls and silicosis that continue to claim lives and livelihoods.

Here are some specific activities that can foster the evolution of industrial hygiene by improving our ability to anticipate, recognize, evaluate, control, and confirm worker protection:

- Prevention through design (PtD) efforts *(http://bit.ly/niosh_ptd)* can proactively engineer hazards, exposures, and resulting risks out of the workplace.
- 21st-century technologies such as the new NIOSH mobile app for ladder safety *(http://bit.ly/niosh_falls)* can serve as tools to drive innovative preventive measures.
- Investigation of the "exposome"—a concept defined as the measure of all the exposures of an individual in a lifetime from before birth to present and how those exposures relate to health—can provide important information about actual exposures to the individual. NIOSH has developed an initiative to evaluate how the exposome can be used in occupational safety and health *(http://bit.ly/niosh_exposome)*. The validation and interpretation of biomarker data will be crucial for the use of this information in exposure assessment and industrial hygiene practice.
- The use of sensors has exploded as billions of remote wireless sensors and direct reading devices are now employed for monitoring the environment, work sites, disaster relief, agriculture and health, to name a few areas. Smartphone technology has helped to drive this field. Enabling workers to monitor their own work activities can enable immediate informed actions to reduce potential exposures. NIOSH has created a new Center for Direct Reading and Sensor Technologies to develop guidance for appropriate use, validation, and interpretation of these technologies.
- NIOSH partnerships in Total Worker Health™ *(http://bit.ly/niosh_twh)* reflect a strategy based on the realities of today's economy, where working life and private life are closely linked for many of us. By combining worker health protection and work-based health promotion, we can better help working people stay safe, healthy, able, and active in the course of a lifetime.
- Addressing the threats of large-scale disaster—whether of natural or human origin—demands that occupational safety and health professionals build on and adapt our historic skills to safeguard emergency responders in dangerous, unpredictable environments. The emerging discipline of disaster science research *(http://bit.ly/niosh_disasterresearch)* will inform new, evidence-based protocols for keeping responders safe in rescue, recovery, and rebuilding operations.

The future of industrial hygiene and AIHA is bright. NIOSH looks forward to continuing our long and fruitful collaborations with you as we protect our nation's workers and those of the global work force.

Banquet at AIHA's first annual meeting, June 1940, in New York.

John Howard, MD, is director of NIOSH.

D. Gayle DeBord, PhD, is NIOSH's associate director for Science, Division of Applied Research and Technology.

Mark D. Hoover, PhD, CHP, CIH, is NIOSH's senior research scientist, Division of Respiratory Disease Studies.

APPRECIATION

Alice Hamilton: Crusader and Scientist

Initially trained as a physician, Alice Hamilton was the foremost practitioner of industrial toxicology in the early part of the 20th century. Her main area of research was on industrial hazards, most notably lead, and although she never held a position of leadership in AIHA, her work exerted a profound influence on the association's earliest members. Beginning with the report she prepared for the Illinois Commission on Industrial Diseases in 1910, which represents the first time hospital records were used extensively to correlate medically diagnosed diseases with specific occupations, Hamilton was a passionate proponent of worker health. Her investigations of working conditions in various industries and the persuasive way she presented her findings to initially incredulous company managers continue to serve as models for today's industrial hygienists.

From the start, Hamilton made it a point to go beyond what she called the "cold printed report."

Barbara Sicherman
is a professor emerita at Trinity College in Hartford, Conn. She is the author of *Alice Hamilton: A Life in Letters* and *Well-Read Lives: How Books Inspired a Generation of American Women.*

Throughout her long, unusually productive life—she continued publishing articles into her nineties, and died at the age of 101—Hamilton was a pioneer in more than her profession. In 1919 she became the first woman to serve on the faculty of Harvard University, whose School of Medicine was organizing the first degree program in industrial hygiene. She was a prominent pacifist, supporter of birth control, and advocate for social legislation, including unemployment compensation and national health insurance. She was also a key contributor to the Settlement movement and spent 22 years living at Jane Addams' Hull House in Chicago.

Barbara Sicherman, a historian whose book *Alice Hamilton: A Life in Letters* combines biography with selections from Hamilton's personal and professional letters, graciously agreed to share her perspectives on Hamilton with *The Synergist.* An edited transcript of this discussion is on the following pages; the full interview is available as a podcast from *http://bit.ly/hamiltonpodcast.*

Q. What effect did Jane Addams and Hull House have on Hamilton?

A. Well, it was really incalculable. Meeting Addams and living at Hull House were fundamental in reshaping Hamilton's values and career. It's also fair to say that she went there looking. While still in boarding school she not so facetiously announced her future address as "corner of 375th Street and slum alley." Settlements were private neighborhood centers established in poor urban areas by privileged men and women who hoped to bridge the growing gulf between classes. In contrast to Britain, American settlements were often led by women. Hull House was the most famous of these, and Jane Addams, a charismatic woman who became the foremost woman leader of her day, was the cofounder.

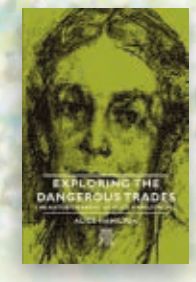
The core settlement ideal, articulated most fully by Addams, was that people of privilege could and should find ways of bringing aid and comfort to the underprivileged men and women of the working class, many of them immigrants, by living among them. The nearest comparison today, I suppose, would be the Peace Corps. Hull House residents, many of them recent college graduates, began by doing things like setting up day nurseries and kindergartens, leading clubs, offering classes, but the settlement soon became a hotbed of reform as residents came to understand the environmental causes of poverty. After thorough investigations of sweatshops, the substandard housing, and child labor, they proposed and sometimes attained legislative remedies and/or administrative oversight. Hamilton had a full-time job, but every resident had duties, and she initially managed a well-baby clinic. But she was more engaged by her investigations of neighborhood health conditions, typhoid, the cocaine traffic, and occupational diseases. Hull House was already a factor in state politics, so it is not surprising that a reform governor appointed her to the Illinois Commission on Industrial Diseases in 1910. The rest is history.

Q. Hamilton is considered a pioneer in industrial hygiene, but she didn't think of herself as an industrial hygienist. What did her work entail?

A. I would say that industrial hygiene as a field had not fully taken shape when she began her work, nor had its sister specialties been organized. Her first step was to establish the prevalence of poisons in Illinois industries, about which little was known, a task complicated by secrecy on the part of manufacturers. Lacking authority to enter plants, she relied on shoe-leather epidemiology, picking up leads about ailing workers by talking to physicians, druggists, and

1940: FIRST PUBLICATION OF THE *JOURNAL OF INDUSTRIAL MEDICINE'S* INDUSTRIAL HYGIENE SECTION.

1941: AIHA'S FIRST CONSTITUTION BECOMES EFFECTIVE.



1943: ALICE HAMILTON'S *EXPLORING THE DANGEROUS TRADES* IS PUBLISHED.

especially to workers whose homes she often visited in the Hull House manner. In this way, Hamilton and her coworkers documented nearly 580 cases of lead poisoning and established that some 70 industrial processes in the state used lead.

The study had real impact. Illinois passed an occupational disease law the following year. Hamilton went on to conduct important industry-by-industry studies of lead for the U.S. Bureau of Labor, among them the white-lead, pottery, painting, and storage battery industries. These early studies correlated specific industrial processes with medically diagnosed cases of lead poisoning. Hamilton adopted strict standards for reporting, but her surveys demonstrated beyond a doubt that American factories had high morbidity and mortality rates.

Her studies were so impressive that when David Edsall, dean of Harvard's Medical School, was asked to justify Hamilton's precedent-making appointment to a new degree program in industrial hygiene in 1919, he reassured Harvard's president that "She is greatly superior to any man that we can learn of for the position." She was also probably the only person who was doing it pretty steadily. From the start, Hamilton made it a point to go beyond what she called the "cold printed report." In the absence of government authority to enforce change, she took her findings directly to those in charge and asked them to act voluntarily on her recommendations. Many did. She also believed that they took advice from a woman more readily than from a man.

During the Harvard years, Hamilton established herself as the leading authority on industrial poisons and waged an insistent campaign to publicize industrial diseases among professionals and the public. She was, in the words of Yale Professor C.-E. A. Winslow, a leading public health specialist, the unusual combination of "crusader and scientist." On the one hand, she had an unsurpassed command of industrial poisons in Europe as well as the U.S. and codified knowledge in two textbooks, one for specialists, one for general physicians. On the other, she took a broad view of her professional responsibilities and maintained constant vigilance over the field as clearinghouse, troubleshooter, and watchdog.

She responded to requests from all over the country about unusual outbreaks in factories and worked with all interested parties, ranging from the business-affiliated National Safety Council to the union-based Workers' Health Bureau. Where many of her medical colleagues were dubious about airing scientific questions in public, she mobilized support for a national conference on radium poisoning called by the surgeon general in 1928. This was in response to the famous case of the New Jersey watch dial painters who contracted radium poisoning.

After retiring from Harvard in 1935, she served for some years as the medical consultant for the new Division of Labor Standards in the Department of Labor. She also did her final study, this one on viscose rayon. Looking back in old age at changes in the field, she felt satisfied "that things were better now and I had some part in it." She died at the age of 101 in 1970, just three months before passage of the Occupational Safety and Health Act.

Alice Hamilton with AIHA founders (from left) Carey McCord, Gordon Harrold, and Stuart Meek.

Q. Her appointment at Harvard was part-time, as you said, which freed her to conduct investigations of factories on her own time. What did the management and executives at these companies think of her?

A. Surviving letters suggest that some manufacturers at least found her evidence persuasive and disturbing and tried to implement changes that she recommended, including such things as improved ventilation, respirators, weekly medical examinations, and the like. She remained on cordial terms with a number of owners and corresponded with them for many years. These connections proved invaluable.

It was through Hamilton's initiative in the 1920s that the presidents of several lead companies funded a Harvard study of the lead industry with no strings attached. The landmark research that resulted established how lead was absorbed, stored, and eliminated from the body and developed an effective treatment for lead colic, so it was really quite an astounding study for the time.

Q. Why is Alice Hamilton still revered today?

A. Pioneers are often honored and deservedly so. Hamilton was one of the first Americans to investigate workplace poisons at a time when little was known about them and less was being done. Her early studies provided new facts that helped to undermine American complacency. More than that, Hamilton was the only person who made the control of industrial poisons her life's work. In the absence of formal institutions and regulations, she took it on herself to find individual and collective ways of preventing and controlling industrial diseases. As a 1934 editorial in the *Detroit Medical News* proclaimed, "The name 'Hamilton' parallels the building up of the awareness and the study of poisoning in industry."

Finally, I think that people find it intriguing that a woman, especially one viewed as "very feminine and even fragile," as some considered her, achieved so much in a line of work once considered very masculine. Perhaps this is why she has been mythologized to the point of receiving credit for achievements she never made, such as the elimination of phossy jaw. My hope as her biographer has been to uncover the human person behind the myth and to demonstrate that even legendary careers develop incrementally.

TIMELINE

1946: THE INDUSTRIAL HYGIENE SECTION BECOMES A SEPARATE PUBLICATION, THE *AIHA QUARTERLY.*

1951: ANNA M. BAETJER IS ELECTED AIHA'S FIRST WOMAN PRESIDENT.

1959: THE AMERICAN BOARD OF INDUSTRIAL HYGIENE (ABIH) IS FOUNDED.

TRIVIA

75 Things You (Probably) Didn't Know about AIHA

In 1994, AIHA published *The American Industrial Hygiene Association: Its History and Personalities.* Edited by George and Florence Clayton and assembled from the contributions of 31 prominent members, the book chronicles the first 51 years of AIHA's existence. Most of the information on these pages is adopted from that book.

1. The American Industrial Hygiene Association was officially founded at the American Conference on Occupational Diseases and Industrial Hygiene on June 6, 1939, in Cleveland, Ohio.
2. The first name proposed for the newly formed organization was the Society of Industrial Hygienists, following the naming convention used in England.
3. In 1939 there were an estimated 300 industrial hygienists in the United States.
4. That year, the New York Yankees won the World Series, the Green Bay Packers won the NFL championship, and the Boston Bruins were Stanley Cup champions.
5. Two of AIHA's founding members—John J. (Jack) Bloomfield, who served on the first AIHA Board of Directors, and William P. Yant, who was AIHA's first president—had participated in evaluating potential health problems and developing design specifications in 1920 for what is now the Holland Tunnel under the Hudson River.
6. The first meeting of the AIHA Board of Directors took place at the Pittsburgh Athletic Club on Oct. 18, 1939.
7. According to the minutes of that meeting, the only requirement for membership in AIHA was "an active interest in the field of industrial hygiene."
8. The Board unanimously agreed that annual membership dues should be $3 "with no exceptions."
9. The first list of members, from December 1939, totaled 160. Today, AIHA has more than 10,000 members.
10. At AIHA's first annual business meeting, held June 5, 1940, in New York, participants applauded when Secretary-Treasurer Gordon C. Harrold noted that "the Association has a positive balance of $367.04."
11. AIHA's first official publication debuted in the January 1940 issue of the *Journal of Industrial Medicine and Surgery.* Known as the Industrial Hygiene Section, it was the forerunner of today's *Journal of Occupational and Environmental Hygiene.*
12. The first issue of the Industrial Hygiene Section contained an article on asbestos that referred to a newly released sampler called the "electrostatic precipitator."
13. AIHA's first logo, a design developed by member Oliver G. Stam and approved by the Board in 1942, featured a centrifugal fan, a laboratory retort, and an X-ray tube.
14. In AIHA's first attempt to affect legislation, the association advised the U.S. government in 1944 to label solvents as hazardous materials.
15. In December 1942, a few months after his term of office ended, AIHA's third president, Donald E. Cummings, was killed in a plane crash while en route to Las Vegas, Nevada, to investigate a mining operation. He was 42 years old.
16. In his memory, AIHA established the Cummings Award Memorial Lecture in 1944. Today, the Cummings Award remains one of AIHA's most prestigious honors.

AIHA leaders at the eleventh annual meeting, Chicago, 1950.

1964: AIHA'S FIRST CANADIAN LOCAL SECTIONS ARE FORMED IN OTTAWA AND TORONTO.

1964: HENRY L. GREEN RECEIVES THE INAUGURAL WILLIAM P. YANT AWARD, NAMED FOR AIHA'S FIRST PRESIDENT.

1966: THE ACADEMY OF INDUSTRIAL HYGIENE IS ESTABLISHED.

AIHA presidents Harry F. Schulte and Warren A. Cook.

17. Direct election of AIHA officers by the membership took effect in 1943. Officers had previously been selected by the directors or by a nominating committee.

18. Philip Drinker of Harvard University, AIHA's fourth president (1942–43), was the inventor of the first widely used iron lung. He served as editor-in-chief of Harvard's *Journal of Industrial Hygiene* for more than thirty years.

19. At Harvard, Drinker was part of the first industrial hygiene faculty in higher education, along with Alice Hamilton and Theodore Hatch, who would become AIHA's ninth president.

20. The annual conference scheduled for Chicago in April 1945 was cancelled because of World War II.

21. The *AIHA Quarterly* began publication in June 1946—the first time AIHA's flagship publication appeared in a standalone format.

22. Because the publication had been in existence for several years as the Industrial Hygiene Section of the *Journal of Industrial Medicine,* the first issue of the *AIHA Quarterly* was numbered Volume 7, No. 2.

23. It included an article that discussed Benjamin Franklin's investigation into lead poisoning from drinking Jamaican rum due to the presence of lead in the distillation apparatus.

24. The first edition of *Patty's Industrial Hygiene and Toxicology*—named after its editor, Frank A. Patty, AIHA's eighth president—was published by John Wiley and Sons in 1948. In print for six decades, it is a standard reference for the fields of occupational health and toxicology.

25. AIHA's tenth president, James Sterner (1948–49), and his colleague Harold Carpenter Hodge are known for their toxicity table, which classifies chemicals in six categories ranging from "relatively harmless" to "extremely toxic."

26. The first mention of students in AIHA was in 1949 when the Board of Directors received a petition requesting recognition of a Rocky Mountain Student Section.

27. Anna M. Baetjer was the first woman to serve as AIHA president (1951–52).

28. Baetjer's career in research and teaching at The Johns Hopkins University spanned 60 years. Every year, Hopkins' Department of Environmental Health Sciences hosts the Anna Baetjer Lecture in her honor.

29. Member Leon I. Shaw, the first staff hired by the organization, never actually worked for AIHA. Scheduled to assume part-time, temporary secretarial duties in the spring of 1947, he asked to be relieved, citing personal reasons.

30. Henry Smyth, Jr., whose dedication to teaching industrial hygiene would be memorialized with an eponymous award granted by the Academy of Industrial Hygiene, was appointed AIHA's executive secretary in the autumn of 1947. His salary: $0.

31. Smyth remained in the role of staff secretary even during his tenure as AIHA's president in 1953–54. At his last Board meeting as president he recommended that AIHA hire a permanent, paid executive secretary.

32. AIHA's first paid executive secretary, member George Clayton, began working for the association out of the second floor of his home in Detroit in June 1955.

33. The terms of Clayton's employment required him to build and install shelves for the storage of back issues of the *AIHA Quarterly*. AIHA provided the lumber for the shelves.

34. The first AIHA technical committees—for air pollution, analytical chemistry, noise, and radiation—were formed in 1955.

35. AIHA was incorporated as an Illinois not-for-profit association in September 1956.

36. AIHA membership reached 1,000 in 1957.

37. That year, the *AIHA Quarterly* became a bimonthly journal with a new name, the *American Industrial Hygiene Association Journal*.

Henry F. Smyth, Jr., AIHA's fifteenth president, in a 1931 photo.

TIMELINE

1970: THE OCCUPATIONAL SAFETY AND HEALTH ACT IS SIGNED INTO LAW.

1974: THE AIHA LABORATORY ACCREDITATION PROGRAM IS CREATED.

1977: THE WORKPLACE ENVIRONMENTAL EXPOSURE LEVEL COMMITTEE IS FORMED TO DEVELOP WEELS.

1979: THE AMERICAN INDUSTRIAL HYGIENE FOUNDATION (AIHF) IS FOUNDED.

TRIVIA

New England Local Section meeting, early 1960s.

38. The October 1959 issue of the Journal featured a Board-approved definition of the industrial hygiene profession. AIHA printed thousands of copies and distributed them to other organizations and the general public.

39. The definition, developed by an ad hoc committee, began, "Industrial Hygiene is that science and art devoted to the recognition, evaluation and control of those environmental factors or stresses, arising in or from the work place, which may cause sickness, impaired health and well being, or significant discomfort and inefficiency among workers or among the citizens of the community."

40. The 1961 annual conference in Detroit was the first organized solely by AIHA and ACGIH. Previously, the two organizations had participated in a joint conference with associations representing practitioners of occupational medicine.

1984: AIHA CREATES THE EDWARD J. BAIER TECHNICAL ACHIEVEMENT AWARD IN HONOR OF AIHA'S 37TH PRESIDENT.

1987: AIHA PUBLISHES *OCCUPATIONAL EXPOSURE LIMITS—WORLDWIDE* BY WARREN COOK.

1988: PUBLICATION OF THE FIRST SET OF EMERGENCY RESPONSE PLANNING GUIDELINES (ERPGS).

1989: *THE SYNERGIST* BEGINS PUBLICATION AS A QUARTERLY NEWSLETTER.

41. Of the original 1961 exhibitors, MSA (Mine Safety Appliances Company) still attends the conference.

42. AIHA's first attempt to develop a relationship with a specific university occurred in 1961 when arrangements with Harvard were made to collaborate in sponsoring an air cleaning course.

43. Before there were WEELs, there were EELs. In the 1960s the AIHA Toxicology Committee developed a series of Emergency Exposure Limits, which were "concentrations of contaminants that can be tolerated without adversely affecting health but not necessarily without acute discomfort or other evidence of irritation or intoxication."

44. Three of these limits, for nitrogen dioxide, 1,1-dimethyl-hydrazine, and 1,1,1-trichloroethane, were published in the *AIHA Journal* in late 1964.

45. In 1965 Henry L. Green of England received AIHA's first William P. Yant Award in honor of AIHA's first president. The award recognizes outstanding contributions to industrial hygiene from individuals outside the U.S.

46. AIHA president-elect Leslie Silverman of Harvard University died in 1966 at the age of 51, before he could assume office.

47. In 1969 AIHA headquarters was moved out of George Clayton's home and into a new office in Southfield, Mich.

48. E. Lynn Schall became AIHA's first full-time managing director on July 1, 1971, taking over responsibility for AIHA office operations from Clayton. The AIHA office moved from Southfield, Mich., to Westmont, N.J.

49. AIHA members testified during congressional hearings leading to the passage of the Occupational Safety and Health Act of 1970.

50. In 1971 Toronto hosted the first AIHA conference held outside the U.S.

51. Evan Campbell, who would later serve as AIHA's thirty-eighth president, led an AIHA effort in 1971 to improve the quality of work done in IH laboratories—the beginning of the Laboratory Accreditation Program.

52. Following the hiring of member William E. McCormick as managing director in 1973, the AIHA headquarters was moved to Akron, Ohio, where it remained until 1992.

53. AIHA offered its first continuing education courses in 1973.

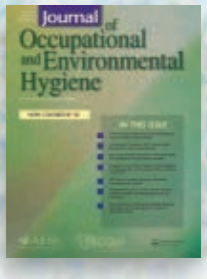
54. In 1975 AIHA member Morton Corn became the first industrial hygienist to lead OSHA. Corn described OSHA as "the instrument of a revolutionary law" and characterized "the right to a safe and healthful workplace" as "a new right in the Bill of Rights."

Staff at AIHA's first office in Detroit, 1965.

TIMELINE

1993: EULA BINGHAM IS THE FIRST RECIPIENT OF AIHA'S ALICE HAMILTON AWARD.

1995: AIHA, ACGIH, AND ABIH ADOPT A JOINT CODE OF ETHICS FOR INDUSTRIAL HYGIENISTS.



2004: AIHA AND ACGIH BEGIN JOINT PUBLICATION OF THE *JOURNAL OF OCCUPATIONAL AND ENVIRONMENTAL HYGIENE.*

TRIVIA

55. At the invitation of the White House Special Assistant for Human Resources, the AIHA Board of Directors attended President Gerald R. Ford's 1976 State of the Union address. An AIHA Board meeting was held at the White House.

56. AIHA members such as Don Chaffin, Morton Corn, Jim Pierce, and Jeff Lee were instrumental in helping NIOSH establish the Educational Research Center (ERC) concept in 1977.

57. AIHA produced the first Workplace Environmental Exposure Levels (WEELs) in 1978.

58. The American Industrial Hygiene Foundation, incorporated in 1979, has distributed more than $1.6 million to 549 students studying industrial hygiene and related disciplines.

59. The 1980 AIHA conference in Houston was the first to be held in a convention center.

60. AIHA's 1983 conference, scheduled to be held at a hotel in Albuquerque, New Mexico, was relocated to Philadelphia out of concern that the original venue was too small for the expected attendance.

61. The International Occupational Hygiene Association, an umbrella organization of occupational health associations, was founded at the 1987 AIHce in Montreal. AIHA was a driving force behind IOHA's formation.

62. The first set of Emergency Response Planning Guidelines (ERPGs), published in 1988, covered chloroacetyl chloride, chloropicrin, crotonaldehyde perfluoroisobutylene, and phosphorous pentoxide.

63. In 1989 the Board of Directors approved a motion to hire an association management firm to run AIHA's day-to-day activities, but the Board rescinded its decision the following year and hired O. Gordon Banks as executive director.

64. *The Synergist* began publication in 1989 as a quarterly newsletter.

65. The Nov. 11, 1991 issue of *US News and World Report* identified industrial hygiene as "one of the 20 hot track professions of the 1990s."

66. Five employees of Los Alamos National Laboratory have served as AIHA President, more than any other single organization.

67. Three AIHA presidents have had medical degrees: Robert A. Kehoe (1945–46), James H. Sterner (1948–49), and David W. Fassett (1969–70).

68. During the 1990–91 Persian Gulf War, members of the AIHA Arabian Gulf Local Section were active in planning and training to respond to possible chemical emergencies.

69. AIHA and OSHA originally signed an alliance agreement on Oct. 2, 2002. The extended relationship between AIHA and OSHA encourages training, education, outreach, and communication and promotes national dialogue on workplace safety and health.

70. AIHA joined Twitter in January 2009. Its first tweet read, "Leadership Workshop is coming up on February 27. Are you prepared?"

71. AIHA now has more than 3,500 followers on Twitter, and the AIHA Facebook page has more than 1,500 likes.

72. 2014, AIHA's 75th anniversary year, saw the creation of two new volunteer groups and a new local section: the Mining Working Group, the Mentoring Program and Professional Development Committee, and the Eastern Upstate New York Local Section.

73. Six conference rooms in AIHA's current headquarters in Falls Church, Va., are named after people who helped shape the industrial hygiene profession. AIHA staff meet in the Yant, Baier, Hamilton, Cummings, Kusnetz, and Smyth conference rooms.

74. The city of Chicago, Ill., has hosted AIHce the most: seven times. Tied for second place with four conferences each are Detroit, Philadelphia, and St. Louis.

75. *Batman*, *The Wizard of Oz*, and *Gone with the Wind* are also celebrating 75th anniversaries in 2014.

TIMELINE

2005: AIHA PUBLISHES ANSI/AIHA Z10 *OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEMS.*

2005: THE FIRST FUTURE LEADERS INSTITUTE IS HELD.

2010: THE AIHA LABORATORY ACCREDITATION PROGRAM, LLC ACHIEVES INTERNATIONAL RECOGNITION.

PHOTO ESSAY

Honoring the World of Work

On Nov. 20, 1968, an explosion in the Farmington Mine in West Virginia took the lives of 78 miners. At the time, the photojournalist Earl Dotter was an anti-poverty volunteer in the Appalachian region of Tennessee, working with miners suffering from black lung disease. He became involved in efforts to elect a rank-and-file leader of the United Mine Workers, and when that campaign succeeded he was invited to become the photographer for the *United Mine Workers' Journal.*

Ever since, the chief focus of Dotter's work has been the depiction of hazardous occupations. His photos have appeared in more than 15 books, including *The Quiet Sickness: A Photographic Chronicling of Hazardous Work in America,* published by AIHA in 1997. His many honors include the 2001 Alice Hamilton Award presented by the American Public Health Association to commemorate his lifetime of service to occupational health and safety. In 2008, Dotter was named an honorary member of AIHA.

The photo essay on these pages pairs Dotter's personal work with antique stereo-view images (most from Dotter's personal collection, some courtesy of the Library of Congress Prints and Photographs Division). Together, the photos depict the advancement—and, in some cases, the stagnation—of occupational health and safety in the 20th century.

Stereoscopic devices were "the Victorian-era parlor television," in Dotter's memorable phrase. They present offset images to the left and right eyes of the viewer, which are perceived as three-dimensional in the brain. According to Dotter, stereoscopic images of influential politicians and labor leaders were popular in the late 19th century. Many images of blue-collar workers were also widely circulated. "The world of work is very well documented in this era as a result of these enterprising photographers who made their way into workplaces," Dotter says.

Dotter's work in progress, *Working in the U.S.A., 1885–1935,* is a collection of 250 stereoscopic images and is available for purchase on DVD. For more information, visit *www.earldotter.com* or e-mail him directly at *earldotter@verizon.net. The Synergist* thanks Earl Dotter for his permission to publish the images on these pages.

Earl Dotter
is an award-winning photojournalist with more than 40 years' experience photographing hazardous occupations.

2011: AIHA HOSTS ITS FIRST REGIONAL CONFERENCE IN THE ASIA PACIFIC REGION.

2014: AIHA CELEBRATES ITS 75TH ANNIVERSARY AT AIHCE IN SAN ANTONIO, TEXAS.

Auto battery manufacturing with lead exposure ventilation hood protection. (Visalia, Calif., 1983)

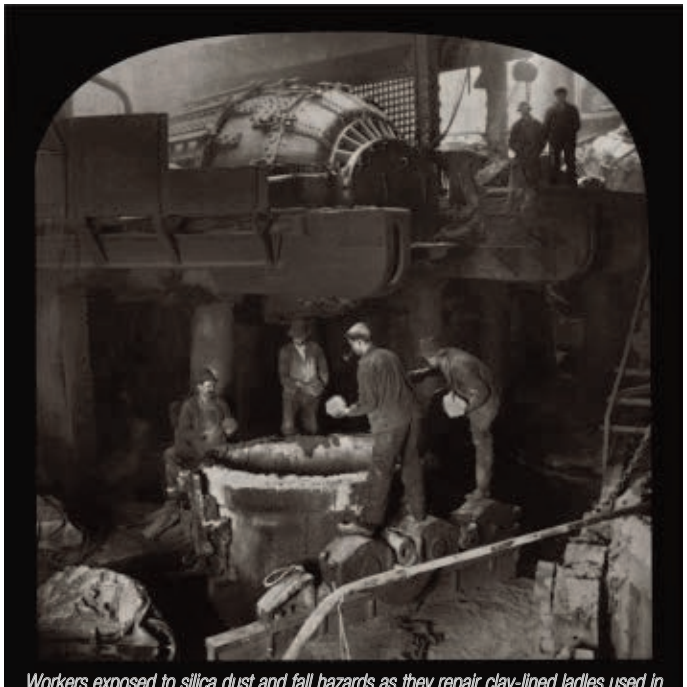
Cotton gin worker with suction tube to unload cotton wagon. (Mississippi, 1978)

Verrazano Narrows Bridge cable inspector. (2000)

Ironworkers working without fall restraints on Metropolitan Tower in New York, circa 1908. (H.C. White Co., from Library of Congress)

Workers cleaning and repairing steel mill ladle in Pittsburgh, Pa. The debris from the old lining is laden with silica dust. (Keystone View Co.)

Bandaging head and arm of injured anthracite coal miner in underground emergency hospital, circa 1910–20. (Keystone View Co.)



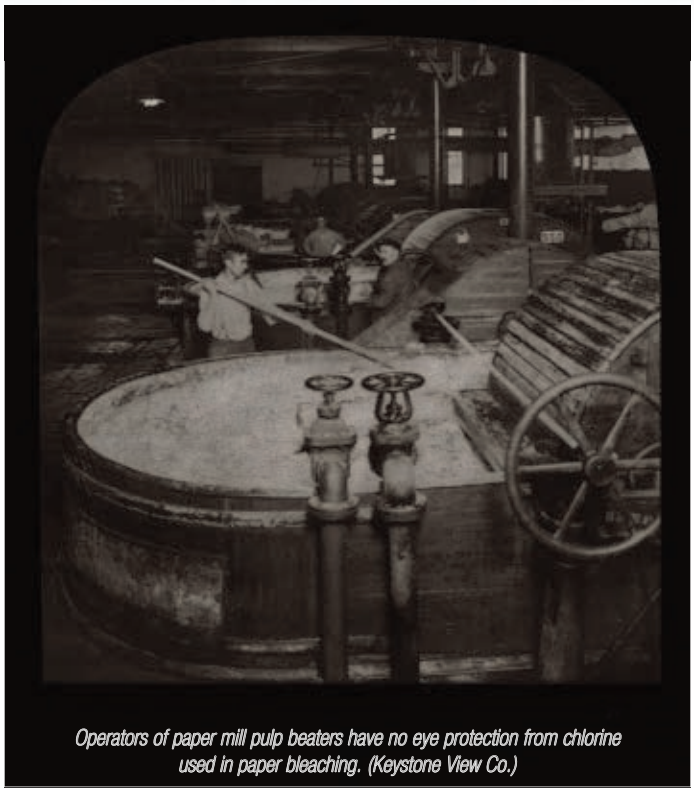
Workers exposed to silica dust and fall hazards as they repair clay-lined ladles used in transporting molten metal from steel mill blast furnaces. (Keystone View Co.)

Marble quarry workers inhale marble dust while operating steam-powered drills to precisely separate blocks for finishing. (Keystone View Co.)

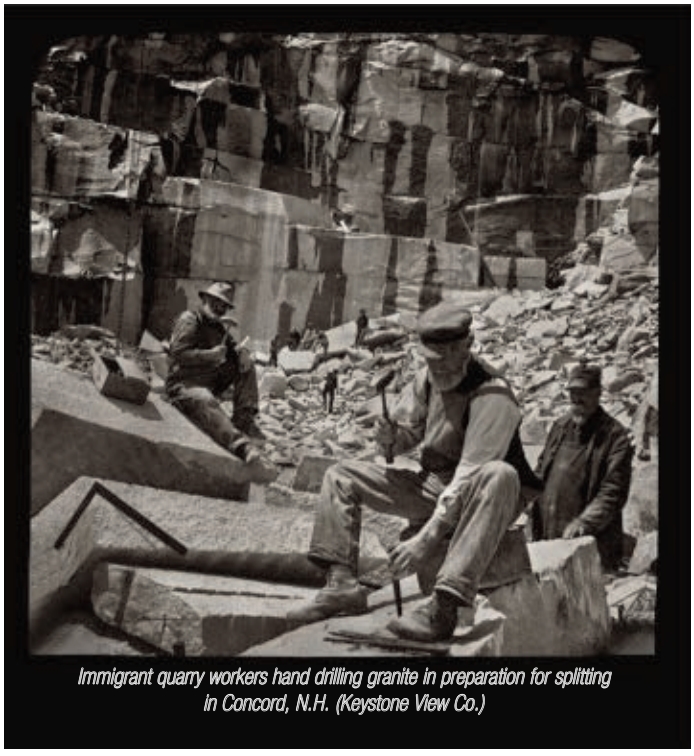
A worker without PPE in a paper factory shovels quick lime, which will "eat" holes in clothing and produce skin sores if spilled in liquid form. (Keystone View Co.)

Commercial scallop dragger bringing in the catch. (Eastport, Maine, 2000)

Jackhammer operator exposed to silica dust. (The Big Dig, Boston)



Operators of paper mill pulp beaters have no eye protection from chlorine used in paper bleaching. (Keystone View Co.)



Immigrant quarry workers hand drilling granite in preparation for splitting in Concord, N.H. (Keystone View Co.)

Recovery team recovers a body from the wreckage following the Johnstown mining disaster flood in 1889 that killed 2,209 people. (George Barker photo)

A grappler opens up the pile following the Sept. 11, 2001 terrorist attack on the World Trade Center.

A CIH sets air quality monitors on heavy equipment at Ground Zero in New York (2001).

Auto workers with PPE. Lead exposure is minimized with downdraft ventilation. (Detroit, 1979)

Toward Better Benchmarks

CAN INDUSTRIAL HYGIENISTS OVERCOME THE CHALLENGES ASSOCIATED WITH OCCUPATIONAL EXPOSURE LIMITS?

BY ED RUTKOWSKI

Occupational exposure limits (OELs) are a foundational element of industrial hygiene. To understand whether an exposure concentration poses a potential health risk, IHs compare it to a value—an OEL—determined by experts to be protective.

Underlying this simple formulation are many complexities. Which scientific studies are most appropriate to the setting of a benchmark value? How were the studies selected? Who did the selecting, and what biases or assumptions informed their decision-making? What uncertainties factored into the derivation of the OEL? In cases where multiple OELs exist for a substance, which one should be used? What should be done if no OEL exists at all, as is the case for an estimated 100,000 chemicals in use today?

Add to these practical questions a thicket of political and regulatory considerations, both in the U.S. and abroad, and the simple idea of comparing exposure to a toxicological benchmark can seem hopelessly muddled.

Such complications did not exist in the early 1880s, when Max von Gruber of the Munich Hygienic Institute made what is believed to be the earliest attempt to determine an exposure limit. Gruber exposed rabbits and hens (and himself) to known concentrations of carbon monoxide, observed the effects, and concluded that exposures under 200 ppm presented no risk of "injurious action."

Today, most OELs are determined by committees of experts representing many disciplines. The typical process involves reviewing experimental data on a chemical, usually studies of effects in animals, to identify the No Observed Adverse Effect Level (NOAEL), or the "threshold dose" at which no harmful consequences have been found. A committee then applies "safety factors" to account for uncertainties, such as the differences between humans and animals and variability in human susceptibility, to arrive at an OEL. The safety factors are determined by the professional judgment of the committee's members.

If the studies under review do not identify an NOAEL—indicating that the animals were not exposed to a low-enough concentration of the chemical, or that a safe threshold does not exist—a committee will usually work off of the Lowest Observed Adverse Effect Level (LOAEL) and apply a larger safety factor.

For Mike Jayjock, PhD, CIH, an independent consultant who spent 35 years in a variety of health and safety roles at Rohm and Haas, the subjectivity inherent in this process needs to be communicated more clearly. "In this system, there is no determination of the percentage of people protected by the OEL," Jayjock says. "Clearly, [OELs produced in this manner are] intended to protect the vast majority of workers, but whether that's 95 percent, 99 percent, 99.1 percent—it's simply not being done by the current system."

HALF THE STORY

To get a clearer picture of the constraints surrounding OELs, industrial hygienists are commonly advised to "read the documentation" of whichever OEL they wish to apply. But part of the

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difficulty, according to Jayjock, is that few IHs have the background necessary to thoroughly understand the toxicology at the heart of OELs.

"Even if you understand exposure completely, you only have half the story," Jayjock says. "And if you were to understand the toxicology of a substance completely, you would only have half the story. So the IH community and the toxicology community really need each other terribly," Jayjock says.

Often, however, industrial hygienists must assess the risks of chemicals that have no OELs. According to a "green paper" on OELs drafted by experienced occupational health experts and posted on the International Occupational Hygiene Association website in 2009, of some 100,000 chemicals in commerce, a mere 3,000 have OELs. For Chris Laszcz-Davis, MS, CIH, one of the paper's authors and a member of the AIHA Board of Directors, the inability of OEL-setting bodies to keep pace with global production of chemicals is a fundamental challenge confronting industrial hygienists today.

The lack of authoritative OELs has led many industrial hygienists to embrace occupational hazard banding, an approach to risk assessment that categorizes substances according to their chemical and toxicological properties. To characterize risk for a substance without an OEL, industrial hygienists can estimate the toxicity of the substance as a category or potency "band," using pre-established decision criteria related to a set of standard toxicity endpoints. For decades, the pharmaceutical industry has used hazard banding to control the risks associated with the development of new drugs, many of which had no OELs initially.

Some industrial hygienists have expressed distrust of hazard banding over its lack of validated approaches and its perceived oversimplification of a process that requires some expertise to apply. But hazard banding proponents received a boost in recent years from NIOSH's proposal of a multilayered approach to hazard banding that sorts chemicals into five groups according to their toxicity. NIOSH's Lauralynn Taylor McKernan and Melissa Seaton described this process in the May 2014 *Synergist.* The approach identifies three distinct hazard banding processes intended for use by practitioners with varied levels of expertise. NIOSH is currently working with stakeholders to validate these processes.

But even hazard banding's most fervent supporters would acknowledge that it is not a complete substitute for authoritative OELs. And while NIOSH and other bodies continue to produce exposure limits, OSHA's well-publicized inability to update its permissible exposure limits (PELs) has seriously hampered efforts to protect workers in the United States.

Since updating the PELs has so far proven to be politically impossible, nongovernmental groups have attempted to fill the need for OELs. The best known of these groups, the ACGIH TLV Committee, began producing OELs in the late 1940s. Approximately 30 years later, AIHA's Workplace Environmental Exposure Levels (WEELs) Committee started publishing exposure values for substances that did not already have a TLV or an OEL but whose use in industry was critical. But these efforts, even when combined with those of other governmental and non-governmental OEL-setting bodies around the world, are barely enough to scratch the surface of the need for OELs.

GUIDANCE NEEDED

Still, there are times when industrial hygienists and other risk-related professionals must choose among several applicable OELs. According to Andrew Maier, PhD, CIH, DABT, there is currently very little formal guidance IHs can use to determine which OEL is most appropriate for the exposure scenario and the affected population.

"Developing guidance tools and decision logics around exposure benchmark selection is an important need," Maier says. Maier is an associate professor at the University of Cincinnati and director of the Fellows program for Toxicology Excellence for Risk Assessment (TERA), a nonprofit organization that develops risk assessment values.

"Picture a chemical for which there are conflicting occupational exposure limits for different jurisdictions," Maier says. "If I'm an occupational hygienist, which one should I pick? There's a need for clarity around selecting among OELs if you have multiple to choose from."

Industrial hygienists also need direction on choosing between an OEL and another type of exposure limit or guidance, according to Maier.

"EPA might have a general population limit," Maier says. "How does that relate to the occupational exposure guide when, as an industrial hygienist, I'm often involved in community exposure issues? How do I translate and cross those different domains for exposure guide values?"

The European Union's Registration, Evaluation, Authorization, and Restriction of Chemical Substances (REACH) regulation has introduced further complications by requiring manufacturers and importers to develop exposure limits for each anticipated use of a chemical or mixture—not only during manufacturing but for all downstream uses as well. These formulaic limits are known as Derived No Effect Levels (DNELs) and

"People can actually look at [RBOELs] and get some idea of the quantitative risk and, perhaps more importantly, the uncertainty around that prediction."

"One of the fundamental challenges for the industrial hygiene profession moving forward is to help practitioners answer the question, 'Which OEL should I use?'"

Derived Minimal Effect Levels (DMELs), depending on whether a threshold dose has been established for the substance in question. DNELs and DMELs are not intended to be used as OELs, but as David O'Malley of the British Occupational Hygiene Society and Robert Roy of 3M explain in the September 2014 *Synergist,* industrial hygienists will almost certainly compare these values to their exposure measurements.

They may be surprised by what they find. A study of data for 90 substances conducted by researchers affiliated with the Stockholm-based Karolinska Institute found that DNELs often differed greatly from OELs established for the same substance. In some cases, the differences exceeded an order of magnitude. The study also found tremendous variance among DNELs set for the same substance by different manufacturers. O'Malley and Roy attribute these findings to manufacturers' differing interpretations of official guidance on the derivation of DNELs. These findings underscore both the importance of "reading the documentation" before IHs apply an exposure limit and the desperate need for IHs to become, in Maier's words, "informed users and consumers of the values for their risk assessment issues."

ONE IN A THOUSAND

The concept of the "hierarchy of OELs" represents an encouraging step toward such guidance. Laszcz-Davis, Maier, and Jimmy Perkins, a retired professor from the University of Texas School of Public Health, described the hierarchy in an article that appeared in the March 2014 *Synergist.*

The hierarchy categorizes OELs and other exposure benchmarks into five tiers. Occupational hazard banding resides at the lowest tier, reserved for substances that often have the least amount of toxicological and epidemiological data. As more data becomes available, industrial hygienists make use of the higher tiers, which include prescriptive process-based OELs, such as DNELs and DMELs; working provisional OELs, such as those that companies and trade organizations develop internally, often without third-party expert review; and health-based OELs, including TLVs and WEELs, which are typically developed by committees of experts.

At the pinnacle of the hierarchy are quantitative health-based OELs. These are often based on extensive toxicological and epidemiological data, are typically intended to reduce the risk of cancer to one in one thousand, and, according to Laszcz-Davis, are believed to better characterize risk to any given population. Some PELs with cancer as the toxic end-point are derived with this target risk in mind, although technical and economic considerations, which OSHA is required to factor into its PEL derivations, usually result in values whose risk is greater than one in one thousand.

The one-in-one-thousand target stems from the U.S. Supreme Court's 1980 decision in *Industrial Union Department, AFL-CIO, v. American Petroleum Institute et. al.,* popularly known as the "benzene decision." OSHA had proposed a benzene standard that would have set the PEL at an eight-hour time-weighted average of 1 ppm because, the agency argued, it could not determine a safe exposure level for benzene. A plurality of the Court invalidated the standard, ruling that, in order to justify a particular exposure limit, OSHA was required by law to demonstrate a significant risk of harm.

But what constitutes "significant" risk? According to the majority opinion,

> If ... the odds are one in a billion that a person will die from cancer by taking a drink of chlorinated water, the risk clearly could not be considered significant. On the other hand, if the odds are one in a thousand that regular inhalation of gasoline vapors that are 2% benzene will be fatal, a reasonable person might well consider the risk significant.

The opinion established one-in-a-thousand risk as the goal OEL-setting bodies should aspire to achieve. "People just jumped on this because they were so hungry for some kind of a line to determine what might define significant risk," Jayjock says. "And if you think about it, it's not a terrible number relative to the actual risk workers face on the job daily from accidents."

But the exposure that produces a one-in-one-thousand risk of cancer is not a number that can be determined with a lot of certainty, either. "We don't have the science to prove that this is what the actual risk is," Jayjock explains. "This is a risk that's predicted from models. And, in fact, the risk could be much less or somewhat higher. There is a significant level of uncertainty around that prediction."

Jayjock argues that the uncertainty around the predicted risk for OELs has not been adequately communicated, and that this failure has had some political consequences for worker health protection. "There needs to be more transparency in what the actual occupational exposure limit means with respect to the level of predicted risk for adverse health outcomes for both carcinogens and non-carcinogens," Jayjock says. "And for me, the critical issue then becomes putting OELs into a risk-based context."

The risk-based OELs, or RBOELs, that Jayjock advocates would express a predicted one-in-one-thousand risk for a particular adverse effect of a chemical exposure. Unlike PELs, RBOELs would not consider the technical feasibility of achieving the concentration levels that yield a one-in-one-thousand risk. Jayjock says RBOELs would also avoid the ambiguity of TLVs, whose documentation states that they are intended to protect "nearly all" workers but does not clarify what "nearly all" means.

For Jayjock, RBOELs are more than a transparent statement of risk—they are a means of moving the political conversation in a direction that favors health protection.

"People can actually look at [RBOELs] and get some idea of the quantitative risk and, perhaps more importantly, the uncertainty around that prediction," Jayjock says. "If they were to see that the occupational exposure limit is significantly higher than an RBOEL, it allows the political process to work. Right now, many, if not most, people actually think they're safe at the occupational exposure limits, whereas the occupational exposure limits, frankly, are fraught with subjectivity. So by substantially increasing the transparency as to what we know and what we don't know, I believe it will help drive the process, help drive the science, and we will be doing a better job."

THE RIGHT CHOICE

In November 2013, NIOSH proposed a revised policy on carcinogen classification and target risk levels for workplace exposure to chemicals. The proposed policy involves the use of risk-based exposure limits and specifies that NIOSH will "communicate an array of risk levels" for carcinogens. The agency's embrace of risk-based OELs could help promote their adoption by other OEL-setting bodies.

In the meantime, Jayjock, Laszcz-Davis, and Maier all agree that education and communication are the keys to making the best use of existing OELs.

"It would be wonderful if we had 600,000 OELs that everybody could use," Laszcz-Davis says, but in their absence, industrial hygienists need training on how to adapt other types of exposure guidance, such as those for community exposures, to the workplace.

"When you look at the history of exposure limits, almost all of the changes to OELs have been to make them lower. For me, this means we just didn't do a good job of understanding the risk associated with them," Jayjock says. "Understanding and communicating the uncertainty around those predicted risks, and trying to be more open scientifically about what we know and don't know, would be big steps forward."

According to Maier, one of the fundamental challenges for the industrial hygiene profession moving forward is to help practitioners answer the question, "Which OEL should I use?"

"The right answer to the question is to have a systematic process to make the decision," Maier says. "And that systematic process relies on having a good understanding of the reasons for the differences.

"Just because OELs are different numerically doesn't mean one is protective and one is not protective, or one is better and one is not better. There are policy and science reasons why different values differ, and the key thing is to understand this so, as a risk manager, you can make the appropriate choice for your situation."

"Understanding and communicating the uncertainty around those predicted risks, and trying to be more open scientifically about what we know and don't know, would be big steps forward."

Return on Investment

HOW AIHF SCHOLARSHIPS HELPED SHAPE TODAY'S PROFESSIONALS

BY KAY BECHTOLD

For more than 30 years, the American Industrial Hygiene Foundation (AIHF) has been helping fund the education of talented students in industrial hygiene and related disciplines. *The Synergist*® tracked down three past recipients of Foundation scholarships to see where they are today.

"Some of the key innovations over the past 10 years relative to implementing our industrial hygiene programs came directly from my technical committee work at AIHA and networking with peers."

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WHERE ARE THEY NOW?

Mark Dudle, CIH, first took an interest in his own health and safety when he started wearing a respirator while working to burn lead paint off of old houses in the mid-1980s to help pay for college. Soon he discovered the IH program at the University of Alabama at Birmingham (UAB), which proved to be a good fit based on his interest in the technical nature of the field. Dudle was hired out of grad school as an assistant industrial hygiene manager for the freight railroad company Norfolk Southern Corporation in 1992, and has worked there ever since. Now the senior industrial hygienist at Norfolk Southern, Dudle has been a member of AIHA national and the Georgia Local Section of AIHA since 1992.

While working on his undergraduate degree at Auburn University, **Barry Graffeo, CIH,** was introduced to several industrial hygienists at his summer job as a health, safety, and environmental technician at Southern Company Services, an electrical utility company. In his last year at Auburn, he took two introductory industrial hygiene courses at UAB. He went on to receive his MSPH degree in environmental health from UAB in 1992. Graffeo is now the global industrial hygienist for Eli Lilly and Company. He is a past chair of the AIHA Exposure Assessment Strategies Committee and has served on the AIHA Board of Directors since 2012.

Christina E. Robertson, CIH, CSP, discovered the profession by coincidence. She was working on a degree in chemistry at Texas A&M University with intentions to teach chemistry at the secondary level. During her last semester at A&M, she took a job as a student worker in the oil and hazardous materials training division of the Texas Engineering Extension Service, where she became interested in the industrial hygiene and safety field. She received her Master of Science in industrial hygiene from Texas A&M, and has worked continuously for the university since June 1997. Robertson was recently named director of environmental health and safety at the university.

All three of these professionals recall becoming aware of the American Industrial Hygiene Foundation through the professors at their respective universities, who encouraged students to apply for these scholarship opportunities and, in some cases, provided administrative help and other support for up-and-coming IHs and safety professionals seeking assistance in funding their education.

AN EVOLVING FIELD

As professionals who have worked in the industrial hygiene and occupational and environmental health and safety profession for more than 20 years, these early scholarship recipients have watched the field broaden in scope, adapt to advances in technology, and extend its reach worldwide.

"Fewer people are practicing strictly traditional industrial hygiene," Dudle says. "The field is broader, and it encompasses safety and environmental elements. It's the way that industries and corporations in the United States have gone; people have to branch out."

Graffeo agrees. In the years since he entered the profession, there has been a transition from specialists in a single discipline to general practitioners whose expertise spans across the health, safety, and environmental fields. In the early 1990s, three different people at a plant site would handle each of those aspects, he says.

Now, in many cases, one person is responsible for all of those items within an organization.

"I think the problems that we face now are actually more complicated, yet individuals are expected to cover a lot more ground," Graffeo says. "So it's more important than ever for practitioners to continue to enhance and broaden their technical expertise."

Dudle adds that industrial hygienists' newfound versatility and broad knowledge base put the profession in a good position to tackle the issues of today's fast-paced world.

"Everybody needs everything now, and that's probably a function of current technology," he says. "Not only do we know the technical aspects of industrial hygiene, we are also able to apply the same types of principles to environmental work. Many IHs have strong safety backgrounds as well. The broad base of our expertise makes us very valuable employees."

As IH and OEHS professionals expand their skill sets, globalization is dispersing health, safety, and environmental risks to areas like South America, the Far East, India, and Asia, which have smaller IH and OEHS communities. These locations sometimes lack the necessary resources, capacity, and capability to properly assess and manage risks, Graffeo says. The challenge is how to leverage new business models and approaches for delivering support to those regions.

Dudle and Graffeo agree that one thing hasn't changed with time: the IH and OEHS field remains a challenging, rewarding profession full of opportunity for young professionals just entering the work force.

"It's a great time to be entering the field," Graffeo says. "A lot of baby boomers are retiring now. But the risks in those jobs aren't going away, so it's actually a good chance for younger professionals to have their pick of opportunities."

Dudle adds that the job security afforded by the profession's ability to adapt to current industry needs is a major draw for today's recent graduates and young professionals. Regulatory compliance in particular is an area that helps support the stability of the field, since regulations become more stringent year after year, he says.

"Industrial hygiene encompasses so many different things," Dudle says. "With diverse work responsibilities in a broad range of fields, it really allows people to branch out."

ADVICE FROM VETERAN IHS

While they wouldn't change much about their own career choices—it seems like they turned out just fine!—Dudle, Graffeo, and Robertson have all learned a few things that may help smooth the path of today's recent graduates and young professionals.

Robertson, who did not have the opportunity to intern because she worked a full-time job while completing her master's degree, is glad to see more internship opportunities being offered to students. She is also encouraged that internships are now incorporated into the curriculum so that students don't miss their chance to experience the field hands-on during their academic years.

"Interning is very beneficial to students because it broadens their perspective on what opportunities might be available to them once they graduate," Robertson says. "They may come in [as interns] thinking that they're all about ergonomics and leave thinking, 'Well, maybe I want to focus more on occupational safety.'"

Similarly, Robertson advises young professionals to acquire broad-based experience, including lots of practice in the field, which she sees as a valuable foundation for a career. She also suggests that those new to the profession concentrate on obtaining their certifications as quickly as possible. Robertson holds both the Certified Industrial Hygienist (CIH) and Certified Safety Professional (CSP) certifications.

"Certification opens doors and creates possibilities that may not have been there previously," Robertson says. "Having both certifications has benefited me significantly because I'm able to work on a broader spectrum of issues."

Dudle stresses the importance of communication skills for those entering the field. Reviewing candidates' writing samples is a critical part of his hiring process to help ensure that potential employees' communication skills are as strong as their technical and analytical ones.

"A strong technical and analytical background is a must to be successful in the industrial hygiene field, but those skills are of limited value if [IHs] cannot effectively communicate to both employees and management," he says.

In thinking back on his career, Graffeo can't imagine where he would be if he had not gotten involved in AIHA as a volunteer.

"[My involvement with AIHA] has created tremendous opportunity for professional and personal growth, and it's really paid dividends in my job," he says. "Some of the key innovations over the past 10 years relative to implementing our industrial hygiene programs came directly from my technical committee work at AIHA and networking with peers."

"It's a great time to be entering the field," Graffeo says. "A lot of baby boomers are retiring now. But the risks in those jobs aren't going away, so it's actually a good chance for younger professionals to have their pick of opportunities."

Over the years, Graffeo has known many members who are reluctant or wait too long to get involved. He stresses that those professionals are missing out on opportunities to meet and network with peers, receive informal mentoring, and work with dynamic teams on a variety of issues that can help boost industrial hygienists up a learning curve more quickly.

"You'll never meet a more eager group of people willing to impart knowledge and help you out," he says of AIHA volunteers. "Don't be afraid. Jump into that volunteer space because you always get more out of it than you put into it."

And what makes for a perfect first job?

"Find an opportunity that fits your skill set, but also leaves some room to grow," Graffeo suggests. "Make sure it's not something you're completely comfortable with. That will always help you to grow professionally and personally."

INVESTING IN THE FUTURE

Are you a student studying industrial hygiene or a related discipline? Details on AIHF scholarships, including application materials and requirements, are available online at *http://bit.ly/aihf_info*.

AIHF scholarships are provided through contributions from AIHA members, individuals, corporations, and local sections. For more information or to donate, visit *http://bit.ly/aihf_donate*.

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THE FOUNDATION THROUGH THE YEARS

The American Industrial Hygiene Foundation (AIHF) works to advance the profession by awarding scholarships for students in industrial hygiene and related disciplines. Foundation scholarships have enabled talented students to complete their education and have encouraged some of the most promising scholars to enter or remain in the profession. Following are a few highlights of AIHF's history.

- The idea for the American Industrial Hygiene Foundation (AIHF) was first presented to the AIHA Board of Directors at its Dec. 1, 1977 meeting, where the Board authorized the establishment of a scholarship program.
- The Foundation was in development for two years before it was incorporated in 1979, with its bylaws formally approved by the Board in 1980.
- On April 15, 1981, the Foundation received its 501(c)(3) statement from the IRS, authorizing it to accept money tax-free.
- Twenty-three universities responded to the Foundation's first request for proposals, submitting for consideration the number of students they would fund and information on their industrial hygiene education programs.
- In May 1982, ten of those universities were selected to each receive $5,000 to distribute to students to fund tuition and expenses for their education. Those scholarship funds were the Foundation's first awards.
- The Foundation's Fun Run fundraiser, now an annual tradition at AIHce, was first held at the conference in 1986 in Dallas, Texas. It raised approximately $5,000.
- By the end of 1990, the Foundation had awarded approximately $300,000 to approximately 300 students.
- As of 2014, AIHF has distributed $1,617,726 to 549 students studying industrial hygiene and related disciplines at 53 different schools and universities.

Most of this historical information about AIHF is based on chapter 17 of *The American Industrial Hygiene Association: Its History and Personalities, 1939–1990*, edited by George and Florence Clayton.

A Passion for Protecting Worker Health

Throughout its history, AIHA has benefited from a passionate base of volunteers. In honor of its 75th anniversary, AIHA asked its volunteers to respond to the question, "What ignited your passion for industrial hygiene?"—in 75 words or less. Some of the responses appear below. Read more at *http://bit.ly/75thresponses*.

"Helping employees avoid injury and learn about the hazards of the materials they work with is what keeps me motivated as an IH."

My earliest memory is of my dad, wearing an eye patch, waiting to be picked up at his work's infirmary. He had an eye injury from ammonia. I am sure this is the origin of my passion for IH. Helping employees avoid injury and learn about the hazards of the materials they work with is what keeps me motivated as an IH.

Sharon Shindel, CIH
Intel Corporation

As a very young woman, wide-eyed and just starting my career in Syracuse, N.Y., out of the blue a very fine gentleman at work, a CIH, took me under his wing and taught me all about what industrial hygiene was and the wonderful ways you could help people with it. I still feel that joy and excitement whenever I learn something new about IH, and want to share that great feeling with others.

Connie Muncy, CIH
AES Corporation

After spending two summers at the bottom of excavations as a water-proofer mopping coal tar on foundations, I took a cancer biology class. The professor started his lecture with the first scientific paper written on cancer, Percivall Pott's study of scrotal cancer among chimney sweeps due to coal tar exposure. With my interest piqued, I learned there was a profession called industrial hygiene and that NIOSH was offering training grants. It was meant to be.

Paul Wambach, CIH
Advanced Technologies and Laboratories International, Inc.

I was in my late 20s when the asbestos abatement industry boomed in Alabama. I became involved in various aspects of the industry from field work, lab analysis and consulting through design to clean-up. Throughout the process there were industrial hygienists involved to protect the workers, the building occupants and public. Now, I am continually reignited by our students looking forward to a career where they can make a difference—and I'm sure they will.

Elizabeth H. Maples, PhD
University of Alabama-Birmingham School of Public Health

Having worked chemical manufacturing shift work while in college, I discovered an appreciation for my own health and safety. There I learned about industrial hygiene being a delightful mixture of both the chemistry and the engineering concepts that I found so compelling. I believe that nothing is going to get better unless someone changes something, so I redirected my career path to industrial hygiene and am excited about the opportunity to make a difference.

Paula Steven
Director for the Midwest Region
of the AIHA Student and Early Career
Professionals Committee

In 1985, during a shift in quality control at a carbonless copy paper plant, a tanker of formaldehyde was inadvertently distributed throughout the basement instead of the tank. The potential hazards of formaldehyde were known to some staff, but not all. While everyone was evacuated quickly and there were no serious injuries, the experience sparked my interest in industrial hygiene. My professional goal has been to recognize, evaluate and control occupational exposures.

Paula Loht, CIH, CSP
Gannett Fleming, Inc.

Working as a student process engineer in a foundry, I found some detector tubes, went out in the foundry and started measuring things. When some workers started reporting "halo vision," we figured out that they were over-exposed to dimethylethylamine, the catalyst in an isocyanate binder process. Working with maintenance to plug the leaks, optimize the operation, and provide some local exhaust ventilation, we prevented the symptoms. The foundry was my first occupational hygiene textbook.

John Oudyk, MSc, CIH, ROH
Occupational Health Clinics for Ontario Workers

VIDEO TIMELINE HONORS AIHA HISTORY AT AIHCE 2014

One of the main attractions at AIHce 2014 in San Antonio was the AIHA historical display and accompanying video timeline. Sponsored by Galson Laboratories and EMSL Analytical, Inc., the timeline comprised three pillars with video consoles highlighting important and influential events in each of the three 25-year periods of AIHA's history. The timeline was the most prominent reminder at AIHce of AIHA's long history protecting worker health. AIHA thanks Galson Laboratories and EMSL Analytical, Inc., for their support of AIHA. The three videos can be viewed on AIHA's YouTube Channel at *http://bit.ly/anniversaryvideos.*

"I believe that nothing is going to get better unless someone changes something, so I redirected my career path to industrial hygiene and am excited about the opportunity to make a difference."

A Future Filled with Promise

BY CHRISTINE A.D. LORENZO

The men and women who founded AIHA 75 years ago were both pragmatic and idealistic. Their practical concerns were informed by the immediate need, in the late 1930s, to organize their peers so that the budding profession of industrial hygiene would have some means of directing its growth and sharing technical knowledge among practitioners. Their idealism is apparent in the overarching, unattainable goal to which their every action contributed: the elimination of occupational disease.

Our challenge for the next 75 years is to build on the firm foundation our predecessors established.

Christine A.D. Lorenzo, CIH, is president of AIHA and safety and occupational health manager for federal and state operations at OSHA. She can be reached at lorenzochrisaiha@msn.com or (720) 264-6572.

And so it continues to this day. AIHA remains an organization guided by both realism and optimism. Without one or the other, we would not be the vibrant, successful association we are today. Our challenge for the next 75 years is to build on the firm foundation our predecessors established. Protecting worker health, in the U.S. and abroad, requires constant vigilance, prudent use of resources, an unerring sense of opportunity, and a reservoir of hope. Throughout our history we have demonstrated these qualities in abundance, and they will serve us well as we enter a new era of achievement.

Thanks to the leadership of the volunteers who guided AIHA through the past 75 years, today we are a vibrant, financially sound, member-focused organization, with a well-earned reputation as the primary resource for education and knowledge in industrial hygiene and its allied professions. The stewardship of our leaders has positioned us to benefit from some excellent opportunities to advance industrial hygiene in the near future.

NEW OPPORTUNITIES

The men and women who run AIHA 75 years from now are likely to look back on this period of AIHA's history as a time when we made great strides internationally. In 2018, AIHA will host the 11th International Occupational Hygiene Association (IOHA) Scientific Conference. This conference, which is expected to bring about 1,000 occupational hygiene experts from around the world to Washington, D.C., represents another step in AIHA's commitment to strengthening ties with allied organizations around the world.

Through collaborations with peer organizations, AIHA can make real progress on the difficult problem of extending worker protections in developing countries. This goal is what motivates us to continue dialogue with groups like IOHA and the Occupational Health Training Association. OHTA has developed an online training program that allows people all over the world to learn how to protect the health of people at work. Our support of initiatives like this is crucial to advancing our profession globally.

AIHA has long recognized the importance of international outreach. For more than 20 years, AIHA has built relationships with our counterparts in India and China. As these countries begin to confront their occupational health challenges, AIHA stands ready to serve their needs through our world-class education and knowledge programs.

AHEAD OF THE CURVE

Today's industrial hygienists use equipment that AIHA's founders could only dream of. Direct-reading instruments, apps that support real-time data, responsively designed websites, and many other developments have transformed the way we work. We can be certain that technology will continue to evolve quickly, and AIHA must be ready to keep pace.

A new initiative launched in 2013, the Content Portfolio Management Team (CPMT), will ensure that AIHA's educational and informational offerings continue to provide the latest technical training to our members. The CPMT's purpose is to help the Board identify new content areas for development and update existing content. It will play a vital role in identifying trends and emerging issues that affect the industrial hygiene profession, and in recommending topics around which AIHA should create products and services.

COMMON THREAD

For three-quarters of a century, AIHA has been at the forefront of worker health protection. Our profession has contributed to tremendous achievements; we have also experienced frustration as some of the occupational hazards our founders grappled with (silica, benzene, lead, to name a few) have endured in workplaces. At the same time, work processes and technologies continue to evolve, introducing new hazards—nanotechnology is the most prominent example—that our founders could not have imagined. Our past achievements give us the confidence to meet these challenges and inspire us with the knowledge that has motivated our profession for generations: that the work we do today will benefit workers tomorrow.

THREE CONFERENCES.

One mission.

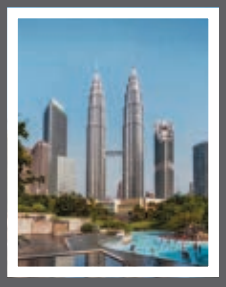
Since 1939, AIHA has provided quality, world-class conferences, expositions and education to help you keep current in the field of industrial hygiene, broaden your expertise and, most importantly, *protect worker health*.

SAVE THE DATE FOR AIHA'S UPCOMING CONFERENCES!

AIHA Fall Conference 2014

Oct. 18 – 22 • Washington, DC • AIHAFallConference.org

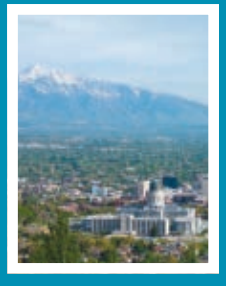
Have conversations that matter at AIHA Fall Conference—the best opportunity of the year to network with colleagues in a collaborative, intimate and engaging environment. AIHA Fall Conference has something for everyone—whether you are a student, a mid-level professional or have been in the profession for years.



AIHA/MIHA 2014 Asia Pacific OH + EHS Conference + Exhibition

Nov. 4 – 6 • Kuala Lumpur, Malaysia • AIHAMIHAAP.org

AIHA and the Malaysian Industrial Hygiene Association (MIHA), two of the world's premier industrial hygiene organizations, are co-sponsoring this exciting new education and training event. This meeting provides attendees with the highest-quality education and training to manage industrial hygiene, occupational health, and environmental health and safety issues in the workplace. It will also provide a unique forum to network with peers, and discuss current events and trends.



AIHce 2015

May 30 – June 4 • Salt Lake City, UT • AIHce2015.org

AIHce is the premier event for thousands of occupational and environmental health and safety professionals worldwide. The conference offers a comprehensive menu of educational programs from exposure assessment to product stewardship & sustainability, and everything in between, plentiful opportunities for networking, and a bustling expo.

www.aiha.org/conferences

AIHA®
Protecting Worker Health


Dedicated
to preserving
human life
Every day, the work being done at Industrial Scientific is guided by our vision to end death on the job in this century. As we continue working tirelessly to preserve human life on, above and below the earth, we are encouraged by organizations such as the AIHA who share in our passion for worker safety.
Congratulations to AIHA on 75 years of protecting worker health and serving the industrial hygiene community.
The Gas Detection People
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www.indsci.com