



PERSPECTIVES

Beyond Mold, Asbestos & Lead: The Role of the Industrial Hygienist in the Construction Industry

Our perspectives feature the viewpoints of our subject matter experts on current topics and emerging trends.

INTRODUCTION TO INDUSTRIAL HYGIENE

Since its inception, a professional performing the job of an Industrial Hygienist (“IH”) has been dedicated to ensuring the health and well-being of the worker. Over the years, this role has evolved as a result of changes in the workplace due to society’s shift from an industrial based economy to a service-based economy. Industrial Hygiene (IH) not only covers the health and well-being of the worker, it has expanded to include environmental services in occupational and non-occupational areas, including environmental health, product safety, safety program development and management, indoor air quality for residential and commercial buildings, and many other environmental health and safety challenges.

Industrial hygiene is defined as the practice of anticipating, recognizing, evaluating, and controlling environmental, health, and safety hazards within the workplace and community. The IH utilizes knowledge gained through a combination of education, training, and experience to anticipate potentially hazardous conditions. The IH must be able to recognize those potential conditions, evaluate and measure the level of the hazard posed, and recommend realistic controls to remove or reduce potential health effects.

Traditionally, since the term “industrial hygienist” had not been restricted by law, anyone who believed they had some capability to act in the realm of advising on the health and well-being of workers could label themselves as an IH. Beginning in the late 1990’s, and continuing into the 2000’s, a “title protection” effort was undertaken by the American Industrial Hygiene Association (“AIHA”) wherein laws were passed in several states requiring certain training and expertise for anyone labeling themselves as an IH.

The “gold standard” to demonstrate competence in the field of industrial hygiene had always been certification by the American Board of Industrial Hygiene (“ABIH”) which was set up in 1960 but changed its name in 2019, to the Board for Global EHS Credentialing® (BGC®) to more accurately reflect the new organizational structure and wider range of credentials and designations for improving public and environmental protection.

When the ABIH began it provided a voluntary certification program to certify a minimum level of knowledge and skills in industrial hygiene. The ABIH subsequently issued the designation of Certified Industrial Hygienist (“CIH”) to those individuals who meet strict board eligibility requirements and pass a comprehensive extensive examination that covers many rubrics such as engineering controls and ventilation, air sampling and instrumentation, biohazards, noise, chemistry, risk analysis, epidemiology, and toxicology.

Currently, certification requires an undergraduate degree in industrial hygiene or a closely related field and is maintained by the Board for Global EHS Credentialing (BGC).

Individuals calling themselves industrial hygienists may not have IH degrees or the CIH designation, but may have received specialized training classes, and with sufficient experience may be competent in narrower specific areas such as mold, asbestos, lead, etc.

Regardless of a practicing individual’s experience or professional certification, the AIHA defines Industrial Hygiene as:

“...a science and art devoted to the anticipation, recognition, evaluation, prevention, and control of those environmental factors or stresses arising in or from the workplace which may cause sickness, impaired health and wellbeing, or significant discomfort among workers or among citizens of the community. IHs are scientists and engineers committed to protecting the health and safety of people where they work. They are the ‘invisible heroes’ who make sure our friends, acquaintances, and loved ones come home safe every day.”^[1]

Due to the specialized knowledge of Industrial Hygienists, they became a more familiar presence within the steel, chemical, petroleum, and other industrial and manufacturing industries starting in the 1970s when the Occupational Safety and Health Administration (“OSHA”) and the National Institute for Occupational Safety and Health (“NIOSH”) were first established. NIOSH provided training grants to jump start the training of a new army of Industrial Hygienists. Hundreds of practitioners went to work for OSHA in rule making, compliance, and consulting roles, while others entered industry.

However, it was not until later in the 1980s and 1990s, with the arrival of the OSHA Asbestos Standards, OSHA Lead in Construction Industry Standard, and OSHA Occupational Noise Exposure Standard, and more recently the Silica Dust Standard, that IHs became more common within the construction industry. These occupational health standards propelled IHs into homes and commercial buildings to protect workers and occupants alike from asbestos fibers, lead dust, and hearing loss. Industrial Hygienists in private consulting roles grew rapidly. By the 2000s, IHs were drawn into investigations involving indoor air quality and other indoor health concerns, most notably mold and ventilation deficiencies. The more recent issues with wildfires have also drawn attention to the inhalation of combustion byproducts from those fires as well as additional attention to smoke contamination of homes and commercial buildings from structural as well as wild fires.

But mold, lead, and asbestos are not the only hazards found on construction sites. This paper will provide insight into those other hazards and how Industrial Hygienists support their clients' needs for safe and healthy workplaces. We begin with some basic concepts about industrial hygiene to lay the foundation for meeting those needs.

BASIC INDUSTRIAL HYGIENE CONCEPTS

Dose/Response

"What is there that is not poison? All things are poison, and nothing is without poison. Solely the dose determines that a thing is not a poison".^[2] This is the fundamental statement made by Paracelsus, a Swiss physician and author credited as being the father of modern toxicology. He taught us that all stressors, whether perceived to be benign or not, can cause harm. When exposed at the sufficient concentration via the correct exposure route for the correct duration, all substances may have adverse effects. It is the responsibility of Industrial Hygienists to reduce exposures as appropriate whenever possible.

Exposure Assessment and Control

IHs use exposure assessments to measure the level of hazards present in the work environment and the exposure experienced by workers. The IH will conduct an assessment to determine the types of hazards present in the work environment, research the potential health effects associated with those hazards, determine the potential routes of entry (inhalation, ingestion, dermal), establish the length of time individuals may be exposed, and gather information on applicable exposure limits and methods of measuring exposures. Based on that information, the IH will develop a sampling plan to best demonstrate the exposures that employees are encountering and determine whether those exposures comply with applicable regulatory limits or guidelines.

IHs then use the results obtained from exposure assessments to develop hazard control strategies to further protect worker safety and health. Strategies for exposure reduction (the "hierarchy of controls," a concept borrowed by other professions) include hazard elimination or substitution, ventilation and other engineering controls, administrative controls including standardized work procedures and training, and as a last resort control, personal protective equipment ("PPE").

Medical Monitoring

To properly monitor the changing health of employees, federal, state, and local regulatory agencies can require initial and ongoing regular medical evaluations be performed by employers to determine if changes of an employee's physiology may be indicating potential adverse effects of exposure. Participation by the employer in a medical monitoring program is also required to verify each employee's fitness to wear required respiratory protection or other PPE. These evaluations allow employees and employers to assess the effects of exposure over a given period and, ultimately, take actions to bolster health hazard preventative procedures.

Regulatory Compliance - OSHA

The purpose of OSHA is to ensure safe and healthful working conditions for workers by setting and enforcing standards and by providing training, outreach, education,

and assistance. This endeavor is best exemplified by OSHA's overarching General Duty Clause, which states that each employer shall "furnish to each of his employees' employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees" and "comply with occupational safety and health standards promulgated under this Act" ^[3]. OSHA also provides regulations pertaining to specific hazards across all industries. The Industrial Hygienist is integral in assisting employers with meeting the requirements of OSHA and other regulating bodies.

IH ROLE IN CONSTRUCTION

The construction industry presents a unique challenge to the IH since most processes are not routine and are of short duration. As opposed to other industries, where processes and procedures are repeated within the same location and under the same conditions, construction site activities change continuously as structures and utilities are erected, installed, and guided to completion; or demolished and removed. As a result, unexpected hazards are often uncovered that require work stoppage, reevaluation, and development of new work procedures to allow the work to be completed safely. On a construction site, activities will often change, even within the same craft. While these workers may be journeymen in their fields of expertise, they must constantly navigate different situations that expose them to changing personnel, activities, weather, vehicles, chemicals, and myriad physical hazards.

Job Safety Analyses (JSA)

A strong culture and positive attitude towards health and safety is essential on construction sites to promote personal responsibility of workers for their own health and safety at times when they are not being observed. Layers of pre-job meetings and "toolbox talks" serve to drive consistent global and craft-specific messages to workers. Job Safety Analyses ("JSA") should serve as starting points for each team to anticipate, identify, and discuss potential hazards associated with the work of each craft and the means that will be exercised for controlling those hazards. Industrial Hygienists can be an integral part of any team performing these analyses. Bolstering the site/task specific JSA is comprehensive training, required by regulation,

that works to keep safety and health issues front and center and provide tools for workers to think independently in the situations in which they are exposed. Construction workers will often attend OSHA 10, 30, or 40-hour training to meet these needs.

Safety Hazards

While the consulting world is familiar with the IH role addressing hazards in accordance with guidelines, and regulations associated with asbestos, lead, and mold, the IH is also responsible for performing process and ergonomic evaluations to determine the best methods for controlling the most common causes of site safety hazards. According to the United States Bureau of Labor Statistics ("BLS"), the four most common causes of fatalities on a construction site not associated with motor vehicle accidents are physical hazards including: ^[4]

- Falls
- Struck-by object incidents
- Electrocution
- Caught-in/between incidents.^[4]

Collectively, these hazards are known as the "Fatal Four." In 2018, they accounted for more than half of the deaths occurring within the construction industry.^[4] In addition, due to tasks involving heavy overhead and floor-level lifting combined with repetitive motion, construction workers experience work-related musculoskeletal disorders ("WMSD") at a frequency higher than all other industries combined.^[5] The IH is frequently engaged to perform process and ergonomic evaluations to determine the best methods for control of these hazards.

Health Hazards

Health hazards in the workplace typically include:

- Noise and vibration
- Confined spaces and oxygen deficiency
- Skin, eye, and lung irritants and sensitizers
- Organic solvents, vapors, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs).
- Toxic gases such as carbon monoxide, nitrogen and sulfur dioxide, and hydrogen sulfide
- Silica, diesel, and other particulate matter
- Asbestos and man-made and non-asbestiform mineral fibers

- Mold, bacteria, viruses, and other biological hazards
- Lead and other heavy metals such as arsenic, mercury, cadmium, and beryllium
- Welding fumes
- Radiation

Noise is a frequently underappreciated hazard on construction sites. As an industry, construction has a large percentage of workers exposed to noise hazards and hearing loss; it is second only to manufacturing.^[6] The IH utilizes sound level meters and noise dosimeters to evaluate an employee's discreet and cumulative noise exposure to determine exposure levels, compliance with applicable regulations and guidelines, and to develop appropriate controls where necessary.

Tasks that frequently expose construction workers to potentially hazardous amounts of inhaled materials include abrasive blasting; welding; grinding and cutting brick, masonry, and concrete; working in confined spaces; applying or removing insulation; and applying or removing adhesives and paint. Some of the substances of concern generated during these activities include airborne silica and other solid particulates, lead and other heavy metals, welding fumes, fiberglass, and various organic solvents. The IH utilizes appropriate air sampling media and collection devices, and/or real-time detection instruments, to determine contaminant concentrations in the worker's breathing zone and work area as well as extrapolate cumulative exposure data for comparison to OSHA Permissible Exposure Limits ("PEL") and applicable guidelines.

Industrial Hygienists must develop experience with identifying hazards as they exist, anticipating where they could arise, and developing programs and systems for employees and employers to utilize which create a culture of compliance within the workplace.

CONCLUSION

In today's world, expert Industrial Hygienists are a necessary cog in the construction industry, performing comprehensive assessments of a variety of hazards associated with complex labor activities. They are essential for creating controls that help minimize unnecessary exposure to an employer's most valuable asset—their workers.

ACKNOWLEDGMENTS

We would like to thank Matthew Allen, CIH, CSP and Robert Leighton, CIH, CSP for providing insight and expertise that greatly assisted this research, and Michael Krause, CIH who provided a peer review of this paper.

MORE ABOUT J.S. HELD'S CONTRIBUTORS

Robert Leighton is a Senior Vice President in J.S. Held's Environmental, Health & Safety Practice. Bob has trained, supervised and managed a diversified staff of industrial hygiene, environmental and safety professionals as the founder and technical director of Leighton Associates, Inc., an environmental health and safety consulting firm specializing in construction projects, indoor air quality, and the investigation, assessment and remediation of environmental health and safety matters in real estate, property management, and property insurance claims, as well as environmental health interventions. Bob's expertise includes an in-depth knowledge and understanding of industrial hygiene, indoor air quality, OSHA compliance, mold, lead, asbestos, and combustion by-products contamination and remediation.

Bob can be reached at rleighton@jsheld.com or +1 516 708 2207.

Michael Krause is a Project Director in J.S. Held's Environmental, Health & Safety Practice. Mike has provided industrial hygiene assessments (including worker exposure monitoring and modeling), control recommendations, and training for employers' regulatory compliance purposes, to address employees' concerns, and to minimize risk. He has provided consultation in heavy industries such as aerospace, metals, and wood products; to insurers, insureds, and brokers; and to schools, building owners and managers, contractors, and government agencies. Mr. Krause has particular expertise in evaluating chromium, asbestos, lead, and solvent exposures; performing noise testing in various workplaces; authoring Safety Data Sheets (SDSs) for pharma clients; evaluating PPE usage (respirators, earplugs, gloves); and assessing indoor air quality (IAQ), mold, E. coli, Legionella, and hypersensitivity pneumonitis (HP) issues.

Mike can be reached at mkrause@jsheld.com or +1 425 207 4370.

REFERENCES

- [1] American Industrial Hygiene Association, <https://www.aiha.org/>, July 2020
- [2] Paracelsus, *The Third Defense*, 1538
- [3] Occupational Safety and Health Act – Section 5
- [4] U.S Bureau of Labor Statistics, <https://www.bls.gov/iif/oshwc/foi/cftb0330.htm>, July 2020
- [5] Wang X, Dong XS, Choi SD, et al, “Work-related musculoskeletal disorders among construction workers in the United States from 1992 to 2014”, *Occupational and Environmental Medicine* 2017;74:374-380.
- [6] OSHA Technical Manual, Section III Chapter 5, https://www.osha.gov/dts/osta/otm/new_noise/, November 2020

This publication is for educational and general information purposes only. It may contain errors and is provided as is. It is not intended as specific advice, legal or otherwise. Opinions and views are not necessarily those of J.S. Held or its affiliates and it should not be presumed that J.S. Held subscribes to any particular method, interpretation or analysis merely because it appears in this publication. We disclaim any representation and/or warranty regarding the accuracy, timeliness, quality, or applicability of any of the contents. You should not act, or fail to act, in reliance on this publication and we disclaim all liability in respect to such actions or failure to act. We assume no responsibility for information contained in this publication and disclaim all liability and damages in respect to such information. This publication is not a substitute for competent legal advice. The content herein may be updated or otherwise modified without notice.