

## Unit Lesson

Industrial hygiene (IH) is a term that you do not hear used quite often in normal conversation. When industrial hygienists tell acquaintances that they are an industrial hygienist, there are some common responses. “You clean teeth?” and “What is that?” are fairly common. Although industrial hygiene has been practiced for hundreds of years, it is not well publicized to the general populace and has not become part of mainstream educational programs. Few colleges and universities have specific degrees for industrial hygiene. You rarely see informational tables for industrial hygiene at college and university fairs. Despite the lack of knowledge and publicity, industrial hygiene can be a challenging and rewarding field of work.

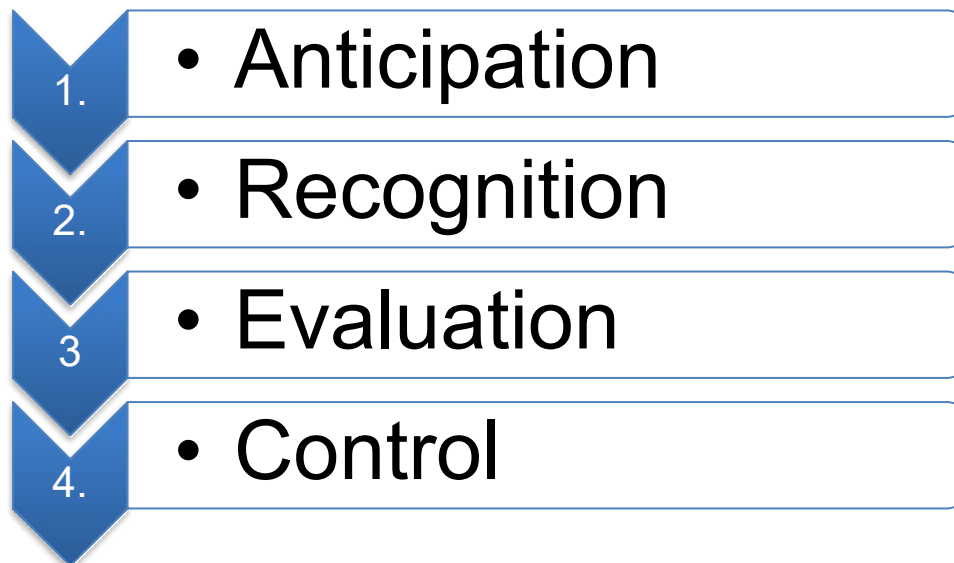
The early days of investigations of occupational illnesses were primarily performed by physicians. Over the centuries, the field has become more specialized with many practitioners obtaining advanced degrees with classes specifically in industrial hygiene. Regulatory influence over the field has also advanced over the years. In the late 19th and early 20th centuries, most regulations for safety and health were promulgated at the state level. The first regulations at the federal level were not introduced until the 1960s (Fuller, 2015).

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The most influential federal regulation for industrial hygiene was the Occupational Safety and Health Act (OSH Act) of 1970, which resulted in the formation of the Occupational Safety and Health Administration (OSHA). Since its foundation, OSHA has published numerous regulations specifically addressing work commonly performed by the industrial hygienist. In particular, 29 CFR 1910.1000 and the tables contained within the regulation are used by industrial hygienists as a regular part of their practice.

Industrial hygiene can be complex, requiring a knowledge of multiple scientific fields including biology, chemistry, toxicology, and epidemiology as well as a basic understanding of some engineering principles like ventilation. An understanding of biostatistics can also be important to evaluate exposures, and hazard assessment/risk assessment techniques are required to identify potential hazards and evaluate the need for implementation of control methods. We will discuss some of these disciplines in Unit II.

Any discussion of industrial hygiene must include the four basic tenets of the field.



The four tenets of industrial hygiene

These four tenets guide the industrial hygienist in his or her approach to controlling risks associated with hazards at a worksite. A clear understanding of industrial hygiene should begin with an education in the four tenets. As we progress through the course, we will look at each of the tenets. For this first unit, we will discuss anticipation and recognition.

### **Anticipation and Recognition**

*Anticipation* is the process by which the industrial hygienist identifies potential hazards at a worksite (Fuller, 2015). Understanding some basic operations can help the industrial hygienist anticipate hazards more effectively. For example, if the industrial hygienist is familiar with how welding operations are performed, he or she can anticipate that certain metal fumes would be expected to be present based on the type of welding and the material involved in the welding process. Thus, if the industrial hygienist knew that a process involved metal inert gas (MIG) welding of galvanized steel, he or she could anticipate some potential exposure hazards before actually visiting the worksite. In other cases, the industrial hygienist may not be familiar with a particular process and would require additional information. The additional information could include a description of the process and a review of applicable safety data sheets (SDS) for any chemicals used in the process. Section 3 of the SDS is typically important in the process since it contains a list of chemicals that may be present. However, because some processes may result in chemical reactions and/or decomposition of the compounds in Section 3 of the SDS, the industrial hygienist may also be required to research the chemistry of some processes.

*Recognition* is the actual observation of the hazards in the workplace (Fuller, 2015). Many people lump anticipation and recognition into one task, but there is a distinct difference between the two tenets. Anticipation is a preliminary assessment that is performed prior to actually visiting a site. Recognition is typically a hands-on inspection of a site utilizing information created during the anticipation phase to complete a hazard assessment (Fuller, 2015). For example, if the industrial hygienist knows that a facility is using several different paints containing a list of solvents, he or she knows to ask about the location of the painting operation when visiting the site. If he or she did not have the advanced knowledge, the presence of a painting operation may not be noticed because paint operations are sometimes located in remote areas of the plant, inside small rooms at the end of the production line. Not realizing there was a paint operation could result in missing some significant hazards. Recognition generally requires the industrial hygienist to spend time observing the workers at their work location. Having reviewed available SDS would allow the industrial hygienist to have a better understanding of the potential exposures at a work operation when he or she visually observes the work. The textbook includes a process to summarize the work process, making it easier to identify worksite hazards. The tool is called process mapping and is discussed on page 11 of the textbook.

The anticipation and recognition tenets require at least a basic understanding of job hazard analysis (JHA). This is one area where safety professionals and industrial hygienists share a common tool. JHAs are performed to identify hazards. The identified hazards may be safety-related or industrial-hygiene related. In some cases, the hazards may be considered both safety-related and industrial-hygiene related depending on whom you ask. For example, a JHA of a stamping operation at an auto parts manufacturer would almost always indicate a *noise hazard* is present. Noise is a hazard that is commonly evaluated by both safety professionals and industrial hygienists. However, an understanding of the stamping operation would indicate there also may be an exposure hazard related to metal-working fluids. Personal exposures to metal-working fluids would typically be evaluated by industrial hygienists and not safety professionals. The textbook contains a discussion of the different types of hazards on pages 6 and 7.

Historically, industrial hygienists have focused more on chemical and biological hazards, while safety professionals have focused more on physical hazards. Musculoskeletal hazards fall into a category that has progressed into a specialty field called ergonomics. Ergonomists tend to focus on that one category. However, there can be a lot of crossover between the fields, with some professionals holding credentials as a certified industrial hygienist (CIH) and a certified safety professional (CSP). It is much more common for a CIH to also obtain the CSP credential than it is for the CSP to obtain the CIH credential. It is also more common for the ergonomist to hold one of three certifications—the certified professional ergonomist (CPE), the certified human factors professional (CHFP), or the certified user exposures professional (CUXP)—and not to hold either the CSP or CIH credentials.

It is uncommon for small- to medium-size facilities to have a full-time employee who specializes only in industrial hygiene. It is much more common for these facilities to have a full-time safety professional on staff, whether or not that individual holds the CSP credentials. In those cases, the safety professional will be required, in most cases, to handle IH responsibilities at the facility. The safety professional then has to choose to become proficient with IH techniques or to bring in outside assistance to complete the work. Larger plants and corporations are more likely to have full-time industrial hygienists on staff and sometimes offer those services to the safety professional at the smaller facilities.

Most safety professionals are familiar with organizations that can provide valuable assistance: the American Society of Safety Professionals (ASSP), the National Safety Council (NSC), the Board of Certified Safety Professionals (BCSP), the American National Standards Institute (ANSI), and the National Fire Protection Association (NFPA). There are several, similar organizations that are important in the practice of industrial hygiene. In addition to government agencies like OSHA and the National Institute for Occupational Safety and Health (NIOSH), many industrial hygienists belong to organizations like the American Industrial Hygiene Association (AIHA) and the American Conference of Governmental Industrial Hygienists (ACGIH). These organizations offer additional resources to both the safety professional trying to deal with exposure issues at a facility and industrial hygienists that make the job of anticipation, recognition, evaluation, and control easier. Many industrial hygienists also seek certification from the American Board of Industrial Hygienists (ABIH), which shows the industrial hygienist has progressed in the field to a point that he or she has advanced skills and knowledge.

One obstacle the industrial hygienist has to deal with is the relationship between some of the organizations. Only OSHA publishes regulations that are legally binding for the employer. However, in some instances, the guidelines published by the other organizations (the ACGIH in particular) are based on more recent scientific data. You may think that deciding whether to apply the OSHA permissible exposure limits (PELs) or the ACGIH threshold limit values (TLVs) to sample results is only important during the evaluation phase. However, determining whether you will be applying OSHA regulations or guidelines published by other organizations can have an effect on how you perform the initial steps discussed above. For example, there are many chemical hazards that do not have established OSHA PELs but do have TLVs (guidelines) published by the ACGIH. The choice of which occupational exposure limits (OELs) you will apply can affect your approach to exposures related to the hazard. Will you look at the hazard in relation to the general duty clause of the OSH Act or apply a guideline that is not legally enforceable by OSHA?

#### Reference

Fuller, T. P. (2015). *Essentials of industrial hygiene*. Itasca, IL: National Safety Council.

### Suggested Reading

*In order to access the following resources, click the links below.*

Occupational Safety and Health Administration (OSHA) and the CSU Online Library contain many articles that relate to the Unit I readings. The following are just a few of the related articles that can be found on the Internet and in the Academic Search Complete database.

OSHA published an informational booklet on industrial hygiene that summarizes the field.

Occupational Safety and Health Administration. (1998). *Informational booklet on industrial hygiene* (OSHA Publication No. 3143). Retrieved from <https://www.osha.gov/publications/OSHA3143>

The National Institute for Occupational Safety and Health (NIOSH) provides health hazard evaluations for workplaces in the United States free of charge when requested by the employer. Visit the following site to learn more about the NIOSH program.

Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. (n.d.). Health hazard evaluations (HHEs). Retrieved from <https://www.cdc.gov/niosh/hhe/>

The following article summarizes the approach NIOSH used to perform a health-hazard evaluation for one employer. Note the steps NIOSH took in the process.

Industrial hygiene practices have been used to improve workers' health for decades. In some cases, advances were difficult because of faulty research from specific businesses. Read the following article to see how an industrial hygienist must carefully review all data used during an assessment.

## Learning Activities (Nongraded)

Nongraded Learning Activities are provided to aid students in their course of study. You do not have to submit them. If you have questions, contact your instructor for further guidance and information.

The National Institute for Occupational Safety and Health (NIOSH) publishes the *NIOSH Pocket Guide to Chemical Hazards*. Access the pocket guide at <https://www.cdc.gov/niosh/docs/2005-149/pdfs/2005-149.pdf> and search for several chemicals. List these chemicals in one of the hazard categories, found on pages 6 and 7 of the textbook, to which they belong. Do some of the chemicals fall into more than one category? Explain why.