

THE BASICS OF INDUSTRIAL HYGIENE

Industrial hygiene, or IH, is the process used to identify and control the various environmental factors and stresses which employees may encounter, and that have the potential to affect employees' health and wellbeing, cause sickness, or cause significant discomfort or inefficiency. Clearly this broad definition covers a variety of hazards that may be encountered in the maritime environment. In this Safety Bulletin, we define some of the sources of stressors, discuss tools and methods used to measure exposure, and apply the hierarchy of controls to IH exposures.

Identifying Environmental Stressors

Stressors fall into four broad categories in IH: chemical, physical, biological, and ergonomic. A detailed analysis of work processes and materials should be conducted periodically to identify potential sources of stressors. Safety Data Sheets (SDS) are a great starting point to identify potential chemical or biological stressors.

- **Chemical stressors** include gases, vapors, dusts, fumes, fibers and liquids.
 - Vapors from evaporating cargoes, or from volatile chemicals like paint thinners
 - Particles such as dusts and fibers can be generated by activities like sand blasting or agitation of cargoes
- **Physical stressors** refer to sources of energy acting on workers and include noise, radiation, pressure and temperature.
 - Large machinery or specific processes such as grinding can create elevated noise levels. If workers are exposed for an extended period of time, they may exceed acceptable levels.
- **Biological stressors** may not be readily apparent unless they are part of a marine cargo, but they are most likely present in some form in every workspace. Biological stressors could be plants, animals, insects or microbial agents.
- **Ergonomic stressors** include factors such as repetitive motions or workstation and tool design.

Measuring Environmental Stressors

Stressors that fall under the IH category can generally be measured and often have exposure limits in place to protect employees. If there is a chance that workers are exposed to a stressor, measurements should be taken under a variety of work conditions to determine appropriate protective measures to be taken.

- Chemical stressors are measured through air sampling. A variety of sampling techniques exist. If there is a known hazard, specific testing can be done for a single chemical. Broader tests are available to test for a variety of exposures more general analysis.
- The most common form of physical stressor testing is noise sampling. This is used to determine appropriate hearing conservation measures. Conveniently, there are several smartphone apps that allow for a general assessment of the noise level of an area. If a non-calibrated method such as an app indicates that there may be an exposure, a more thorough testing may be appropriate.
- Biological stressors are probably the least likely threat in an industrial workplace.
- Ergonomic stressors include repetitive motion, poor work positioning and excessive loads. An ergonomic assessment of highly repetitive tasks can help management establish worker rotations and determine if workstation designs need to be modified.

Controlling IH Exposures

As with any identified hazard, industrial hygiene exposures should be addressed using the hierarchy of controls. Solutions should be addressed at the highest level possible on the hierarchy.

- **Elimination:** If possible, simply remove the source of the industrial hygiene hazard.
- **Substitution:** There are often alternative products or materials that pose less of a hazard to employees. A good example of this is replacing silica sand with an alternative abrasive agent in sand blasting operations.

- **Engineering:** Workplace engineering controls can address many IH hazards. For example, effective ventilation can control many chemical hazards. Workstation design can help mitigate ergonomic exposures.
- **Administrative:** Administrative controls can be very effective in reducing worker exposure, but they do require additional supervision to be successful. These controls may include worker rotation and worker exposure monitoring (such as radiation badges).
- **Personal Protective Equipment (PPE):** If hazards cannot be addressed by any other means, PPE may be necessary. Proper use of PPE requires that all employees be trained in its use, all exposed employees are appropriately fitted and outfitted, and supervisors are trained to enforce consistent use.

As with any industrial environment, there are many potential sources of industrial hygiene stressors in the maritime industries. These exposures can be effectively mitigated to ensure worker safety as long as they are not ignored. To address IH concerns, first evaluate work processes and materials for potential sources of stressors. Then measure to determine the exposure to employees. If it is determined that a hazard exists, use the hierarchy of controls to address the exposure.

If you have any questions, or would like to discuss how to implement an IH program at your workplace, please contact your AEU loss control manager.

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