FUNDAMENTAL 55: Laboratory Safety

Key Takeaways:

- Realizing the hazardous substances in your laboratory and the need to minimize exposure.
  Understanding the purpose of the Laboratory and Hazard Communication standards and their primary directives.
- Learning your employer's responsibility to supply information and training at the time of your initial assignment to a work area or a new exposure situation.
- Comprehending the information that needs to be included in a Chemical Hygiene Plan and your employer's responsibility to communicate the location and availability of the plan.
- Recognizing the various controls that protect laboratory personnel, including engineering, administrative, work practices, and personal protective equipment.
- Learning your employer's responsibilities and your rights relative to exposure monitoring, medical consultation and examinations, and records.

Course Description

OSHA stated that "More than 500,000 workers are employed in laboratories in the U.S. The laboratory environment can be a hazardous place to work. Laboratory workers are exposed to numerous potential hazards including chemical, biological, physical and radioactive hazards, as well as musculoskeletal stresses."

In non-production laboratories, chemicals pose physical health hazards to workers, which is why they are the number one concern for laboratory employees. These employees will likely be exposed to compounds of certain volatile chemicals. Even individually, chemicals can be dangerous or unstable, but when stored beside other unpredictable chemicals or mixed with dangerous compounds, the potential for risk exponentially increases.

A variety of chemical properties lead to physical health hazards. For example, chemicals that are flammable or reactive are most closely associated with physical hazards, in addition to compounds displaying corrosive or toxic properties. There are even some chemicals that are both flammable and corrosive, or reactive and toxic; every chemical must be treated as a unique hazard with unique risks. The two OSHA standards (the occupational exposure to hazardous chemicals in laboratories standard and the Hazard Communication standards) are the primary regulations in place to safeguard your workforce against hazardous chemicals incidents.

While interacting with chemicals, you should also to refer to the hierarchy of controls, which prioritizes hazard mitigation strategies on the premise that the best way to control a hazard is to systematically eliminate it or substitute a less hazardous technique, process, or material. In the case that elimination and substitution aren’t feasible, laboratories should implement the necessary engineering and administrative controls, and determine the appropriate level of personal protective equipment (PPE) you need to provide as much protection as needed.

The following administrative controls can be inserted into general policy or standard operating procedures for laboratory safety:

- Laboratory Safety Manual
- Chemical hygiene plans (CHP)
- Policies and standard operating procedures
- Guidelines and reference materials
- Prior approval
- Required training
- Hazard signs and symbols

Basic procedures which minimize the duration, frequency, or intensity of chemical exposure include:

- General precautions around interacting with all laboratory chemicals.
- As a cardinal rule, dodging skin contact with chemicals.
- Not consuming, smoking, gum chewing, or applying cosmetics where chemicals are present, in addition to washing hands before conducting these activities.
- Prohibiting the dual use of containers or utensils for food handling, consumption or storage.
- Cleaning chemical spills with appropriate protective apparel and equipment.
- Correctly disposing of all hazardous waste material.
- Immediately reporting any and all accidents and potential chemical exposures.

The first line of defense is engineering controls, built into equipment operation or instruments and require no actions from the employee. Examples include building design, ventilation systems, fume hoods, and self-capping syringe needles. The purpose of engineering controls is to eliminate or reduce exposure to chemical or physical hazards by different methods. Prior to designing the high-risk industrial or manufacturing environment, safety professionals should be involved to evaluate the necessity for engineering controls, consult on healthy workflow practices, and improve safety outcomes through design. To further this point, one of the most important safety devices in a laboratory is a properly functioning fume hood, which controls airborne hazards that are released inside the ventilation device. Safety professionals know where a vent hood should be placed, and they can ensure that hazards are mitigated before they ever manifest.

Secondly, personal protective equipment (PPE) will provide a barrier between personnel and the chemicals they are asked to work with. Personal protective equipment should be implemented last, after administrative and engineering controls, but nonetheless, it is just as important as the other lines of defense against hazards. What type of PPE workers need is determined and provided by employers based on the type and degree of hazard in both specific operations and throughout the laboratory setting.

Majority of personal protective equipment used in laboratories are eye protection,

lab coats, and protective gloves. It may be a good idea to require your team to wear additional PPE, such as face, hearing, head, foot protections and respirators, when appropriate. It cannot be exagerrated that workers need to understand how to properly use and maintain it. It is up to employers to provide training on the use and maintenance of general and specific PPE.

All employees in the laboratory workplace must have a clear responsibility to use engineering controls, follow administrative controls, and wear personal protective equipment correctly.