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TOPIC: Ergonomic Considerations While Working in the Sanitation Department of a Food Manufacturing Facility and Wearing a Personal Protective Equipment (PPE)

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OVERVIEW

All foods are regulated in part or in whole by myriad federal, state and local government agencies. An effective regulatory compliance program ensures that the food company is adhering to national regulations and legislation, state and local rules and any applicable international standards related to the production of foods fit for human consumption.

The guidance found in 21 CFR 110, "Current Good Manufacturing Practice in Manufacturing, Packing, or Holding Human Food," is considered the most fundamental of all food safety programs. The GMP regulations set forth criteria for complying with provisions of the Federal Food, Drug, and Cosmetic Act, which requires that all human foods be free from adulteration. The guidance lays the groundwork for the production and preparation of safe and wholesome food in several general areas, including provisions for sanitary operations, sanitary facilities and controls.

Sanitation is a cornerstone to a company's food safety program. It is difficult, if not impossible, to prepare safe product without a clean facility.

Cleaning and sanitizing are the two essential elements that comprise a food sanitation program, and both must be performed in tandem in order to successfully achieve food safety and quality assurance goals. Cleaning is defined as the use of mechanical agitation and detergents to remove visible soil, biofilms and other residuals from the surfaces of equipment, floors, walls, etc. Sanitizing is the application of chemicals or chemical treatments to remove any remaining bacteria or residuals that cannot be seen with the naked eye.

Due to the ever increasing customer demand for safe and quality foods, and stringent regulations food companies are now incorporating sanitation into their food safety programs.

Unlike the cleaning/sanitation practices of the seventies, modern sanitation program involves the use of modern equipment, chemicals and Personal Protective Equipment (PPE). Most companies have separate sanitation department, made up of several crew members who are trained on sanitation techniques, using PPE.

The use of PPE is gaining popularity as the day goes by due to government regulations that fine companies and their officials for safety negligence.

Internally, companies are mandated to form Joint Health and Safety Committee to monitor health and safety activities in the plant. Employees are even protected by laws if they refuse unsafe work.

WORKING ENVIRONMENT FOR SANITATION EMPLOYEES.

The plant/facility where I work is about the size of three foot ball fields combined together, and we manufacture waffles and pancakes. It is an example of a typical modern food manufacturing facility in the developed world.

The facility is comprised of the warehouse, mixing room (both are at room temperature in most cases), bakery (very hot environment), freezers (very cold environment) packaging (room temperature) and shipping (very cold environment). In all these areas that make up the facility are different kinds of equipment and structures that must be cleaned at predetermined schedule.

Most of the work environments where sanitation operations are being performed are either too cold, or too hot for the normal functioning of the human body. Also, some of the equipment is very dangerous to work on and corrosive chemicals are often used, hence the need for proper PPE to minimize the effects of these harsh work environments. Safety regulations by various level of government is another reason while sanitation employees wear PPE while performing their tasks.

PPE such as chemical suit, goggles, hard hat, kneel pads, gloves are not too comfortable to wear for over eight hour period daily. At times, these PPE are worn while working in awkward positions such as lying under a piece of equipment, kneeling to get a hidden part of a machine cleaned, climbing a ladder to clean over head pipes and other structures, etc.

The PPE that is commonly used by the sanitation crew in my plant is the chemical protective clothing/suits or garments to guard against chemical injuries.

Chemical-protective clothing

Chemical-protective clothing (CPC) consists of multilayered garments made out of various materials that protect against a variety of hazards. Since no single material can protect against all chemicals, multiple layers of various materials usually are used to increase the degree of protection. Aluminum-lined, vapor-impermeable garments increase the level of protection. Protection is maximized by total encapsulation. An assortment of types of chemical-protective hats, hoods, gloves, and boot covers complements the garments.

The purpose of chemical protective clothing and equipment is to shield or isolate individuals from the chemical, physical, and biological hazards that may be encountered during hazardous materials operations. During chemical operations, it is not always apparent when exposure occurs. Many chemicals pose invisible hazards and offer no warning properties.
These guidelines describe the various types of clothing that are appropriate for use in various chemical operations, and provides recommendations in their selection and use.

It is important that protective clothing users realize that no single combination of protective equipment and clothing is capable of protecting you against all hazards. Thus protective clothing should be used in conjunction with other protective methods. For example, engineering or administrative controls to limit chemical contact with personnel should always be considered as an alternative measure for preventing chemical exposure.

The use of protective clothing can itself create significant wearer hazards, such as heat stress, physical and psychological stress, in addition to impaired vision, mobility, and communication. In general, the greater the level of chemical protective clothing, the greater the associated risks. For any given situation, equipment and clothing should be selected that provide an adequate level of protection. Overprotection as well as under-protection can be hazardous and should be avoided.

THE CLOTHING ENSEMBLE.

The approach in selecting personal protective clothing must encompass an "ensemble" of clothing and equipment items which are easily integrated to provide both an appropriate level of protection and still allow one to carry out activities involving chemicals. In many cases, simple protective clothing by itself may be sufficient to prevent chemical exposure, such as wearing gloves in combination with a splash apron and faceshield (or safety goggles).
The following is a checklist of components that may form the chemical protective ensemble:

Protective clothing (suit, coveralls, hoods, gloves, boots);

Respiratory equipment (SCBA, combination SCBA/SAR, air purifying respirators);

Cooling system (ice vest, air circulation, water circulation);

Communications device;

Head protection;

Eye protection;

Ear protection;

Inner garment; and

Outer protection (overgloves, overboots, flashcover).

Factors that affect the selection of ensemble components include:

How each item accommodates the integration of other ensemble components. Some ensemble components may be incompatible due to how they are worn.

The ease of interfacing ensemble components without sacrificing required performance (e.g. a poorly fitting overglove that greatly reduces wearer dexterity).

Limiting the number of equipment items to reduce donning time and complexity (e.g. some communications devices are built into SCBA's which as a unit are NIOSH certified).

The type of equipment used and the overall level of protection should be reevaluated periodically as the amount of information about the chemical situation or process increases, and when workers are required to perform different tasks. Personnel should upgrade or downgrade their level of protection only with concurrence with the site supervisor, safety officer, or plant industrial hygienist.

It is important for you to realize that selecting items by how they are designed or configured alone is not sufficient to ensure adequate protection. In other words, just having the right components to form an ensemble is not enough. The EPA levels of protection do not define what performance the selected clothing or equipment must offer.

ENSEMBLE SELECTION FACTORS.

Chemical Hazards.
Chemicals present a variety of hazards such as toxicity, corrosiveness, flammability, reactivity, and oxygen deficiency. Depending on the chemicals present, any combination of hazards may exist.

Physical Environment.
Chemical exposure can happen anywhere: it may occur either inside or outside of the facility; the environment may be extremely hot, cold, or moderate; the exposure site may be relatively uncluttered or rugged, presenting a number of physical hazards; chemical handling activities may involve entering confined spaces, heavy lifting, climbing a ladder, or crawling on the ground. The choice of ensemble components must account for these conditions.

Duration of Exposure.
The protective qualities of ensemble components may be limited to certain exposure levels (e.g. material chemical resistance, air supply). The decision for ensemble use time must be made assuming the worst case exposure so that safety margins can be applied to increase the protection available to the worker.

Protective Clothing or Equipment Available.
Hopefully, an array of different clothing or equipment is available to workers to meet all intended applications. Reliance on one particular clothing or equipment item may severely limit a facility's ability to handle a broad range of chemical exposures. In its acquisition of equipment and clothing, the safety department or other responsible authority should attempt to provide a high degree of flexibility while choosing protective clothing and equipment that is easily integrated and provides protection against each conceivable hazard.

SELECTION OF PROTECTIVE CLOTHING COMPONENTS.
Protective clothing and equipment SOP's must take into consideration the factors described above.

All clothing and equipment selections should provide a decision tree that relates chemical hazards and information to levels of protection and performance needed.

Responsibility in selecting appropriate protective clothing should be vested in a specific individual who is trained in both chemical hazards and protective clothing use such as a safety officer or industrial hygienist. Only chemical protective suits labeled as compliant with the appropriate performance requirements should be used. In cases where the chemical hazards are known in advance or encountered routinely, clothing selection should be predetermined. That is, specific clothing items should be identified in specific chemical operations without the opportunity for individual selection of other clothing items.

Training should be completed prior to actual clothing use in a non-hazardous environment and should be repeated at the frequency required by OSHA SARA III legislation. As a minimum the training should point out the user's responsibilities and explain the following, using both classroom and field training when necessary, as follows:

The proper use and maintenance of selected protective clothing, including capabilities and limitations.

The nature of the hazards and the consequences of not using the protective clothing.

The human factors influencing protective clothing performance.

Instructions in inspecting, donning, checking, fitting, and using protective clothing.

Use of protective clothing in normal air for a long familiarity period.

The user's responsibility (if any) for decontamination, cleaning, maintenance, and repair of protective clothing.

Emergency procedures and self-rescue in the event of protective clothing/ equipment failure.

The buddy system.
The discomfort and inconvenience of wearing chemical protective clothing and equipment can create a resistance to its conscientious use. One essential aspect of training is to make the user aware of the need for protective clothing and to instill motivation for the proper use and maintenance of that protective clothing.

An example of a complete chemical protective gear.

HUMAN FACTOR PROBLEMS

As indicated above, sanitation employees in the plant where I work are exposed to extremely hot or cold, humid weather conditions that contribute to the overall workload encountered during sanitation operations. Proper cleaning of the ovens and bakery room at over 80 degrees Celsius or freezers at a temperature of below 18 degrees Celsius, using highly corrosive chemicals requires sanitation employees to wear fully encapsulated chemical protective suits for a maximum period of 20 minutes at a time. The nature of these suits, combined with workload and environmental conditions, poses a potential heat stress problem for employees, by impairing the capacity for evaporative heat exchange from the body to the environment.

HEAT STRESS.
Wearing full body chemical protective clothing puts the wearer at considerable risk of developing heat stress. This can result in health effects ranging from transient heat fatigue to serious illness or death. Heat stress is caused by a number of interacting factors, including:
Environmental conditions;

Type of protective ensemble worn;

The work activity required; and

The individual characteristics of the responder.

Working in the freezers for about 20 minutes at a time, using a chemical suit could result in numbness of some of the body joints. Continued exposed to this extremely cold conditions could result in frost bite.

A complete chemical suit and the accessories can be very heavy on the wearer, thereby making body movements difficult for employees.

COUNTERMEASURES

When selecting chemical protective clothing and equipment, each item's benefit should be carefully evaluated for its potential for increasing the risk of heat stress. For example, if a lighter, less insulating suit can be worn without a sacrifice in protection, then it should be. Because the incidence of heat stress depends on a variety of factors, all workers wearing full body chemical protective ensembles should be monitored.

Oven room and associated equipment should only be cleaned when the equipment is shut down and the room temperature has dropped to about 40 degrees Celsius. In this way, the heat that would be absorbed from the environment through the suit will be minimal, thus reducing the chances of heat stress.

Clean In Place (CIP) system which does not require employees to manually clean equipment should be installed in both the oven room and freezers to automatically clean equipment.

The time employees work in the hot oven room, or cold freezers should be reduced from 20 minutes at a time to about 10 minutes at a time; employees should be made to go for regular short breaks in cooler or warmer areas, as the case ay be.

Employees should also be encouraged to drink small quantity of water regularly. They should, however, avoid caffeine containing beverages which can cause dehydration in hot environment.

Chemical suits should be made of very light material, thereby causing little or no discomfort to the wearers.

With the proper implementation of the countermeasures listed above, the HFE associated with sanitation operations in my plant would be significantly reduced.