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Manufacturer's Report

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By Dennis C. Ertel, Jr., CIH, CSP, REM

The conservation community is challenged with a myriad of products, equipment and environments when they conduct their work and the H&S Committee often get inquiries about whether something is safe or how to safely perform certain activities. In Michael McCann's Artist Beware, he states "Every day we find that more and more of the chemicals we eat, drink, breath, work with, or are exposed to in some other way are hazardous. The twentieth century is the era of chemistry. It is estimated that we are exposed to over 20,000 known toxic chemicals, and of the 500 new chemicals that are introduced into the marketplace every year, most have never been tested for their long-term effects on the human body."

While it is understood that not all chemicals or products are harmful, one needs to be able to determine if a specific use can be done safely, and this is the practice of risk assessment. Risk assessment will often be coupled with risk management, which is the coordinated effort to control or reduce identified risks. Conservators do not normally perform formal risk assessment, but will certainly consider elements of risk assessment or work with other professionals who perform risk assessments fairly regularly.

Risk Assessment

Risk assessment, is a tool for evaluating risk. According to the United States Environmental Protection Agency (US EPA), risk is "the chance of harmful effects to human health or to ecological

systems resulting from exposure to an environmental stressor". The "EPA uses risk assessment to characterize the nature and magnitude of health risks to humans (e.g., residents, workers, recreational visitors) and ecological receptors (e.g., birds, fish, wildlife) from chemical contaminants and other stressors, that may be present in the environment." Other organizations in the United States and in other countries may have slightly different definitions, but the principals are similar.

Risks have been studied by various government agencies for many years. Generally toxicological studies, studies of the effects of various toxicants, on animals or other organisms, have been a basis for risk analysis with respect to chemical products. Epidemiology studies, the study of disease patterns in groups of people with similar exposures, have also supported the effort to perform risk assessments. When governmental or research agencies evaluate risk, they review information from current research and estimate exposures or doses that will not regularly result in permanent harm to an unacceptable number of individuals. For example, in the United States, occupational exposure levels are designed through the risk assessment process, to protect most workers from the most pronounced effect of a toxicant, for an average eight hour day, during a forty hour work week, over 50 weeks a year for a 40 year working lifetime. Limits published by the EPA are typically intended to protect the most vulnerable members of a population, usually children, the infirmed or the elderly, for 24 hours per day over a 70 year lifetime.

For many agents or characteristics, the risk levels have been translated into occupational exposure levels (OELs), environmental regulations, guidelines or other resources that provide guidance for daily exposures. These requirements or guidelines are usually based on established information from a mix of applicable scientific disciplines including epidemiology, toxicology, ecology, and other health sciences.

Most public health guidelines will differentiate between permissible levels over different time periods. For instance, one level may be set as the concentration that an average worker may tolerate without adverse effects over the span of a typical work shift (an 8-hour time weighted average or TWA). There are also Short-Term Exposure Limits for acutely irritating or hazardous substances that set a concentration to which one should not be exposed longer than a certain time frame (typically 15-minute duration). Finally, there can be ceiling or one-time maximum concentrations to which one must not be over exposed for any length of time without severe adverse consequences. None of these standards are construed as absolute lines between safe and unsafe exposures, but should be part of the overall exposure assessment. Some OELs, such as permissible exposure levels (PELs), published by the Occupational Safety and Health Administration (OSHA), have regulatory and legal requirements for compliance. Other OELs, such as the Recommended Exposure Limit (REL), published by National Institute for Occupational Safety and Health (NIOSH), and the Threshold Limit Values (TLVs), published by the American Conference of Governmental Industrial Hygienists (ACGIH), are based on more current scientific studies, but do not carry the regulatory or legal requirements of the PELs.

For non-occupational exposure, there are guidance levels published by EPA regions, such as Region 3's Risk Based Concentrations (RBCs), and other guidance from agencies like the World Health Organization (WHO). Again, the non-occupational risk levels, such as the RBCs, are typically based on lifetime risk levels to the most sensitive members of the population, and may not be appropriate for use in all situations.

The evaluation of risk takes into account the specific type of harm caused by the studied toxicants. Effects may be acute or chronic, systematic or localized. Traditionally government agencies consider cancer and non-cancer effects. The non-cancer effects that might be evaluated are quite diverse and chemicals can be classified based on the type of harm they do, such as asphyxiants, nervous

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Contractors, MSDS and OSHA

By Isaac Powell, 3E Company

Managing MSDS for the hazardous materials at a work site can be difficult and often times painfully time-consuming. Compliance can go beyond just maintaining an accurate inventory and current MSDS for products that you use. Also consider, for example, the role of general contractors on a worksite which may include any number of subcontractors. OSHA's Hazard Communication Standard (HCS) requires that subcontractors have MSDS for the hazardous substances they use available to not only their employees but also to any other workers on site that may be exposed to those chemicals. This becomes more complex where there are multiple employers on one job-site, such as commonly found on a construction site. So to what extent are they responsible under the HCS for providing MSDS access to the other workers at that site?

Job sites that have a workplace where there are multiple employers in addition to their employees on site would be considered a "multi-employer workplace" under the HCS. Multi-employer workplaces, defined in 29CFR1910.1200(e)(2), have an added level

of SHARED responsibility amongst the employer(s) with employees on the job-site. Each employer that uses or stores chemicals on a job site where employees of other employer(s) may be exposed must ensure that the following elements are defined and implemented within their hazard communication plan:

i. The manner in which MSDS will be accessed by the other employer(s) on the job site. A contractor may choose to house the MSDS in a central location where all employers on the job site will make available their respective MSDS. However, this central location must be accessible by all employees while on the job site. In this type of MSDS sharing situation there will be a primary party who has taken the ownership to maintain this central location; however, it is each employer(s) responsibility to ensure that their respective MSDS are available at the central repository and that his/her employees can access the MSDS. If MSDS are not maintained at a central location, each contractor must provide MSDS to the other employers for each hazardous chemical that their employees may be exposed to.

ii. The manner in which they will notify the other employer(s) on the job site of any precautionary measure to be taken to protect employee under normal and foreseeable emergencies.

iii. The manner in which they with notify the other employer(s) of the hazard labeling utilized at the job site.

It should be noted that the HCS is a "performance-oriented" standard which allows employers flexibility to implement their hazard communication to best suit the needs of their business. The intent of OSHA's HCS is met on a multi-employer worksite when information on the hazards of chemical substances at the worksite is transmitted to or shared with all affected employers and their employees, and that information is readily accessible to employees when they are in their work areas. As such, each contractor bears a responsibility to ensure that the intent of the HCS is met and that their employees are able to readily access MSDS for each hazardous chemical in the workplace. If a contractor relies on another employer to maintain their MSDS and the MSDS are found to be unavailable or not accessible for their employees, then they may be cited under the HCS.

References:

1) 29CFR 1910.1200(e)(2)

2) Interpretation Letter 5/16/90 - Availability of MSDS for Construction Sites

3) CPL 2-0.124 - Multi-Employer Citation Policy

Thank You Sponsors!

Thank you sponsors for making the Spring Conference in Columbus, Ohio a huge success!! Your continued participation and support is highly valued and so critical to our members.

I look forward to seeing everyone in the Fall. Have a safe and happy Summer!

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FALL Occupational Safety and Health Committee Conference

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systems toxicants or respiratory hazards. Carcinogens are often related to specific types of cancers, such as the relationship between benzene and certain forms of leukemia. Chemicals may also be classified as mutagens (an agent that is capable of causing a gene-change) or teratogens (an agent that causes a structural abnormality following fetal exposure during pregnancy).

Perception of Risk

For many years, both occupational and environmental regulations in the United States have had to consider the risk and benefit of new regulations. A question that risk assessment professionals often face is what is an acceptable number of individuals that might be harmed by a specific product. With respect to chemical products, most US agencies try to control occupational risks in the range of a few per 1,000. For environmental risks, most US agencies try to control risks in the range of a few per 100,000.

Within risk management, some individuals are dedicated to the dialogue of "how safe is safe"? In his work, The Perception of Risk, by Paul Slovic, there is a discussion of the fact that the public as a whole is willing to take risks "from voluntary activities (eg. skiing) roughly 1000 times greater than it would from involuntary activities (eg. eating food with preservatives) that provide the same level of benefit. In addition to "voluntariness", other factors such as perceived control, familiarity and immediacy played important parts in individual attitudes towards risk. These same factors apply to conservators when they make choices about chemical use.

An important distinction needs to be made between toxicity and hazard. The term toxic means capable of causing injury or death. It does not describe the potential of causing this harm in a particular environment, and the mere fact that something is toxic does not mean that a meaningful dose of the product is present. Theoretically, all agents are potentially toxic, and it is the dose and route of exposure that can determine the potential of that agent to cause harm.

Hazard, or risk, is the probability that a certain substance will cause harm in a specific situation. A toxic chemical that is in a sealed container has inherent toxicity, but presents little or no hazard. When the chemical is removed from the container and used by in a closed space, without appropriate ventilation or protective equipment, a hazard may exist.

Hazard Control and Risk Management Process

A hazard control and risk management process can be implemented by various operations (labs, fieldwork stations, shops, etc.) and can focus on overall activities, specific processes or new operations. The British Health and Safety Executive simply defines risk management as "a process that involves assessing the risks that arise in your workplace, putting sensible health and safety measures in place to control them and then making sure they work in practice." The hazard control and risk management process is a continuous improvement cycle with these basic steps:

- Identify the hazards
- Decide who might be harmed and how
- Evaluate the risks and decide on precautions when appropriate
- Record your findings and implement them
- Review your assessment and update if necessary

Hazard identification

Hazard identification begins with a thorough workplace evaluation, with a close look at the operational steps, a review of equipment used and inherent hazards, a review of the materials or products used in the immediate workplace (including Material Safety Data Sheets), adjacent areas and the ambient environment, and finally, a careful observation of how the workers actually conduct them. If it is determined that there is something potentially hazardous in a workplace through the hazard identification, appropriate hazard controls should be implemented. The major steps of a job hazard analysis are listed in Box 1.

Interpreting results

If there is an OEL, environmental regulation, or other guideline level, these can be used for comparison to the

concentration of the stressor in the particular environment. The factors that lead to the development of the standard should be considered when evaluating the applicability of the standard to a particular situation. For example a work place OEL would not be used to evaluate exposure to the public.

There are also some situations where there are no guidelines to rely on for data interpretation. A good example is the situation of mold or fungi. Fungi are generally evaluated with respect to two factors—concentration and the types of organisms present. Indoor concentrations should be at levels near or below outdoor levels. Indoor levels in excess of outdoor levels or the presence of a significant number of different types of organisms, when compared to outdoors, suggest an indoor source of fungi contamination. In the case of fungi, or chemicals in which there has only been limited or no research, data interpretation requires more specialized, or in some case, a full risk assessment or research effort may be required. The lack of an appropriate limit does not permit concluding that the agents or characteristics do not pose a potential health risk.

For situations where there is no obvious or regulatory driven guidance on acceptable exposure, conservators should work with various parties involved in the project or at the institution to determine how to establish an acceptable exposure level. These situations may require involvement and advice from specialists, such as industrial hygienists or occupational physicians, legal representatives, risk or insurance representatives, public affairs personnel and other appropriate parties.

There may also be airborne concentrations of certain agents or characteristics that are acceptable or desirable for collections, objects or museum materials that will not be the same as those from the occupational exposure and environmental health fields. Some of these studies have been published in various journals and publications from

BOX 1: Major Parts of a Job Hazard Analysis

1. List the major tasks of the operation in question.

2. Determine the possible injury or illness hazards, and judge the degree of risk posed by the hazard in relation to the frequency and duration of worker exposure during the task, versus the severity of the injury or illness posed by the hazard.

3. If the stressor is one that can be measured quantitatively (e.g., chemical, biological, ergonomic), employee exposure or environmental assessments should be performed.

BOX 2: The Hierarchy of Controls. When implementing controls, this is the preferred order of approach:

• **Engineering Controls** – Including substitution with less hazardous materials, as well as ventilation, isolation, guarding and other methods. Engineering controls are recommended as the primary means of control with the idea that reducing or removing hazards from the workplace will be the best method to reduce the potential for overexposure. Engineering controls are considered a more permanent solution to reduce or remove hazardous exposures.

• **Administrative Controls** – Including actions that can be directed to reduce or remove hazards. Administrative controls don't necessarily remove a hazard from a workplace, but do theoretically reduce the duration or magnitude of exposure. Administrative controls can be implemented as a matter of policy and require the acceptance of those that will be using these methods to control hazards.

• **Personal Protective Equipment (PPE)** – Chosen to protect from specific hazards and should be considered the last resort for protection or used when engineering and administrative controls are not feasible. PPE may also reduce individual's exposures but they require correct use and maintenance and are not effective when individual behaviors or habits circumvent the protection. The effectiveness of PPE is contingent upon the acceptance of the wearer and the degree that the PPE is effective and fits the wearer.

the fields of conservation and museum studies. Pollutants in the Museum Environment, by Pamela Hatchfield, lists many concentrations of chemical compounds that are believed to be damaging to various museum materials.

Controls

Effective methods for reducing unacceptable exposures include replacement of hazardous materials with safer substitutes, engineering controls (a more permanent and physical barrier method) or administrative (safework practices, worker rotation, training, preventive maintenance) and the use of respirators and other PPE. Many workplace hazards will require a combination of controls, not only to maximize the hazard reduction but to offer redundant controls in case of system failures. These controls are described in Box 2.

Many conservators and museum professionals assume that engineering or administrative controls are not viable options; however these should be considered prior to acceptance of PPE as the only alternative to reducing or eliminating hazards in the workplace. Many engineering and administrative control solutions are easy to implement and carry out, especially in a museum or conservation laboratory setting.

A job hazard analysis, interpretation of the results and implementation of controls can be performed by conservators as well as those in more industrial operations. In the US, many operations run by conservators technically are considered laboratories, and the requirements for laboratories spelled out in the OSHA Laboratory Standard are fully applicable.

Who ultimately decides if something is too "risky" and who are you trying to protect

While the conservator may play an important role in risk assessment, risk management may not ultimately be the sole responsibility of the conservator. In some institutions, legal counsel, public relations, human resources staff or claims management/insurance staff may play a role in risk management. Protection may be needed for outside researchers or visitors, and these other entities may need a say in the decisions about how to control risks. If hazards are associated with only conservators or museum staff, then OELs and workplace standards may be applicable. In these circumstances, how a job is performed or the appropriate use of PPE may be dictated by an analysis of the job being performed within a particular space. For these cases, risk assessment may dictate the solutions posed, such as increased building wide ventilation or restricted handling of certain products. If the hazards are associated with the public, environmental risk standards may be more applicable. Where the parties may be mixed or not easy to define (such as visiting researchers or objects that will be shown to children) the application of existing risk levels may not be appropriate.

Finally, the evaluation of risk, the management of the risk, and development of risk reduction strategies, is only ultimately effective when the risk is communicated to staff in order to elicit their participation in preventive policies. Failing to effectively communicate information about risks or lack of risks, associated with particular projects or products, can cause serious alarm and concern, which in some cases may be completely unwarranted. The same is true about the potential risks of a material or activity that a conservator may be involved with during the course of their work.

Risk assessment and risk management are important components of a comprehensive health and safety program. Understanding the potential risks and solutions to hazards in the workplace is achievable and essential for protecting workers, visitors, the public and museum collections.

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About SOMA

Founded in 1983, Sandler Occupational Medicine Associates, Inc. (SOMA) specializes in providing occupational health, industrial hygiene and toxicology services to major corporations, governmental agencies, and other organizations across the United States and internationally. SOMA is headquartered in New York with offices in Maryland, Delaware, and Florida.

Our experienced and professional staff includes: certified industrial hygienists (CIH), credentialed occupational physicians and nurses, certified safety professionals (CSP), toxicologists, epidemiologists, public health professionals and engineers. SOMA performs hundreds of site visits annually, ranging from pre-scheduled sampling surveys to full program auditing for benchmarking and needs assessment. Our global project experience includes a wide range of over one thousand industrial hygiene, ergonomic and safety projects for companies and organizations of all sizes.

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