9.
SAFETY TRAINING PROGRAMS FOR THE INDUSTRIAL RESEARCH LABORATORY. ***Kenneth P. Fivizzani**, Nalco Chemical Company, One Nalco Center, Naperville, IL 60563, Fax: 630-305-2932*

Industrial research safety training programs must comply with governmental regulations and address all corporate safety policies and procedures relevant to the laboratory. In addition, such training must provide knowledge and develop skills that enable researchers to work safely in their labs or at field sites. Nalco's training programs for research begin with the new lab employee and continue for the entire duration of employment. The laboratory safety manual must be read by every new employee and discussed with the supervisor. OSHA Lab Standard/Chemical Hygiene Plan training occurs within the first 90 days of employment. For researchers who work at customer sites, a specialized training program is required; topics discussed include hearing protection, lockout/tagout, confined spaces, and transportation of hazardous materials. Every research department has monthly safety meetings where specific topics are addressed. Researchers also serve on safety committees and emergency response teams, receiving specialized training appropriate for these groups.

10.
LABORATORY SAFETY TRAINING FOR THE NORTHERN ARIZONA UNIVERSITY CHEMISTRY DEPARTMENT: A HANDS-ON APPROACH. ***John K. Nauman**, Department of Chemistry, Northern Arizona University, P.O. Box 5698, Flagstaff, AZ 86011, Fax: 520-523-8111, John.Nauman@nau.edu*

Safety training for the Chemistry Department at Northern Arizona University has slowly evolved from a 3 hour workshop in early fall to a 1-2 credit hour course, "Laboratory Safety and Supervision". The safety portion of the course is taught once a week for the first half of the semester. Hands-on activities such as mock emergency training, fire extinguisher training, CPR, group exercises, and laboratory safety audits are central to the training design. These activities are interspersed with lecture presentations to keep students engaged when covering the drier aspects of laboratory safety. Mock emergency training is a novel approach to emergency response training involving past course students, faculty, campus security dispatch, and a representative our from risk management department. Mock emergency training, the culmination of the safety course, has become a tradition for our student employees. All graduate and undergraduate students working in lab areas must take this course taken for graduate, CHM 595, or undergraduate credit, CHM 295. The optional second credit hour requires hands-on training for general and organic chemistry teaching assistants.

11.
PREPARING A CHEMICAL EMERGENCY RESPONSE TRAINING PROGRAM FOR IN-HOUSE USE. ***Neal Langerman**, Advanced Chemical Safety, 7563 Convoy Ct, San Diego, CA 92111, neal@chemical-safety.com*

Employees who respond to a chemical release must be trained as required by 29 CFR 1901.120(q). This regulation defines the minimum content and duration of training, but does not provide guidance as to "how to train" employees. Experience has taught that those responsible for the training must develop clear objectives, develop a relevant agenda or outline of the training, and define the exact presentation methods. Once these are listed, then appropriate training materials must be developed or purchased. Finally, since spill response is a combination motor skill and didactic exercise, field exercises must be developed. This entire process, will be described in some detail, with examples of the development of "Hazardous Material Technician" training for a R&D setting and a chemical-intensive industrial setting.

12.
RESTROOM POSTINGS: AN EFFECTIVE MEANS TO COMMUNICATE SAFETY. ***Allan V. Bayless**, Procter & Gamble, Health Care Research Center, 8700 Mason-Montgomery Road, Mason, OH 45040, Fax: 513-622-1350, bayless.av@pg.com*

Safety messages are posted weekly in the restroom stalls of P&G's Health Care Research Center. These postings, affectionately referred to as "potty postings" or "restroom rantings", have proven very effective in conveying safety messages to the researchers. The mechanism and timing of the postings will be discussed, as well as researchers' responses to the postings. Examples of the most popular postings will be provided.

13.
SAFELY EDUCATING UNDERGRADUATE LABORATORY STUDENTS: WHY WE WORK WITH THE WEB. ***John G. Palmer**, and Sheila M. Kennedy, Department of Chemistry & Biochemistry, University of California, San Diego, 9500 Gilman Dr. MS-0332, La Jolla, CA 92093-0332, Fax: 858-534-6255, jpalmer@ucsd.edu*

What is the best way to educate (train) undergraduate laboratory students in matters of safety? I am sure there are many professors, teaching assistants, laboratory staff and safety professionals looking for a clear answer to that question. Undergraduates in chemical laboratory classes have widely varying levels of experience and knowledge. Large enrollments, changes in experiments or experimental protocols, and design/layout/management differences in individual laboratories greatly complicate the problem. At UCSD's Chemistry and Biochemistry Dept., we are finding that the use of the "Web" to provide supplemental information and, in a limited way, to provide direct training and testing of students in safety and protocol knowledge can help smooth the process for student and teacher alike. This presentation gives an overview of how our academic safety training program was developed, the types of information provided, and how our Web site is actually set-up.

14.
USING HUMOR IN LABORATORY SAFETY TRAINING. ***Ben Greene**, Laboratory Department, Honeywell Technology Solutions, Inc, PO Box 20, Las Cruces, NM 88004, Fax: 505-524-5597, bgreene@wstf.nasa.gov, and Harold Beeson, Laboratories Office, NASA Johnson Space Center White Sands Test Facility*

At the White Sands Test Facility, we have found that humor presented in photographs of real and simulated laboratory conditions, signage, commercially available video footage, and from other sources can greatly enhance trainees' attention to otherwise potentially unexciting material. Receipt and understanding of effective and memorable laboratory safety training by widely diverse groups within an industrial laboratory can be greatly complemented by the appropriate use of humor. Humor can be an effective tool to capture audience attention and elicit participation. In addition to other applicable regulations and prudent practices for the laboratory, we present examples of chemical hygiene training material that may be used to augment the employee information and training requirements of the Occupational Safety and Health Administration Laboratory Standard (29 CFR 1910.1450). With emphasis placed on use of humorous subject material readily found in and around the laboratory, approaches to customizing laboratory safety training programs are also discussed.

15.
WASTE MANAGEMENT IN UNDERGRADUATION LABORATORIES OF THE CHEMISTRY INSTITUTE OF UNICAMP/BRAZIL. ***Regina C. C. Mesquita Micaroni**, Maria Izabel M. S. Bueno, and Wilson F. Jardim, Department of Analytical Chemistry, UNICAMP / Brazil, Cidade Universitária Zeferino Vaz, Campinas - SP 13083-970, Brazil, Fax: (55)(19)32393805, regina@iqm.unicamp.br*

This work reports the monitoring carried out at all laboratories practices done at the Chemistry Institute of UNICAMP/Brazil and the changes introduced in order to reduce residue generation. During this monitoring we have quantified all the reagents used and all the residue generated. In this way, we have found out that before graduation, a Chemistry undergraduation student generates more than 11 kg of residue which requires some type of treatment. Moreover, we have identified the Analytical Chemistry Laboratories as the most critical residue generators. In order to reduce the huge amount of residue produced, different strategies have been applied to the critical experiments in terms of residue generation, such as: scale reduction, change of chemicals used and introduction of essays in which the students treat their own wastes. These strategies are helping to manage potentially toxic wastes more properly and to rise student awareness on how to handle and dispose chemicals.

16.
INDUSTRIAL HYGIENE EXPOSURE ASSESSMENT - DATA COLLECTION AND MANAGEMENT. ***Paul Hewett**, National Institute of Occupational Safety and Health, Morgantown, WV 26505, Fax: 304-285-5820, pah2@CDC.GOV*

Each worker expects a work environment devoid of unreasonable risks. Our goal is to protect each individual worker, but limited resources usually compel industrial hygienists to first aggregate workers into exposure groups, determine which exposure groups warrant priority attention, and evaluate the 'exposure

profile' of each exposure group in order of priority. Consequently, industrial hygienists are often faced with questions regarding the collection, analysis, interpretation, and management of occupational exposure data. This talk addresses issues and options regarding exposure assessment strategies, the goals of an effective exposure assessment program, the types of exposure limits and how they are interpreted, exposure surveys, and exposure database elements.

17.

INDUSTRIAL HYGIENE EXPOSURE ASSESSMENT - ANALYSIS, AND INTERPRETATION. ***Paul Hewett**, National Institute of Occupational Safety and Health, Morgantown, WV 26505, Fax: 304-285-5820, pah2@CDC.GOV*

Each worker expects a work environment devoid of unreasonable risks. Our goal is to protect each individual worker, but limited resources usually compel industrial hygienists to first aggregate workers into exposure groups, determine which exposure groups warrant priority attention, and evaluate the 'exposure profile' of each exposure group in order of priority. Consequently, industrial hygienists are often faced with questions regarding the collection, analysis, interpretation, and management of occupational exposure data. This talk covers the statistical analysis of exposure data and the interpretation of the results.

18.

ENVIRONMENTAL CONTROLS AND LIABILITIES. ***James Harless**, Haley & Aldrich of Michigan, Inc, 44808 Helm Street, Plymouth, MI 48170-6026, Fax: 734.454.1233, JMH@HaleyAldrich.com*

There are a variety of environmental controls (laws, regulations, clarifications, interpretations) impacting U.S. facilities that use hazardous materials in their operations. This paper will introduce the various federal laws and their impact on these facilities, including those which regulate air quality, water quality, hazardous waste management and right to know issues. Additional focus will include a discussion on liabilities associated with these laws and regulations.

19.

FLOOD CONTINGENCY PLANS. ***Ruth A. Hathaway**, Hathaway Consulting, 1810 Georgia St, Cape Girardeau, MO 63701-3816, Fax: 573-334-2551, hathaway_consulting@hotmail.com*

If a facility is located in an area that is prone to flooding (either flash flooding or a slow-rising flood, due to a stream or a river), or is protected by a levee, the facility must have a written flood contingency plan in place. A flood contingency plan is relatively simple, but requires forethought and prior planning. The presenter will discuss the considerations that should be included.

20.

RESEARCH LABORATORY BUILDING DESIGN. ***Janet S. Baum**, Health, Education + Research Associates, Inc, P.O. Box 3229, Saint Louis, MO 63130, Fax: 314 862 9201*

Research laboratory building design is a complex, yet orderly process that examines the specific requirements of the building owners and their designated laboratory users and synthesizes design options from a wide variety of considerations: health and safety, efficiency of space utilization, effectiveness for proposed activities, scientific productivity, accessibility and materials' flow, ergonomic comfort, flexibility and economy.

This talk, based on the chapters on laboratory design and laboratory furniture will illustrate many practical, safe and economical strategies for laboratory design and fit-out. The speaker will explain effects of the newest U.S. building codes on chemical use, storage and safety, as well as other regulatory agency trends that will affect new laboratory building design. The presentation will show examples of good laboratory design and furnishings that meet the considerations listed above.

21.

CHEMICAL HYGIENE PLAN: TEN YEARS LATER. ***George H. Wahl**, Department of Chemistry, NC State University, Raleigh, NC 27965-8204, Fax: 919-515-3757, george_wahl@ncsu.edu*

How have we dealt with "The Laboratory Standard" 29CFR1910.1450 during the past decade?

We'll try to answer this question by presenting the results of an informal survey of a wide variety of institutions. The questions we asked in our poll include: Are our Labs any safer now? Are lab workers more aware of the consequences of their work? Have we experienced fewer accidents? Was it worth the effort?

22.

ASSESSING LABORATORY CHEMICAL EXPOSURES IN AN ACADEMIC AND BIOMEDICAL RESEARCH SETTING. ***Joe I. Parham**[1], Richard G. Costello[2], Robert J. Emery[1], and Kent D. Cavender[3]. (1) Environmental Health and Safety, University of Texas Houston Health Science Center, UCT 7000 Fannin, Houston, TX 77030, Fax: 713-500-3416, jparham@admin4.hsc.uth.tmc.edu, (2) Environmental Health and Safety, University of Texas Pan America, (3) Facility Operations, University of Texas Houston Health Science Center*

The guidelines and regulations for occupational exposures to hazardous chemicals in the workplace are well established by the National Institute of Occupational Safety and Health (NIOSH), the American Council of Governmental Industrial Hygienists (ACGIH) and the Occupational Health and Safety Administration (OSHA). These regulations and guidelines can be ambiguous when applied to an academic and biomedical research environment. To address this situation, the University of Texas - Houston Health Science Center is using the principles outlined in the second edition of AIHA's A Strategy for Assessing and Managing Occupational Exposures. Potentially hazardous chemicals are first identified through a comprehensive laboratory and facilities surveillance program, and thorough evaluation of applicable standards. Specific chemicals are then monitored using a variety of established methods. A questionnaire has been created which, through the use of an algorithm allows us establish a "Health Risk Ranking" based on a review of the protocol and procedures followed by the researcher. This qualitative assessment allows us to prioritize monitoring activities. Employees which have been prioritized include 1) those exposed to chemicals specifically regulated under 29 CFR 1910 (ethylene oxide, formaldehyde, benzene, methylene chloride) 2) those exposed to chemicals with established guidelines, (waste anesthetic gases, research laboratories, gross anatomy laboratories, and nitrous oxide), and finally those persons exposed to chemicals with no established guidelines but are either potentially hazardous or a nuisance. The program has given us a better understanding of potential employee exposure to airborne contaminants at our institution. Furthermore, the results from quantitative monitoring conducted are used as "objective data" that can be used as decision criteria for future monitoring activities at the university.

23.

RISK ASSESSMENT TOOL FOR LABORATORY USE (LAB RAT). ***Neal Langerman**, Advanced Chemical Safety, 7563 Convoy Ct, San Diego, CA 92111, neal@chemical-safety.com*

Risk assessment is the process whereby the potential severity of the consequences of the chemical hazards associated with a process are combined with the likelihood of an untoward event occurring. This process is highly refined for large scale processes using various process safety management tools. These tools have been modified to develop a Laboratory Risk Assessment Tool (LAB RAT). The use of this tool will be illustrated by applying it to a common lab process. The result of using the LAB RAT is not only an estimate of the overall risk of the process (low, moderate, high, unacceptable) but also a clear definition of the drivers of the risk, which provides the investigators with guidance as to how to lower the overall risk. The risk assessment tool is available for download at www.chemical-safety.com/safety.

24.

TECHNIQUES TO CONTROL CHEMICAL EXPOSURES. ***Jeffrey A. Silvers**, Occupational Services, Inc, 6397 Nancy Ridge Drive, Suite B, San Diego, CA 92121, Fax: 858-558-6756*

Jeffrey A. Silvers, MPH, a certified industrial hygienist and certified safety professional with fifteen years of laboratory safety experience, is Vice President of Occupational Services, Incorporated. He will deliver a presentation covering common laboratory accidents, fires, and chemical releases. The presentation will emphasize the prevention of these accidents and discuss the applicable regulations governing laboratory safety such as "Occupational Exposure to Hazardous Substances in Laboratories" standard. The presentation will also cover the following topics: Regulatory compliance, inspection histories, tips on improving compliance, tools to assess safety hazards in the laboratory,

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