What to expect when you're inspecting: A summary of academic laboratory inspection programs

As a result of incidents in academic laboratories, there has been review of laboratory safety in academia, leading to an assessment of the laboratory safety programs currently in place. In 2013 Iowa State University Environmental Health and Safety (ISU EHS) conducted an online survey to benchmark the laboratory safety inspection programs of 42 universities and colleges across the nation. Results have provided a useful baseline of the current laboratory safety programs in a subset of public and private universities across the United States, and showed areas within individual programs that can be improved upon.

By Ryan Wyllie,
Kendra Lee,
Sarah Morris-Benavides,
Bethzayda Matos

INTRODUCTION

Fatalities and injuries in academic laboratories at University of California, Los Angeles (UCLA) (2008), Texas Tech University (2010), Yale University (2011), and the University of Minnesota (2014) have prompted a review of laboratory safety practices and guidelines in academia.[1–9] Incidents like these led the Chemical Safety Board to ask the American Chemical Society (ACS) for assistance with developing guidance for safer research in academic research laboratories.[8] In addition, a Safety Task Force of the ACS was created to identify ways to assist academia in strengthening and building a strong safety culture.[9] Health and safety professionals in academia have begun to inquire how effectively safety is being communicated to, and subsequently utilized by, academic laboratory personnel.[1,3–7]

Laboratory safety inspections are not merely compliance based but also serve as a mechanism through which health and safety professionals interact with the research community, and as such serve as one of the vehicles for discussing safety issues with laboratory personnel. These discussions include identifying safe work practices and areas for improvement. A comprehensive laboratory safety inspection program should verify the laboratory follows a Chemical Hygiene Plan, including the following aspects: chemical inventory, standard operating procedures (SOPs), exposure control measures, protective equipment, hazard assessment and communication, information and training, and compliance with applicable laws, guidelines, and university policies.[11] In this manner laboratory safety inspections contribute to preventing injuries, illnesses, and fatalities at colleges and universities.

We sought to undertake a comparison of academic laboratory safety inspection programs, which have been established at 42 academic institutions across the United States, via a benchmarking survey. Benchmarking is defined as the search for the best practices that, if undertaken, can lead to superior performance or organizational success.[10] Benefits to undertaking a benchmark include performance assessment, enhanced performance and learning, improvement potential, and total quality management.[10] Herein, using the ISU EHS laboratory safety inspection program as an example, we have provided a mechanism by which

Ryan Wyllie is an Occupational Safety Specialist with Environmental, Health, and Safety, Iowa State University, 2809 Daley Drive, Ames, IA 50011, USA (Tel.: 1 515 294 4092; e-mail: rwyllie@iastate.edu).

Kendra Lee is a Laboratory Safety Specialist with Environmental, Health, and Safety, Iowa State University, 2809 Daley Drive, Ames, IA 50011, USA (Tel.: 1 515 294 0627; e-mail: kmlee@iastate.edu).

Sarah Morris-Benavides is an Environmental Specialist with Environmental, Safety, Health, and Assurance with the Ames Laboratory, U.S. Department of Energy, G40 TASF, Ames, IA 50011, USA (Tel.: 1 515 294 7923; e-mail: sarahmb@iastate.edu).

Bethzayda Matos is the Biological and Laboratory Safety Manager/Biosafety Officer with Environmental, Health, and Safety, Iowa State University, 2809 Daley Drive, Ames, IA 50011, USA (Tel.: 1 515 294 6593; e-mail: bmatos@iastate.edu).

laboratory safety programs can be assessed and enhanced.

METHODS

We created a 23 question laboratory safety inspection benchmarking survey (Attachment 1). The survey included questions about the institution's name and size, how communication with the campus community occurred, inspection responsibilities, number of inspection spaces, corrective action follow-up procedures, and annual reporting procedures. The questions were formulated from current practices with each question focused on one topic with an ISU EHS answer provided as an example, answer choices, and an option to write-in. This method allows for the received data to be precise and usable for making decisions.

A link to the questionnaire was provided to ISU's peer institutions, the Director's Roundtable Listserv, Campus Safety Health and Environmental Management Association (CSHEMA) Listserv, Peer 11 Land Grant Universities, and the Big 12 Universities. The survey was available from July 2013 through October 2013. The responses were imported into Microsoft Excel and reviewed for completeness and adherence to either a numerical or text format. Answers with a mixed format and/or unanswered questions were verified as needed by email or phone follow-up, and modified noting the change. Non-responses to follow-up inquiries were excluded from data plots and statistical summaries to eliminate misrepresentations. Data from each question was then plotted in Microsoft Excel to provide a comparative examination and to illustrate the results.

RESULTS

Forty-two U.S. colleges and universities (36 public and 6 private institutions) completed the online benchmarking survey (Attachment 2). Some data plots may be skewed as not all responses were included. Some institutions checked more than one answer; therefore, some survey responses include more than 42 responses.

Communication With the Campus Community

Seventy-nine percent of respondents indicated they introduced Environmental, Health, and Safety services at their institution through new employee orientations, while 55% of respondents met individually with new employees to discuss research activities and emphasize safety in the work environment. Other methods included employee handbook, personalized emails, and committees, letter, new supervisor training, referral from programs, training, and EHS website (Figure 1).

Although all respondents indicated they have a departmental website and use e-mail (including electronic press releases) as the primary method for communicating with the campus community, our results showed the additional communication methods utilized were diverse (Figure 2). Seventy-one percent reported sharing information through conversation and paper media, 43% indicated they have promotional products and host an event to promote networking, 29%

use social media (Facebook, Twitter, or YouTube), and 7% use fleet advertisements; training opportunities accounted for less than 1% of the findings.

Inspections

Over half of the responding institutions defined a laboratory (space) as any place, situation, set of conditions, or the like, conducive to experimentation, investigation, and observation. Responding institutions that possessed biohazardous or radiological materials performed inspections that are specific to regulatory requirements and work practices for biohazardous and radiological laboratories. Ninety-one percent of institutions conducted a general safety survey that encompassed occupational and general health, environmental topics, documentation, fire and life safety, equipment, chemical storage, hazardous waste, housekeeping, and signage (Figure 3).

Ninety-five percent of EHS programs checked hazardous waste accumulation areas and chemical storage during laboratory safety inspections. Maintenance of emergency equipment (such as eyewash, fire extinguisher,
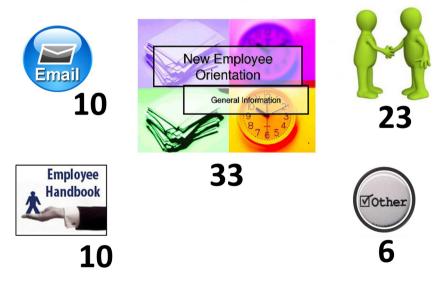

Methods of reaching new employees

Figure 1. Methods of reaching new employees. The choices that were provided on the survey included new employee orientation, new employee handbook, face-to-face meeting, and e-mail, with an option to write-in answers. The responses that were included as other are committee, letter, new supervisor training, referral from programs, and training/EHS website.