Out of My Mind

Reflections on Lab Safety

By

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Introduction

Forty-one years ago this June (2014), after spending 25 years in school, I left and went to work for the Dow Chemical Company. Stunningly, I learned more about lab safety on the first day at Dow than I had in 25 years in school.

Since then, I been deeply involved in and committed to making health and safety an integral and important part of science education. I've been studying about how you convince people that safety is important and that you're serious about.

I've also been writing articles, essays, and editorials on various aspects of lab safety. This publication is a collection of these pieces. I hope you find them helpful, provocative, and entertaining.

Dedication

I like to thank several people who helped to influence my thinking about lab safety. Don Dix introduced me to lab safety at Dow. Sue McKinley encouraged me to write the Laboratory Safety Guidelines. And, Hal Friedman taught me that you can't be too careful.

Jay Young, Malcolm Renfrew, and Howard Fawcett were inspirational in the American Chemical Society. Jay once said that I reminded him of himself before he mellowed. I never noticed that he had. Howard explained how he maintained his dedication for 50 years. And, Malcolm said he wrote in the Journal of Chemical Education that LSI was a national resource for safety conscious science teachers.

Lastly, I want to thank LSI's board members (Ken Roy, Jack Breazeale, Karen Morrissey, Louise Malette, Tony Gemmellaro, Gina Kyle, Linda Charpentier, Bill Stanwood, and Peter Markow) who help to keep us on the right track and my colleagues at LSI. Ana, Andrealee, Christina, Jon, Holly, Chelsey, Shannon, Laura, Adam, Juan, Bette and Harvey make everything happen.

Give the Whole Rat

Several years ago, Jim Firebaugh, Virginia State Science Supervisor, and I were traveling around Virginia in a blue Department of Education van doing one-day seminars throughout the state. Jim is one of the State Science Supervisors in Virginia.

In one city, we stopped in a Dollar Tree Store and I found some plastic squeeze rats for one dollar each. I bought two.

I'd been fond of saying that "chemistry faculty in the United States, present company excluded, don't give a rat's rear for lab safety." Why?

The reason that I would say this is that 90% of chemistry majors and chemistry graduate students at a Boston University National Chemistry Week Career Day (November 1995) had never seen "Safety In Academic Chemistry Laboratories". These young folks were from institutions all over New England. They had never seen the most important publication on lab safety from their professional organization, ACS. Why?

It's a FREE, two-volume, ninety-page booklet that's almost 40 years old. Visit the ACS website for many free publications on lab safety. NOW! http://portal.acs.org/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_ARTICLEMAIN&node_id=2228&content_id=CNBP_027854&use_sec=true&sec_url_var=region1&__uuid=8f1119c2-f879-40df-ba83-956cdeebdb64

Back to the rats.

People at the seminars and short course kept asking if I would give away or sell the rats. They're very popular.

One day this past summer it occurred to be that besides saying "They don't give a rat's rear for safety", we should give the whole rat!

I made a small label that I attached to the rat's tale. The label says:

Lab Safety Rat
We don't give a rat's rear for safety.
We give the whole rat.
Congratulations
You've just been ratted on for working safely.

Now it's your turn to rat on someone else.

Too often we focus on criticizing people for unsafe acts and unsafe conditions. Here's a way to have a little fun while recognizing good performance. If you see someone working safely, you give them the lab safety rat. They need to pass it on when they see someone working safely.

"Lab Safety Rats" are available from the Laboratory Safety Institute for $4.95 plus shipping and handling. Or, make your own. If you do, and you're having fun with it, give us a call or an email. We'll be eager to hear about the kind of reaction it's getting at your place.

… jak

The Acceptable Number

I was thinking the other day about William Lowrence. He wrote the book, *Of Acceptable Risk*. Lowrence said that safety is a judgment about the acceptability of risk.

This got me to wondering about what's really acceptable. How many deaths and permanently crippling injuries? How much pain and suffering and property damage?

If the risk is really small, does that make it acceptable? And, if so, to whom? The family that has suffered the loss, the school, the community, society?

If you are a school science teacher, how many children dying in your classroom in a thirty year career is acceptable? How about in your school, in your town, in your state, in our nation? What's acceptable?

Last March, in Tulsa, Oklahoma a student was rushed to the hospital to have his thumb reattached after a school science experiment exploded. I'm told that the teacher was grinding a mixture of potassium perchlorate and sulfur in a mortar and pestle.

By one account, the teacher was having trouble grinding the mixture so a student was asked to help. Acceptable?

What about at colleges and universities? Last year, there were fires at UC Irvine, UC San Diego, and UC Santa Cruz. Millions of dollars of property damage resulted. Acceptable?

There's no such thing as risk free living. Life is full of hazards. You can't cross the street without taking some risk. How much risk should be acceptable for a school, college, or university science lab? What about graduate school?

Since 1974, there have been at least a dozen fatalities in school, college, and university science programs. How do you explain to the parents of a child that was electrocuted that you didn't have a $15.00 ground fault circuit interrupter? Do you tell them it costs too much?

Speaking of acceptable, on a slightly different note, what about repeated violations of EPA hazardous waste violations? How many times does a science department, the principal investigators, post-docs and graduate students need to be warned before they should pay the EPA fine personally?

Imagine that your institution sent you to a professional conference. On the way, you got a speeding ticket. While there you got a parking ticket and your car was towed. When you got back, would you ask the Principal or the Dean to pay the fines? Of course not. You need to be responsible.

… jak

Rewards and Incentives

For many years, I've listened to wiser folks say that you shouldn't give rewards for good safety performance. They usually have one or both of two reasons.

The first reason is that you should not reward people for doing what they are supposed to do. Second, employees will conceal an accident or injury so as not to lose the reward.

I don't buy either. Working safely needs to be a condition of employment. Good performance should be rewarded. The reward, when properly sized, can be a very positive incentive.

What's the smallest reward that you can give to someone that doesn't require a requisition or a purchase order?

Praise. A pat on the back. An "attaboy" or "attagirl". Say thank you. Almost everyone appreciates a sincere "thank you." How about scaling it up to cookies and milk. Want to go all out? Break the bank with Pepsi and pizza.

Several years ago, I started asking the seminar participants if they had managed to go a year in their departments without a lost time accident. Many said yes.

Then, I asked if the department manager or supervisor had said anything to anyone to acknowledge this important contribution to the organization's success. Almost everyone says no.

I've seen supervisors with 10-25 years of experience apologize to colleagues on the spot as they realized that they had missed a simple, important opportunity to encourage good safety performance, And, it's free.

What about reason number two? I think it's really unlikely that folks are going to avoid reporting accidents or injuries just to hear their supervisor or department head say thank you.

The secret (if there is any) is to make the reward appropriately sized. And, it doesn't hurt to make the penalty for not reporting ten times worse than the one for having an accident.

I worked for four years at the Dow Chemical New England Central Research Laboratory. We had a $10,000 lobster clambake dinner for employees

and their spouses and significant others to celebrate a year free of lost time accidents.

I was conducting a leadership training seminar for a group of supervisors at a company in North Carolina. We were discussing rewards and I mentioned what Dow did.

One of the supervisors said, “That could never happen here. They would never spend that kind of money.”

The president of the company was one of the participants. I turned to him and asked, “How would you like to trade last years $500,000 workers compensation premium for a $10,000 lobster clambake dinner?” Without missing a heartbeat he replied, “Try me!”

I think rewards and incentives make good sense, good safety, and good business. They’re on my short list of the top five items for an effective safety program.

Find the appropriately sized ones for your department.

… jak

Snap, Crackle and Pop

How do you convince people that safety is important (and, that you are serious about it)? This more than any other is the most common question that LSI's seminar and short course participants want answered.

For 28 years, I've been studying this question. I read widely, talked to numerous people, and listened to many ideas and suggestions.

Several years ago, Ruth Tanner at the University of Lowell called. She asked if I would talk to science teachers during national chemistry week on this subject.

I accepted. I began building a list of 101 Ways To Convince People that You are Serious about Safety. So far, there are 72 ideas on the list. A copy of the list appears in this issue.

Number 70 on the list is "Snap, Crackle, and Pop. Almost everyone knows those three loveable Rice Krispies elves. What do they have to do with lab safety?

Last year, I had the privilege to go to Battlecreek, Michigan, the home of Kelloggs. I provided an LSI training seminar for some of their chemists.

I learned that there had been some difficulty in convincing lab workers to wear their eye protection. However, the R&D director implemented a new policy that solved the problem. I call it the "Snap, Crackle, and Pop" approach to eye protection.

If you're caught without eye protection in the lab, you get a verbal warning (Snap). If you're caught a second time, you get a written warning (Crackle). And, if you're caught for a third time, you're terminated (Pop).

Now, there's a large, clear, sign over the lab entrance: "Eye Protection Required Beyond This Point." There's also a supply of safety glasses on the wall by the entrance.

Lab workers look out for each other. If they spot a colleague without eye protection, they remind each other.

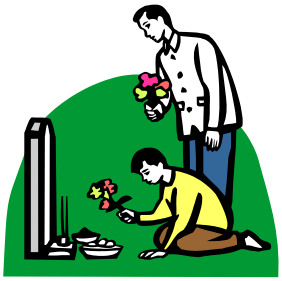
The bottom line is this. If the policies are not in writing, you don't have policies. You have an "oral tradition." And, if the rules are not enforced, you don't have rules. You have lip service.

When I write the word rules today, I write it differently from most people. I put a unique punctuation mark after the word. A tombstone.

What rules really are are monuments. We erect over the dead and crippled bodies of people who figured out a way to do something that got them in trouble (big time).

It's not because safety professionals sit up late at night trying to figure out a way to make it take long, cost more money, and irritate the living daylights out of their colleagues. It's because they know that when someone did it that way, they were either killed or crippled.

Employers who have the best safety programs have discovered one simple truth. Working safely must be a condition of employment. It's that simple. Snap, Crackle, and Pop. ***



Scared Safer

Last month in Illinois, the Institute presented it's 24-hour short course at William Harper Rainey College. We were hosted by Kelly Jones and the science faculty at Harper.

During the introduction to the course, we discuss the issue of working alone. Perhaps you remember this story… A woman is working in a lab outside of Lubbock, Texas. She's doing something that I hope you don't do and that you wouldn't allow you students to do. She was working alone.

Then, she did something else that I hope you don't do. When went to the stockroom, she picked up a one gallon container of concentrated sulfuric acid with her bare hands. She was not using a suitable secondary container for transporting hazardous materials. I'm sure many of us, myself included, have done something similar.

When she go back to her lab, she dropped the bottle. There was glass and sulfuric acid everywhere. Now, concentrated sulfuric acid is greasy and slippery. So, she slipped and fell backwards into the broken glass and acid. She was cut about four inches long and an inch deep along her spine.

The woman called for help but no on could hear her because she was working … ALONE!

Finally, someone down the hall heard her call for help. When they go there, they discovered that there was no safety shower or eyewash in the room. They had to pick her up and carry her through the building to a shower.

She was out of work for over eighteen months with a serious, disfiguring, traumatic injury.

I worked for Dow Chemical for four years. At Dow, they had a written policy in the safety manual. "When you transport (including walking) hazardous materials, use a suitable secondary container."

Following the story, there was a lively discussion about working alone. On another occasion, I'll share more of my thoughts on this subject. But now, I'd like you to know what happened the next day.

One of the course participants came up to me in the morning and said: "You scared me so much yesterday that I took my cell phone with me last night when I went into the lab to get some work done!"

Now, some folks might say that he didn't get it. I think he got it just fine. He took a simple, inexpensive step that significantly improved his chances of getting help in an emergency.

Can you do more? Sure. That's not the point. The point is two-fold. First, he wasn't "Scared to Death". He didn't quit science to become a librarian. Second, he did something to help improve the situation. He was "Scared Safer!"

Being "Scared Safer" is the very positive effect of hearing an accident story. It's the desired result.

Can you think of another example. If you can, please take a few moments to share the story. We'll publish it here in *Speaking of Safety*.

… JAK

Two Essential Words

There are two essential words in effective safety programs … "Safety Performance."

How will a person working at your company or academic institution know that working safely is important? One of the best and least expensive ways is to insert these two words into your organization's job performance review form.

As I travel and talk with thousands of people working in all types of organizations, you would be surprised to learn how few organizations do this. And yet, what could be more convincing than seeing those two words of the printed form.

For science faculty, the principle is the same with respect to evaluating student performance. Make sure these two simple words appear in the course syllabus and on the grading sheet.

When I worked at Dow, the lab director told us we were being paid to do three things: (1) Work safely, (2) Do our research, and (3) Write our reports and patent disclosures.

At DuPont, the most important thing is not profit. It's not productivity. It's working safely. You know, there's a reason why they have such an excellent safety record.

How about you? What are you paid to do? Is working safely part of the job description? Is it on the job performance review form?

Talk to your Human Resources department. Send them a copy of this article attached to your organization's current performance review form.

This is a good way to begin or continue to affect a culture shift in your organization. Once it's on the form, both managers and employees will need to be more aware of "safety performance."

Of course, once these two simple words appear in the job performance review and the job description, you'll probably need to talk about it during the job interview. Why, you might even need to ask job candidates about their background and potential in this area!

What about the syllabi for the courses taught at your institution? Is “safety performance” explicitly part of the grading criteria in section describing the grading of laboratory work?

Let’s not forget tenure. Is “safety performance” explicitly part of the tenure evaluation criteria?

Wait a minute. This is getting out of control. Maybe you had better put the two words in the your job ads too! **… JAK**

Three C's of Safety

There are three C's in safety.

The first "C" is "Choices. As Lucy so rightly points out in my favorite Peanuts cartoon: "Life is Full of Choices."

Now it turns out that you are not really free to choose unless you know the choices. I make the point in a variety of ways by challenging seminar participants to identify various pieces of safety equipment and to recognize the differences between various types of safety goggles. Good safety programs help people to understand the choices.

What follows from choices is the second "C" is Consequences. Choices have consequences. The people best prepared to choose will understand the consequences.

A few years ago I had a phone call from John Rekus. John is an industrial Hygienist working for OSHA in Maryland. John ask, "What do you think of this?"

A young man, twenty-five years of age, is working for a company in Elkton, Maryland. He's using a rotary evaporator.

In the rotary evaporator he had a reactive material and he knew it. So, he had a portable shield in front of the rotating flask.

As he reached in to take the flask off the evaporator, he pushed the shield out of the way. At that moment, the contents of the flask exploded and the glass fragment slit his throat and killed him.

Nineteen ninety-four, Elkton, Maryland, twenty-five years old, dead.

John asked, "Jim, what do you think?" I said, "I think he wasn't wearing a face shield."

And, you know what, it wasn't the money. The face shield was in the room. It was a bad choice. It had horrible consequences.

The third "C" is a twofer. Two C's for the price of one. What does it take to Convince people to Care. What does it take to get people to care enough to wear the necessary protective equipment? What does it take to get people to take the time to understand the hazards they face in their work and in their lives?

There's no magic to safety. There's just three C's. Choices, Consequences, and Caring.

… JAK

Looking Back and Thinking Ahead

I've had a lot on my mind recently. The Institute has taken on a new life with the energy of it's new name. It' caused me to look back at the last 28 years and think to where we're going in the new century.

I never would have guessed 30 to 40 years ago that my focus would become safety in science and science education. I was too busy thinking about studying chemistry and playing soccer.

The years at Dow catalyzed a transition. Today, 12-14 hour days are not uncommon. Take this one for example. I'm in San Francisco at the ACS national meeting to conduct one-day seminars on *Lab Safety Fundamentals* and *How to Be a More Effective Chemical Hygiene Officer*, attend the Division of Chemical Health and Safety (DCHAS) executive committee meeting, and talk for a few hours at the chemical education day symposium.

The day started at five in the morning. Now it's about eight in the evening at the San Francisco airport. It will "end" with a redeye flight back to Boston so I can be in the office tomorrow morning.

When I first joined the ACS probably 35 years ago, I had no idea what they did about safety. Their resources have continued to grow.

In 1974, I discovered the new probationary health and safety division, DCHAS. Today, the DCHAS has 2,000 members and runs programs, symposia, and workshops at the semiannual national meetings. The next two are Washington, DC in August 2000 and San Diego in Spring 2001.

The Northeastern Section of ACS (NESACS) had a safety committee and I got involved. I was surprised to learn from Local Section Activities that only 10 of 183 local sections had safety committees. Fortunately, that improved significantly in part due to LSI's inviting representatives from all the ACS local section to attend the workshops at Curry. DCHAS and NESACS provide seed money.

NESACS continues to be the major sponsor of lab safety training for under- graduates and graduate students.

At the national level, the ACS has several important resources for lab safety. Many are free.

The Joint Board/Council Committee on Chemical Safety publishes *Safety in Academic Chemistry Laboratories*, *The ACS Guide to Spill Response Planning in Laboratories*, and *Safety Audits and Inspections*. Call 1-800-ACS-5558 for a free copy of each.

Multiple copies (2-199) of *Safety in Academic Chemistry Laboratories* (SACL) cost $3.50 each. The price drops to $1.75 each for orders of over 200 copies. LSI buys SACL 200 at a time and resells them for $2.75 each. So, if you want 2-199 copies and don't want to ask each of your folks to call individually for their free copy, call LSI and save $0.75 per copy. And, if you are a member, you will save an additional 10%.

By the way, the break even point is 114.5 copies!

… JAK

Speaking of Safety, Volume 9.3, Fall 2000

LAB SAFETY IS A TEACHABLE MOMENT

Last week, I received a call from a teacher with a question about the storing of chemicals in unlocked cabinets in the science classroom. Her school wants to use the room for other subjects and for a homeroom. Is this a good idea? What did I think?

As the conversation continued, it became clear that I was fairly adamant about keeping chemical storage cabinets locked and generally keeping chemical storage out of classrooms. The teacher expressed concern about the time and hassle of locking and unlocking the cabinets. My reaction was to ask "what are you teaching your students by taking time to keep chemical storage secure?" You teach them the importance of secure chemical storage and can point to the need to do likewise in their homes.

Lab safety is a teachable moment. Every time you take care to protect the health and safety of your students and yourself, you have a teaching opportunity. Take advantage of them and make them an integral and important part of the science curriculum.

Maintenance problems can be another teachable moment. Here's a new way to deal with them. When you identify a hazard related to your facilities, discuss it with your students. This brings it to their attention and will help them to avoid being hurt. And, it shows them that you consider caring about health and safety as worthy of your time. Discuss approaches to solving the problem. Can you correct it yourselves? Should a warning sign be posted?

If you can't solve the problem or correct it yourselves, fill out a "Safety Maintenance Request Form". Teachers should complete this form and send copies to each of the listed people (science department head, maintenance director, and principal). Keep a signed and dated copy for yourself. If no reply is received in one week, the form should be sent again with an additional copy to the superintendent of schools, academic dean, or headmaster. If no reply is received after two weeks (and the teacher has tenure), copies go to all of the above and an additional copy to the local town or city fire marshall.

Another teachable moment is your prelab briefing. This is where you take time to describe the hazards, appropriate precautions, and possible emergency procedures associated with the experiment. You can make this process easier and at the same time keep a permanent record by using a "Hazards Review Form". This form encourages the teacher to make a careful, written review of hazards, precautions, and emergency procedures. It provides a record that this information was presented to the students.

The "Hazards Review Form" and the "Safety Maintenance Request Form" are two new Laboratory Safety Institute handouts. If you would like free sample copies, please send a stamped self-addressed envelope.

Lab safety is a teachable moment. Use it to enrich your classes. Teaching science safely is teaching science safety.

… JAK

SOS #6 Spring 1989

HOW DO YOU EAT AN ELEPHANT?

Several years ago at one of our three-day workshops, the participants were starting to feel the information overload and frustration that comes from discovering what an enormous problem lab safety represents. Many never realized how much there was to it - the incredible variety of topics, issues, and dilemmas we all need to deal with.

Some teachers come right out and say "I'm depressed", "I'm overwhelmed", "I have no idea where to begin", and "I'm leaving cause I can't take any more." And for all the ones who say it, there are probably ten times as many thinking just the same thing.

I began to realize that it was important to provide reassurance that the problems could be solved and that you didn't have to do it all in one day. You don't have to convince everyone in your department to feel as strongly as you do about lab safety. But you do need to begin.

One of the participant's said: "How do you eat an elephant?"
We all asked "How?" He replied: "One bite at a time!"

By breaking the problems down into small, bite-sized pieces, you can slowly work your way through them and make considerable progress. Find just one departmental partner. Now you're a team.

When Philip Wilson, Science Department Head at Lynnfield High School (Lynnfield, MA) attended the workshop in the Spring of 1988, he resolved to take some action (regardless of how small) every day. And, he would keep a list of his "one-a-days". He related this story when he returned to teach in the program this Spring.

After a month, he looked at the sheet of paper and was surprised to see one side was filled with progress. A few months later, the list was several pages long. "Some days all I did was take the waste paper baskets out from under the safety showers." But, he did something every day.

How about you? Try keeping your own list of "one-a-days" and see how much you can get done by Thanksgiving. We'll give away a copy of "Safety in the Secondary Science Laboratory" for the best list we receive. David Letterman has his lists and we'll have ours. It's in the **GOOD IDEAS** section.

With this issue we're starting a new feature, **MASTERS OF SAFETY**. These are men and women from diverse walks of life. Although they never were involved in lab safety, their words and ideas can help us today to "eat an elephant".

JFK is our first **MASTER OF SAFETY**. When I visited the Kennedy Library in Boston a few months ago, I was struck by one quotation on the wall of the library. It speaks to the enormity of the problems we face in teaching science safely. It underscores the patience we need in dealing with science safety issues.

President Kennedy said; **"All this will not be finished in the first one hundred days. Nor will it be finished in the first one thousand days, not in the life of this Administration, nor even perhaps in our lifetime on this planet. But let us begin."**

I urge you to continue your efforts. There's good news and bad news. The good news is that you can begin tomorrow morning and it will make a significant difference in the lives of your students. The bad news is that you'll never be finished.

Good luck in the new academic year. Take lots of small bites out of your lab safety problems.

… JAK

SOS #7, Fall 1989

How Good Is Your Accident Record?

I can`t tell you how many times I`ve heard teachers and their administrators say, with pride, "we haven`t had an accident in years." Naturally, that`s better than having had a string of minor and serious mishaps and injuries. But, simply having a clean slate for the past five, ten, or fifteen years may not be as good an indicator as you might think.

Consider for a minute the chemical industry, on average they have one lost workday injury or illness every 400,000 man-hours worked. For 100 employees working 2,000 hours per year, that`s one incident every two years. Dupont`s record is 17 times better than the chemical industry average!

Now let`s compare that with a school that has 500 students in lab for an hour a week for 40 weeks. This is 20,000 student-hours. In order to have the same frequency rate as the chemical industry, this school would be allowed to have one lost workday incident every 20 years. That`s one student sticking a thermometer or glass tube through her or his hand, going for medical treatment, and not returning to complete the experiment that day. It`s one student feeling overcome by vapors and not returning to lab that day. It`s one student cutting themselves with their dissecting knife and not being able to continue the experiment. One in 20 years.

At our hypothetical school, one of these incidents every two years (not uncommon) would give a frequency rate of ten times the chemical industry average and 170 times worse than Dupont. In fact, it appears (from meager data) that the accident rate at schools and colleges is 10 to 100 times that of the chemical industry.

Seven years ago at Curry, a part-time science faculty member splashed some fluoroboric acid in her eye during an organic lab. She washed it thoroughly in the eyewash fountain and went to the hospital for a check. She was ok but did not return to work that day.

We have 15 faculty members in our Science Division and we spend on average five hours per week in lab for 30 weeks a year. That`s 2,250 teacher-hours per year. For us to match the chemical industry`s safety record, we can have one accident 175 years. So, the next time my colleagues point out that we haven`t had a lost time accident in seven years, I can say that`s right and we have 168 more years to go!

What will you say to your colleagues?

Speaking of talking to your colleagues, tell them about **Speaking of Safety**. We would still like to reach as many science faculty as possible and we need your help to spread the word. Circulate your copy and suggest that they subscribe. How about giving gift subscriptions to your students.

I`ve made an big point in the training seminars about the risks involved in smoking. Smoking 1.4 cigarettes increases your chance of dying by one ppm. 400,000 people die every year prematurely according to the surgeon general. A male who smokes takes, on average, 2,250 days off his life. Do you remember the National Safety Council Poster that shows the attractive woman smoking and says "Suicide, it just takes longer"?

Now there`s more bad news. According to Judson Wells, his article on mortality from passive smoking published in the December 1988 **Environment International** represented the first attempt to quantify U.S. death from heart disease and cancers other than lung. A summary of the article appeared in the September 1989 issue of **Occupational Health and Safety**.

Wells claims that "each year, 46,000 non-smokers in the United States die from exposure to cigarette smoke." For those of you who count such things, that about the same as all the U.S. soldiers who died in the entire Viet Nam war!

… JAK

SOS #8, winter 89/90

Why Teach Lab Safety?

There are five reasons why teaching lab safety is important:

1. legal
2. career
3. safety program
4. moral … and …
5. lifetime value.

Each of these areas gives us some motivation to teach about lab safety. Let's examine them.

The law makes it perfectly clear that it is the teacher's duty to protect the children in school. Also, it is the responsibility of the employer to provide a safe and healthful workplace for the employee. To meet these requirements, teachers and employers need to provide instruction in the hazards that are present and the methods for proper self-protection.

There are many career opportunities related to health and safety. Providing both safety instruction and information about potential careers not only addresses the issues of personal protection but also shows another important application of the training. The need for safety professionals, industrial hygienists, public health officials, industrial doctors and nurses is considerable. Each provides a career application of safety training and service to fellow man.

Safety programs are part of most well run organizations. These programs consist of the activities, functions and practices that address the health and safety needs in your workplace. As such, they must instruct the people there about hazards and protection from those hazards.

In our society and culture, life is to be cherished and protected. Therefore, morally we have a responsibility to protect the safety of our students and employees. We help to meet this moral responsibility by teaching people about the hazards that surround them and how to protect themselves.

To me, the most important reason is the lifetime value of teaching about lab safety. All the hazards of life are present in the lab under more controlled and supervised conditions. When we as science teachers take advantage of the opportunity to teach children about life's hazards, they learn how to identify those hazards, how to protect themselves, and can live safer, healthier, longer lives.

"When all is said and done, **Isn't it worth it!"**

The monthly magazine **Research and Development** is conducting a poll to decide how its readers feel about whether frog dissection should be required in high school. We'll share the results with you as soon as they're published. What's your opinion? We'll publish our readers replies here.

… JAK

SOS #9, spring 1990

Just Tell Two Friends

Ellen Pereault attended the three-day lab safety short course at Curry this past April. I received an interesting thank you note from her because the experience had "opened her eyes and ears." Her letter made me think about how we communicate about lab safety and reminded me of a related personal incident.

Ellen wrote: "All during the video presentations and the workshop lessons, I kept hearing myself say, to myself, 'I didn't know that!' Now that I'm back home, I keep hearing myself say, to others, 'Did you know that...!' This reminds me of that old T.V. shampoo commercial, 'I told two friends, and they told two friends and they told two friends....' If nothing else, word is getting around."

The word needs to get around and telling two friends is one of the best ways to do it. It's another example of eating the elephant one bite at a time. For most of us, the three-day short course is quite an "eye and ear" opener. Unfortunately, we never learned much about lab safety in school or college.

Ignorance is a very powerful and dangerous force.

The dangers of ignorance were shown to me this past March as I left home at 5:30 AM to catch a 7:00 AM TWA flight to Los Angeles. The trip to Logan Airport was no problem. Even a five minute delay going through the tunnel didn't disturb me because I had allowed plenty of time.

I dropped my luggage off at the curb at 6:05, watched a woman run to catch another flight at 6:24, and went to park my car in the garage. I strolled into the terminal, saw a man run by me at 6:15, and stopped for coffee and a chat at the concession.

About 6:20 AM, I arrived at the gate waiting area. It was empty. I thought this was kind of odd. I was not so early but no one else had gotten there yet. I looked at the monitor and it said the flight to L.A. was at 6:24 AM. Down the gangway, I could see the nose of the plane moving away. I called out and asked if this was the TWA flight to L.A.. Yup! They waved the plane back. I boarded and was on my way!

The truly amazing part of all of this was that at no time did I experience any anxiety or concern. I was totally ignorant of the problem I was having in making my flight. The human body has some marvelous defenses to protect us.

But, they are of no value if you have no sense of danger or need to react. I had not checked my departure time carefully enough.

Think about how analogous this is to the problem we face with lab safety. So many people think the flight leaves at 7:00 AM and **SPEAKING OF SAFETY**

it's really at 6:24. They don't understand that some of the materials they handle are a lot more toxic than they suspect. They don't realize that certain electric appliances can be lethal. They don't appreciate the lifetime impact they can have on the health and safety of their students by teaching them more about lab safety.

So, let's do like Ellen and the folks in that old T.V. commercial and just "tell two friends". You don't have to convince everyone in your department. (It's probably close to impossible). Just find one or two and tell 'em what time the plane is leaving.

… JAK

SOS Fall 1990

That's Incredible

I've decided to have a new section in the newsletter. It's called "That's Incredible". Maybe you remember the TV show with Cathy Lee Crosby and John Davidson. The show featured people and events that almost defied belief.

As my collection of anecdotal accounts of lab accidents has grown over the years, a few fall in this category. You just can't believe that someone actually did it. It's the sort of thing that you wouldn't have thought you should warn your students not to do. Usually it's the result of ignorance and/or thoughtlessness and carelessness.

Two recent examples made me wonder and want to share them with you in this new feature, "That's Incredible". If you know of such an incident or accident, please send it along. If we use it in the newsletter, you'll get a copy of "Safety in Academic Chemistry Laboratories" as a special thank you.

I received a letter from a former workshop participant recounting an incident at her institution ...

> "Joe" was recently injured while attempting to dispose of some old gas tanks whose labels were gone. He took them to the roof and opened the valves on most but four had inoperable valves. "Joe" cooled these in liquid nitrogen and drilled a small hole to vent them. The vapors of one unknown gas exploded when it contacted the sparks from the drill motor.
>
> "Joe"'s polyester shirt melted to his arm. He has burns on one arm, singed hair, eyebrow and moustache and lost part of an earlobe - fertile ground for safety info! After the accident he asked my husband about the conference I went to last spring.

Our invitations went out in January to all the chemistry, biology, and physics departments in the country for the second annual National Lab Safety Training Conference for College and University Science Faculty. If you have a colleague like "Joe" whose students, institution, and themselves would benefit from his/her attending, write or call for application materials.

At one of our seminars, a chemistry teacher described an incident that occurred in a college freshman lab. They were doing an experiment to determine the specific heat of metal cylinders by first immersing them in boiling water and then placing them in a calorimeter cup and measuring the temperature rise of the water.

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A student reached barehanded into the boiling water to remove the cylinder instead of using the tongs that were lying on the lab bench. He received third degree burns on his hand.

Think about the things we take for granted. Think about the things we assume. If you take a minute to reflect, maybe there are one or two additional cautions you would share with your students.

… JAK

SOS Winter 90/91

MASTERS OF SAFETY[1]

I don't know when I have heard an introduction that was so warm and friendly, so gracious and so complimentary, so extravagant, so optimistic, so true.

It's long been my feeling that the good safety training and effective safety programing is largely based on certain fundamentals, certain fundamentals of human nature. While the techniques of laboratory safety may have to be worked out within the framework of the laboratory itself, the whole of this subject of safety training stands on certain basics.

These are basics not only of science and the various types of hazards in our lives but the basic rules that govern man's conduct toward man.

And, it's my feeling that safety training, today more than ever, needs to rely on these fundamentals, even though these fundamentals crop up from year to year and time to time under different names and slogans.

You know, teaching safety used to be simple. Maybe, you mentioned a few hazards at the start of the year and that was it.

But today, we have a host of hazards, precautions, emergency procedures, protective facilities, protective equipment, liability, and the state and federal regulations. Teaching all of this and incorporating it into our curriculum is a real challenge but an important one. We really do need to **make health and safety an integral and important part of science education, our work and our lives.**

To help achieve our goal, we need to return to the fundamentals. Actually, anyone who has successfully mastered the fundamentals of human nature should qualify as a good safety teacher.

Today, I would like to present to you a few of these people and a few of these principles and see if we don't find that there have been many masters of safety who never knew they were good safety teachers and never considered themselves as safety trainers.

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(1) Adapted from "Masters Of Selling" by Zenn Kaufman, 1961. Presented May 6, 1989 by James A. Kaufman at the Annual Meeting of the Massachusetts Association of Science Supervisors.

However, when we examine them, I think you may find that it would be your feeling that they would enhance the value of the staff of any science department.

My group of Masters today includes such improbable people as Cato and Willie Sutton and Harpo Marx and John Fitzgerald Kennedy and John Wooden and Zsa Zsa Gabor. Indeed strange bedfellows, if I may use the word 'bedfellows' in its broadest sense.

Now here and there a touch of humor may appear in our thinking but it is what my father called "kidding on the square". Under it I am serious, very serious, and this is just a method of treatment that I endorse vigorously in its place. As a matter of fact, our first Master is Mark Twain for his wonderful remark that **"humor is the good natured side of truth."**

Let me give you an example. Too often, safety training is considered to be rather dry and humorless. The fire chief is Austin, TX once said to the vice president for business affairs at the University of Texas: “I go to home fires in the city of Austin all the time where people’s homes are burned to the ground and there’s nothing left but the foundation. Interestingly, they all say the same thing. ‘That never happened before!’”

For our next Master, we go back in time several thousand years to the days of the classic struggle between Rome and Carthage. As you remember reading in your history books, a Master of Safety appeared on the scene. A great orator by the name of Marcus Cato. And, using the favorite teaching medium of his day, the human voice, Mr. Cato toured the land making speeches against Carthage. He may have varied his message, but he always opened and closed with this same phrase, "Carthage delenda est." Carthage must be destroyed. My message is **"teach science safely."**

Through good days and bad, whether he saw progress or not, he stuck to this one simple appeal until, as you know, he finally was successful. Now we could well consider the way that Mr. Cato repeated his basic message until he achieved success.

Repetition is one of the important ingredients in an effective safety program. We all get forgetful and careless. We all need reminders. On the subject of repetition, let's not forget Albert Lasker, the great founder of the advertising company Lord and Thomas. His answer to a client who thought his advertising schedule brought him too much duplication was **"Don't worry about people who see your ad twice. The fellow you've got to worry about is the one who doesn't see it at all."**

Don't worry about the student who hears you warn him twice about the hazards or emergency procedures, worry about the student who doesn't hear you at all.

What's the first thing your students should do when an accident occurs? Tell the teacher. Well, it doesn't always work that way. I met a science teacher who described the following incident.

The teacher was lecturing his class and a student was making up a lab in the back of the room. The student put his hand up and the teacher said: "Just a moment, I'll be right with you." The student put his hand up again and the teacher repeated the reply.

The student had spilled his concentrated acid in his lap and was too polite or shy to simply ask for help.

For our next master, we move down through time some thousands of years to Harpo Marx. He joined our Masters' group when someone asked why he liked to look at pictures. His answer was **"I like to see what I read."**

Students like to see what a teacher is talking about. And that's why its so important to use visuals in the teaching of safety. Good visuals hold a student's attention, they make your lesson more convincing, they help to keep your story remembered.

Your visuals can be stories of accidents like the 1,500 examples that are be part of LSI's series "Learning By Accident". For example, you can tell a student about properly carrying hazardous materials or your can relate the story of the accident that occurred last march near Lubbock Texas.

A science teacher (who unfortunately was working alone on a Friday afternoon) went to the stockroom to get a one gallon bottle of concentrated sulfuric acid. She carried it back in her hands rather than using a proper secondary container for transporting hazardous materials. Back in the lab, she dropped the bottle and fell backwards into the broken glass and concentrated acid. She suffered serious traumatic and disabling injuries and was out of work for over 18 months.

You can use effective posters like the now infamous "Mary never liked to wear safety goggles. Now she doesn't need them" created by Lab Safety Supply.

Speaking of accidents brings us to another Master of Safety, Henry Ford. Mr. Ford Said: **"Failure is the opportunity to begin again mere intelligently."** We need to learn from our mistakes. We need to share our accounts of accidents so we can "begin again more intelligently." Can you think of an accident example that you can share? Please send them to me at Curry so that I can include them in our newsletter.

The next Master is Daniel Defoe, the author of Robinson Caruso, who in one of his more serious moods wrote a book called "The Complete English Tradesman." In it he said: **"Let not the apprentice run your shop - the customer likes to hear the master's voice."**

In our case, the "master's voice" is the principal, the superintendent, and the board of education. Good safety programs are supported, championed, and directed by the highest levels of management. Employees and students need to hear the "master's voice in the articulation of a safety policy statement and its aggressive support.

Here's a sample policy statement..... **It is the responsibility of our school and its employees to ensure that our educational programs and other activities protect and promote the health and safety of our students, our employees, and the environment.**

Sometimes, unfortunately, you don't have the support of your administration. I've even heard of a few situations where your colleagues are not interested in safety. Two of our Masters shed some light on this all too common problem.

John Wooden, the great basketball coach at UCLA made that point clearly when he said **"Don't let what you can't do, interfere with what you can do."** This was made so clear to me last month when we had a three- day short course on lab safety at Curry College in Milton. Forty-five science teachers from 15 states attended. Two were from California, two from Iowa, and two from Texas. One of the men from Texas, Clyde Yeates, was in a wheelchair. Nothing stopped Clyde from doing what he can do. I figure, if he can try that hard, I'd better not get discouraged by what gets in my way.

The other master is anonymous. I've got this thought posted in my lab. He or she said, **"Never try to teach a pig to sing. It wastes your time and annoys the pig."**

A closely related common problem with safety programs it lack of money. Here's where our next Master's wisdom is invaluable. Willie Sutton taught at banks. Frequently, he conducted night classes after they were closed. He was a great believer in the use of the visual teaching techniques recommended by our other master, Mr. Harpo Marx. In fact, Willie carried visual aids (sometimes he

had two of them, one in each hand). And he had so much faith in his visual aids that he had boiled his lesson down to just two or three words.

In any event, Willie finally got caught. And when they put the handcuffs on him and they hauled him away, one of the reporters asked him: "Willie, how come you only held up banks?" His answer was a gem and in my opinion, qualifies him for our Masters group. He said: **"Cause that's where the money is."**

After you have conducted an inspection of your facilities, and prioritized your needs, take a hard look at your department's budget and see what you could do without to address your top safety and health need.

Now go to the principal and ask for the rest. Next go to the superintendent and the school board. If your need is still unmet, ask for permission to submit a proposal to outside sources. Make an appointment to see the president of the largest local bank in town and ask for the rest as a gift.

The worst she or he can say is no. And, if you never ask, you'll never get. If you're satisfied with what you have now, you'll never have more.

Incidentally, We're looking for more Masters to add to our Hall of Fame. If you nominate someone and we include him or her in our newsletter "Speaking of Safety", we'll send you a nice safety thank you.

Bert Williams was a vaudeville singer who's popular song title has an important message. **"Everyone wants to go to heaven, but nobody wants to die."** This title deserves to be a Master. People seem to naturally want to avoid doing the things they like least.

If you have ever been through a college or university laboratory, you know that one thing that's liked least is cleaning up. But it's such an important habit. Teach it to your students every chance you get. I know one teacher who uses a kitchen timer set for five minutes before the end of the lab....

Now here's the Master you may have been waiting for, Zsa Zsa Gabor. She made our group when she said: **"Husbands are like fires; they go out when unattended."** I'm sure we all accept that statement as basically true 'cause she knows whereof she speaks.

But most of us here know that this philosophy also applies to the handling of students. They need our attention and our caring about them. Show them that you care about your own health and safety and that you care about theirs. It's really infectious.

While you're paying attention to them, they'll be paying attention to you. Our next Master of Safety was aware of this. Andrew Carnegie said **"As I grow older, I pay less attention to what men say. I just watch what they do."**

Your students pay close attention to what you do. In teaching them good safety habits you need to set the example. Wear your protective equipment and keep your work areas neat and orderly.

Ben Franklin put it a little differently; **"Well done is better than well said"**

Our last Master today is John Fitzgerald Kennedy. When I visited the Kennedy Library in Boston a few months ago, I was struck by one quotation on the wall of the library. It speaks to the enormity of the problems we face in teaching science safely. It underscores the patience we need in dealing with science safety issues.

President Kennedy said; **"All this will not be finished in the first one hundred days. Nor will it be finished in the first one thousand days, not in the life of this Administration, nor even perhaps in our lifetime on this planet. But let us begin."**

I urge you continue your efforts. There's good news and bad news. The good news is that you can begin Monday morning and it will make a significant difference in the lives of your students.

As science teachers we need to take advantage of the special opportunity we have in our laboratories. When you **teach science safely**, our students can learn to identify hazards, learn to protect themselves, and live safer healthier, longer lives.

The bad news is ... you'll never really be done. But as our friend Jack Reilly of Fisher Scientific helped Jack Klugmann to say **"After all is said and done ... Isn't it Worth it."**

That winds up our gallery of Masters for today. In no sense have I tried to provide a capsule course in safety. Rather, I've tried to provide a few benchmarks that can serve us in our daily pursuit of developing effective safety programs.

At the same time, reaching outside of our everyday work, and outside of the commonplace of our daily routine, I may have succeeded in making these ideas provocative enough to sink in and stay in.

Most importantly, I hope I have imparted to you a bit of my own philosophy on teaching science safely, namely that the "outside look" is important; and that teaching safety, while a craft in itself, should tap all the aid it can from the words

and wisdom of those people of all times and in all fields who, by their own success, have qualified as Masters.

Actually, all of the people we have quoted were experts at living and human relations. And human relations is really the word we're dealing with. All of our Masters were experts in that subject. That's what teaching science safety is really about.

Remember ... **No Lesson is So Important and No Task So Urgent that We Can Not Take time to Teach, Learn, and Practice Science Safely.**

… JAK

Product Stewardship In Philanthropy

The Laboratory Safety Institute has launched a campaign to make college and university research programs safer. The campaign is based on an application of the golden rule: "The one with the gold makes the rules!"

How can corporations and foundations insure that the dollars they give to research at colleges and universities will help to protect the health and safety of the researchers and their institution? They can establish a program of Product Stewardship in Philanthropy.

Product Stewardship is not a new idea. Some companies have had programs to insure the safe use of their products for several decades. The concept was developed twenty years ago by the Dow Chemical Company. Today, increased numbers of companies have such programs. They want to be socially responsible by protecting the health and safety of their customers and the environment and prudent with respect to issues of liability.

The Laboratory Safety Institute's application of the Product Stewardship concept to research philanthropy is both new and simple. The corporation or foundation implements a program to ensure that their contributions are used to do research in a manner that protects and promotes the health and safety of the recipients and their institution.

A typical Product Stewardship program would consist of:

1. Requiring that research proposals contain thoughtful discussion of the related health and safety issues. This would be one of the selection criteria.

2. Conducting complementary laboratory inspections for the grant recipients. The implication becomes clear that renewal is unlikely if an unacceptable standard of working conditions and practice is maintained.

3. Presenting complementary lab safety training seminars for researchers, research supervisors, and principal investigators.

The standard of safe research practice at corporate laboratories is significantly higher than at academic institutions. In many cases, the conditions

in academic labs are deplorable and border on criminal negligence. A recent article in **The Scientist** (February 18, 1991) highlights the problems.

It's time for corporations to share their health and safety expertise through Philanthropic Product Stewardship. It's time to use the motivating force of their research grants to encourage health and safety. In return, a significant added benefit for the corporation will be that students hired from these institutions will have had better safety training.

The Laboratory Safety Institute is the only non-profit national center for training and information on lab safety issues. Located at Curry College in Milton, Massachusetts (1978-93), the Center has been described in the **Journal of Chemical Education** as "a national resource for safety conscious science teachers."

I see the Philanthropic Product Stewardship concept as a significant new approach to making health and safety an integral and important part of science education. It's sorely needed because, unfortunately, science faculty receive almost no training in lab safety. Surveys by our Center and others suggest that the accident rate in school and college labs may be ten to one-hundred times greater than in the chemical industry.

Perhaps then we would not be faced with the death of more than 75,000 people due to workplace accidents, illness and disease, nearly 100,000 accidental deaths and nine million disabling injuries each year in the United States.

In addition to assisting corporations and foundations with developing and implementing programs of Philanthropic Product Stewardship, the Center provides training programs in the fundamentals of lab safety and safety program development, operates an audio-visual lending library, and offers numerous publications on lab safety including a bibliography, safety guidelines, and a newsletter "Speaking of Safety".

The Laboratory Safety Institute's programs and services are made possible by the support of generous individuals and corporate sponsors including Union Carbide Corporation, Fisher Scientific-Educational Material Division, and the National Safety Council's Foundation for Safety and Health.

For more information about Philanthropic Product Stewardship or the Center's other programs and services, contact the Laboratory Safety Institute at Curry College, Milton, MA 02186 or call 617-333-0500 x2220.

… JAK

Safe Science at Home

How safe are the science experiments that children do at home? For three families in Bethesda, Maryland the answer to that question, tragically, was "not safe enough."

On New Year's Eve, four boys were killed in the garage of a Brazilian diplomat's home experimenting with explosives. Two of the teenagers died instantly in the explosion. The other two died in the hospital from injuries sustained in the 3am incident.

This unfortunate tragedy raises questions about the safety of home science experiments. It makes us want to ask "what can parents, children, and teachers do to make home science be safe science?"

Examples of problems are far too prevalent. In Rhode Island, two boys were burned when a science fair project overturned while being transported on the school bus. The caustic solution injured both the student carrying it and the boy sitting next to him.

In a separate incident, several school children were injured when a model volcano exploded while being demonstrated at a school bus stop. The project had been successfully demonstrated at school during the day. However, on the way home, the bus stop demonstration did not have the same happy ending.

There are three common ways that science experiments end up being conducted at home. (1) The school suggests or requires a project. (2) The child is given a toy or kit that involves science experiments. Or (3), the child decides to try something on her or his own.

In each case, there are a few simple and inexpensive precautions that should be observed. These precautions will help to ensure that home science experiments continue to be enjoyable and positive learning experiences.

We can learn two important lessons from our country's major chemical companies. First, in their research laboratories scientists are not allowed to work alone. As with other potentially risky activities, such as swimming or skiing, working alone is a bad practice.

Second, these research scientists do only those experiments that are approved. This means that the health and safety consequences of new

experiments are thoroughly reviewed and discussed before the experiment is conducted. If it can't be done safely, they are not supposed to do the experiment.

Why are children doing unsupervised and unauthorized experiments?

In fact, they shouldn't be. Children need to be taught by their teachers and their parents that they should not work on science experiments without adult supervision. And, they also need to be taught the importance of conducting only approved experiments.

Both parents and teachers have a role to play in encouraging safe science in the home. Parents have several important responsibilities. Clearly, it is important that they teach their children these two golden rules of science safety:

1. Don't experiment without adult supervision.
2. Only do approved experiments.

Parents need to supervise their children's home science activities. For experiments arising out of purchased toys and kits, only the published experiments should be performed. And, for experiments originating from their child's school, clearly written procedures should be provided so that parents can be confident that what the child intends to do is appropriate.

When parents have doubts or questions concerning the safety of a particular experiment, they should contact a science teacher at their local school.

Teachers also should play a key role in making sure that home science is safe science. First, they need to store chemicals and equipment securely. Children do continue to take these and it's the schools' responsibility to see that they are not easily accessible.

In Connecticut, an honors student was taking chemicals from an unlocked chemical stockroom and storing them in his locker before taking them home to his lab. One morning, his locker exploded and eight students were injured.

Two boys were injured in an explosion in a New York school. The explosion took place while the boys mixed chemicals in the stockroom after being sent there as a disciplinary action by the science teacher. One boy may lose the sight in one eye.

Two Massachusetts college students were stealing chemicals from the college's stockroom and making rocket fuel in the basement of their dormitory. After several successful launches on the front lawn of the dorm, something went very wrong. One morning, during the loading phase, the fuel mixture exploded and both boys were seriously injured.

The chemical stockroom must be kept locked at all times and students should not be allowed to enter without direct teacher supervision.

Teachers and their schools are, in fact, liable for the health and safety of their students when science projects are assigned as part of the curriculum. If students are expected to do a science fair project, the school is responsible for the project even if the work is done at home. Therefore, teachers need to carefully review each of their student's experiments to help ensure the issues of health and safety are carefully considered.

The Laboratory Safety Institute recommends that science teachers use a rules agreement as part of all school science projects that will be conducted at home. This agreement lists the safety precautions that should be observed. Student and parents are required to sign a statement that they have read, understood, and agree to follow these precautions before the school allows the project to start.

A sample rules agreement is available from the Laboratory Safety Institute for $.50 and a stamped, self-addressed envelope. Call or write for our publications list and price list.

Home science can be safe science. All it takes is for students, parents, and teachers to understand these simple precautions. Let's be sure that your student's next home experiment will be the right kind of learning experience for everyone.

… JAK

SOS Winter 1991/92

Leadership In Safety: It's Time to Wake-Up America

As I travel around the country lecturing, conducting seminars and short courses, and performing facilities inspections, I'm continually reminded of the almost total lack of administrative leadership in the area of safety. Boards of Education, superintendents and principals are not providing the badly needed leadership for the development and implementation of safety programs to protect the health and safety of their students, employees, and the environment.

I suspect the major reason for this is that they themselves are the product of an educational system which ignores management's responsibilities to provide leadership in safety. Science teachers and often their department heads and science supervisors find themselves trying to implement change from the bottom up and find it, at best, to be something equivalent to trying to push a rope. At worst, they are faced with an administration which is simply criminally negligent.

In 25 states, OSHA workplace safety regulations apply to public schools. I've visited too many of these states where science teachers have no idea that their employer needs to comply with all the workplace safety laws as enforced by their state safety agency. These laws include the OSHA Lab Standard (discussed in previous issues) and the new OSHA Bloodborne Pathogens Standard (discussed in this issue).

Just to set the record straight, here's the list of states which have "State Plans" and therefore the laws apply to public as well as private schools: Alaska, Arizona, California, Connecticut, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York, North Carolina, Oregon, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, Wyoming.

In these states, the workplace safety laws are as strict or stricter than the federal OSHA regulations. And, it is the employer's (not the employee's!) responsibility to be in compliance. The fines and penalties run to $70,000 for single willful, serious violations. Members of Boards of Education need to find out what's being done to comply with the law. Board members could be personally liable.

More than fines and penalties is the important issue of protecting the health and safety of the children, the employees, and the environment. At one fairly typical school, they spend about $100,000 to dispose of the school's trash. They spend zero on a Health, Safety and Environmental Affairs (HS&E) Program.

It's time to wake-up America. No more dark-ages management in public education when it comes to protecting the health and safety of the children, the employees and the environment. Tax-payers will need to recognize and support HS&E programs for public schools.

This wake-up call begins with the Board of Education and the Superintendent of Schools establishing the HS&E Policy and Principles for the school system. A simple policy statement might read as follows:

> It is the responsibility of the school system and its employees to ensure that our educational programs and other activities protect and promote the health and safety of our students, our employees, and the environment.

Next come the fundamental principles which support the policy statement:

1. All accidents can be prevented.
2. Management is responsible for the prevention of injuries.
3. All hazards can be safeguarded.
4. Training is essential.
5. Safety is good business.
6. Working safely is a condition of employment.

Everyone with management responsibility (starting with the Board of Education) must understand that they are personally responsible for the health and safety of the people they supervise.

What follows is the development of an HS&E program to formally address these issues and help to ensure compliance with the applicable laws. An HS&E Director should be **HIRED** to coordinate the HS&E program and advise management on HS&E matters. The HS&E Director should report directly to the Superintendent of Schools. A budget line should be established for the HS&E program to support its development and implementation.

Next, the Superintendent of Schools should appoint an HS&E committee. The committee should be made up of both staff, faculty, administrators, and school board members. The committee's role is to review and discuss HS&E issues, provide advice and recommendations to the Superintendent, and assist with the development and implementation of the HS&E program.

The HS&E Director should propose a plan of action which is reviewed by the HS&E committee and forwarded to the Superintendent with its recommendations. The plan might include:

1. A program of facilities inspections
2. Acquisition of reference materials

3. Publication of a short HS&E newsletter
4. Establish more formal accident reporting, investigation and recordkeeping
5. Initiation of training programs
6. Taking specific steps towards regulatory compliance

For the past twelve years, the Laboratory Safety Institute has provided programs and services to make health and safety an integral and important part of science education. We've offered training programs to more than 17,000 science teachers and science administrators, publish newsletters and numerous other materials, operate an audio-visual lending library and provide advice on health and safety questions.

Today, we begin addressing our attention to the management side of the problem. The accident rate in schools and colleges is 10 to 100 times greater than comparable industry. Last year, 93,400 people died accidentally and 9,000,000 suffered disabling injuries. The cost was over 175 billion dollars. If you think there's not enough money for public and private education, do something to stop wasting it on this carnage.

It's time to wake up America. It's time for leadership in safety. It's time for school administrators to step forward to protect the health and safety of their employees and make it an integral and important part of education in the United States.

For more information about programs for school administrators on Leadership in Safety, contact the Laboratory Safety Institute.

… JAK

SOS Spring 1992

Keeping Score

Do you like to play tennis, basketball, softball, poker, gin rummy or bridge? How about soccer, golf, racquetball or hearts? Chances are that if you do enjoy any of these activities, you keep score. We keep score because we want to know how we're doing and be able to compare our performance to our own or others performance.

And yet, when it comes to safety performance, we are pretty bad at keeping score. Generally, schools' records of lost time accidents, medical cases, and other reportables are poor or non-existent. Equally unfortunate is the fact that in most cases the faculty and staff have little or no idea what the record is.

For years, the chemical industry has lead the list of those industries having the least frequent and least severe accidents. Typically the lost time rate is one per 400,000 man-hours of exposure (according to National Safety Council data).

Compare this to your situation. Assume you have 1,000 students and 100 employees. If half the students take a science course (500) and the lab is one hour per week for 35 weeks per year, the exposure is 17,500 student-hours. To have a lost time accident rate equal to the chemical industry, you can have one every 23 years (400,000/17,500). How are you doing?

What about the employees? One hundred people working 40 hours per week for 50 weeks is 200,000 man-hours. So you can have two lost time accidents, if you want to match the chemical industry record.

That's the good news. The bad news is that companies like Dow and DuPont are 10 to 17 times better than the chemical industry average. That means going 250 to 300 years for your students and 20 to 34 years for your staff (without a lost time incident). Our Dow Chemical research lab's 50 employees in Wayland, MA went 35 years without a lost time accident.

Schools and colleges have rates that are 10 to 100 times greater than the chemical industry. Do the calculations for your school and let me know how you're doing.

Last Fall ('91), I started an HS&E newsletter for the faculty and staff at Curry. One of the regular features is our accidents record, performance, and days since our last worker's compensation claim. I picked the worker's compensation claim to use as an index because it's easy to track and has been too high (one per month). We spend about $110,000 per year on our worker's compensation insurance premium.

Since we went public with the "score", our employees are more safety aware. The average interval has increased from 30 days to 45 days. I hope we can make 60 days by the end of this academic year. Each new milestone is the basis for pausing briefly to celebrate our community's achievement and the foundation for increased improvement.

I urge you to keep score in public. Right on the wall of the school cafeteria. "It's been XX days since a member of our community was hurt here at school." Or, "It's been XX days since we had a lost time accident." Try it. It works!

… JAK

SOS Fall1992 FALL 1992

The Wrong Questions

I can't tell you how many times I've been asked: "Which chemicals should we get rid of?" I've decide. This is the wrong question? The right question is "which chemicals do we need for the curriculum we want to teach?"

If you're not sure which ones these are, buy some Avery or Dennison colored adhesive dots. Put a dot on the top of the cap each time a chemical is used for the next year. At the end of the year you'll have marked all the chemicals being used in your curriculum.

Make a list of the unused ones. Ask your colleagues if they really need any of them for future experiments. Show the list to your sister institutions to see if they have any use for these perfectly good but unneeded chemicals. Share them. After all, they were all shipped to you safely. You can ship them safely. Be sure to include a copy of the MSDS with each chemical given to another institution.

Determine which of the unwanted materials are regulated hazardous wastes. Get several bids for their proper disposal. Remember, you would be much better off buying smaller quantities and being able to throw away empty containers than having to pay to have materials disposed of commercially.

The other popular question is "which chemicals should not be permitted in schools?" Again, it's the wrong question. The right question is "do the educational benefits derived from using this chemical outweigh the associated risks?" Do you have the experience, training, facilities and students of sufficient maturity to be able to use the material safely?" Remember, safety is a judgment about the acceptability of risk?

In those unfortunate situations where a list of "banned" chemicals is going to be developed, I argue for an appeals or waiver procedure. Consider building into the "ban" a process by which a teacher can request review of a specific material under acceptable conditions.

Teaching Science Safely means being responsible for understanding the hazards of experiments and demonstrations before they are conducted. It means being responsible for foreseeing emergency situations and being prepared to deal with them. It means using the prudent practices, protective facilities, and protective equipment needed to minimize the risk to an acceptable level ... where the educational benefits outweigh the risks.

… JAK

SOS SPRING 1993

"You Mean, It's Just a Matter of Priorities?"

The recent explosion of a research project at Boston University that sent a graduate student to the hospital and the death last November of a Texas high school biology student who drowned on a marine biology field trip are graphic reminders of the risks associated with school and college science laboratories.

The Laboratory Safety Institute's (LSW) studies show that the accident rate at schools and colleges is 10 to 100 time that of the chemical industry and 100 to 1000 times greater than that of Dow Chemical or DuPont. As the nation's only non-profit educational center dedicated to academic laboratory safety, we're often asked why this is the case. The answer is simple. Perhaps it's best told in the following story.

For almost ten years, I've had the privilege to work with Barbara Foots, Science Supervisor for the Houston Public Schools, and her colleagues in Houston Independent School District. I've provided lab safety seminars for their secondary and elementary teachers. I've also conducted facilities inspections for nearly 50 high schools and junior high schools in the district. The comprehensive inspection reports have included a buyers guide to facilitate purchase of supplies or equipment keyed to specific report recommendations.

This past Fall we added something new - Administrator Training. It's something I consider really critical. In fact, I think it's so important that we make it available for free in conjunction with our teacher training and inspection services. We provide one to three hour safety awareness seminars for principals and superintendents at no additional cost.

I can't tell you how many times science teachers have written on our seminar evaluation sheet under "additional comments" -- "I wish my principal or administration could hear this. Maybe then they would understand what we have to deal with here!" I agreed and a few years ago began offering these complimentary seminars for administrators.

Other school systems have taken advantage of the offer. Bob Chambers, Science Supervisor of the Knox County Public Schools in Knoxville, Tennessee, and Kathy Sparrow, Science Supervisor of the Akron, Ohio Public Schools, have both made this training available to their "management". The sessions have been eye-opening for the administrators. They learn about their indispensable role in safety excellence - leadership. They become primed to do more to promote health and safety in their schools.

But in Houston last October something special happened. A group of principals gathered on a Thursday afternoon for a two-hour session on "Leadership in Safety". After about fifteen minutes of conversation, one of the principal's faces lit up, following what had arguably been an already too long and trying day, and he asked, "You mean, it's just a matter of priorities?". I smiled and replied, "Yes, we can go home now!"

Well, we didn't go home. We all stayed for another two hours to underscore how important that one idea was. Jack Klugman says it in the movie. "When all is said and done - isn't it worth it!" We all find time in our lives for the things we feel are most important. Whether it's our faith, our family, our friends, our hobby, or our work, how we spend our time speaks for itself. What we do are our priorities. It's not the money that's critical. It's our time and how we decide to spend it.

I've developed a new seminar titled: The simplest, least expensive, most effective, lab safety program. The seminar highlights the ten key components in an effective safety program. In a future issue of SPEAKING OF SAFETY, I'll highlight the ten components. For now, the important thing is the idea that they are all very inexpensive, like having a written safety policy endorsed by the board of education or board of trustees.

The bottom line is you don't have to spend a lot of money to have a great safety program. You just have to start spending your time differently. The good news is that you can start immediately. You don't have to wait. There are no purchase orders or requisition to fill out. The bad news is that you are going to have to spend the rest of your life doing the work.

I hope you'll want to arrange for a lab safety awareness seminar for your administrators. It won't be easy. Just like us, they never learned in school to care about health and safety, to identify hazards and provide protection, to create a safe and healthy learning and working environment. You'll need to provide them with this educational opportunity and convince them to attend. Your job is to "get them to the water". I'll "make them drink".

Maybe the light will come on again and your principal or superintendent will say: "You mean, it's just a matter of priorities?"

I'll smile and reply, "Yes, it really is just a matter of priorities. We can go home now!"

… JAK

SOS Spring 1994

The Importance of Planning

A year ago September in Denver at one of the local high schools, a physics teacher was doing a demonstration for his students. He was burning magnesium.

When the reaction was over, his students asked him to perform the thermite reaction. He had not planned to do this demonstration. And he forgot how hot burning magnesium can be. He poured the thermite mixture into the container which has held the burning magnesium. The still too hot dish ignited the thermite and his hand was lost in the explosion. Several students were also injured.

As I thought about this tragedy, I could recall two other accidents from the more that 5,000 I collected over the years. One involved a science teacher in Vermont and the other involved a school in Massachusetts.

In Fall River, a science teacher was demonstrating the various colors produced when chemical burn. He arranged five crucibles on the front demonstration desk. Four of the five ignited and burned. The third one did not ignite. The students asked to see it burn so he checked with his hand to be sure it was really out. Then, sensing no heat, he opened a bottle of alcohol and poured it into the crucible.

The alcohol vapors ignited immediately and burned back into the bottle causing it to act like a flame thrower. The bottle shot burning alcohol on the face, chest and shoulder of a student in the first row. The student needed to be flown by helicopter to the burn center in Boston. She was in the hospital for over one month and required plastic surgery.

The Vermont science teacher worked at a private school. She was demonstrating the evaporation of a liquid by heating alcohol in a beaker on a ring stand with a Bunsen Burner. When the demo was over, the students gathered around the front table and asked to see it again.

The science teacher opened a bottle of alcohol and poured some into a clean, dry beaker. She set the still open bottle on the front table and then poured the alcohol into the original beaker which was still being heated over the Bunsen Burner. The alcohol ignited explosively and caught the students on fire.

One student struck the open alcohol bottle with his arm knocking it onto the floor and adding fuel to the fire. Four students were badly burned. One was

in the hospital for six months and she required extensive plastic surgery. The school is now litigating a six million dollar law suit.

In each of these three examples, the teacher performed a demonstration in a way that he or she had not really planned. The interest and enthusiasm of the students propelled the teacher ahead beyond what was really thought out and prearranged. Also, in each of these cases, the teacher failed to use a portable shield between the demonstration and the students. The result ... injured students!

This is not just a concern for teachers doing demonstrations. This is an issue for all of us in labs. First, it is not uncommon for industrial chemists to visit schools and in the presentation perform demonstrations. Second, lab workers often have experiments which may appear not to have proceeded as planned. Proceed with caution.

When I talk to teachers about "Chemical Demonstrations: Safety and Liability", I try to emphasize the value or demonstrations and the need for careful planning. So let's me share six of the ideas that might be helpful in preventing a reoccurrence of these kinds of accidents.

1. Demonstrations need to be planned and tested in advance. At the very least, experiments need careful planning. In a later issue we'll discuss the Dow "safe operating package" and 3M Hazardous Reaction Review.

2. Portable shields should be used between the demonstration, the students and the teacher. Researchers need them too. What's going to protect you from an imploding rotary evaporator?

3. When something goes wrong, put it aside and start over with new, clean, dry chemicals and equipment.

4. Try to imagine the ways in which the demonstration or experiment could fail so that you can anticipate problems.

5. Do not add a flammable liquid or solid under conditions where an ignition source may be present (This is the lab equivalent of pouring lighter fluid on a hot barbecue grill!). You would not believe the number of accidents that occur when trying to refill a hot or still burning alcohol burner.

6. Make sure you are wearing the proper protective equipment to protect yourself and serve as a good example for the students.

… JAK

How to Get Material Safety Data Sheets

When the Federal Hazard Communication Standard (29CFR1910.1200) went into effect, OSHA mandated that employers create a list of hazardous chemicals in the workplace and obtain material safety data sheets (MSDS) for each. The law required the manufacturer, importer and distributor to determine the hazards of chemical substances and make this information available downstream to the users. However, they only have to send it the first time you purchase that material from them. The problem was what to do about all the bottles already on your shelves.

Folks started calling companies with long lists of chemicals asking for free MSDS's. Pretty quick, this got stale on the vendor's end of the line. Some vendors started selling a compendium of MSDS's for up to several thousand dollars per year as a subscription.

However, there are still several very good ways to inexpensively get MSDS's without paying an arm and a leg. And, without violating anyone's copyright. But first, consider this.

You are no longer required to obtain MSDS's for all the chemicals in your lab! When the OSHA Laboratory Standard went into effect, all that changed. "Occupational Exposure to Hazardous Chemicals in Laboratories" (29CFR1910.1450.h.ii) states that "Employers shall maintain any material safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees."

Note ... there is no mention of having an MSDS for all lab chemicals. That's it except for one other mention.

In the section on Information and Training there is another comment on MSDS's (29CFR1910.f.3.v) while describing what employees shall be informed of. "The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets received from the chemical supplier."

Why the change? Simple. Folks who work in laboratories are expected to be able to choose appropriate reference material from the wide range of sources that are available. Unfortunately, many of the labs that I audit have poor reference collections. I'll save comments on "What to Read" for another column.

With material safety data sheets being one of the most easily available and least expensive references, it just might be a good idea to have a complete collection. So, this brings us back to the original proposition.... How to get them.

Some labs seem to have trouble getting them at all. Never mind for all the old chemicals in the house. The simple solution is to stamp on your purchase order that "This order is not complete until the material safety data sheet is received by Ms./Mr. CHO (the name of your chemical hygiene officer or whoever you like). You would be surprised how fast that corrects this problem.

The bigger problem is the MSDS's for all the older chemicals. What you need to do is list your chemicals by vendor. If your inventory is on a computer, this should be no problem. And, select only those for which you need an MSDS. If you are still using index cards, now is a good time to switch to a computer based system. There are some very inexpensive yet effective systems available. For more information about them, fax your request to 508-647-0062.

You're almost ready. You need to know the current catalog number for the chemical that's closest to what you've got. Now, send a short, separate request to each of the vendors asking for MSDS's for only 5-15 chemicals and include the catalog number as a reference. Wait for the MSDS's to arrive and then move down the list for the next 5-15 chemicals from each vendor.

While some labs want to have the exact MSDS for each vendor's chemical, others are satisfied to have any relevant MSDS. In some cases with older chemicals, this may be the best you can do. If all you want is a ballpark MSDS try the online system from Mallinckrodt. They have their MSDS collection available by calling 1-314-895-4870 with your computer. The log-on is "LABLINK" and the password is "QUALITY". Then, you can download any of their MSDS's to your computer. The selection process is easiest if you have a copy of their catalog and use the appropriate catalog number. This use to be an 800 number in the early days!

The next best bargain is the CD-ROM collection from the Canadian Center for Occupational Safety and Health. Several years ago it cost about $350 for 75,000 MSDS's. Call CCOSH at 416-572-4400 for current information and pricing.

One last comment about MSDS's. I often hear people complain about the MSDS for sodium chloride. They get upset at the level of precaution recommended by the vendor. They feel the vendor is overdoing it in order to "Protect the Farm".

Well, there may be some truth to that. However, few chemicals have such a narrow range of safe use. The amount of sodium chloride that produces adverse physiological effects is about two to three times the average healthy dose. Furthermore, the vendor has no idea whether you plan to back a freight car of the stuff onto your railroad siding or use two milligrams in the lab!

Be that as it may, we all have a personal responsibility to know the hazards of the chemicals we're using before we use them. What are the PEL's, STEL's and LD_{50}'s? Take the time to learn more about the chemicals you're using. Have you read a good MSDS lately?

… JAK

SOS Spring 1996

How District Administrators Can Help To Ensure Safe Science Study

You don't have to spend a lot of money to have a safe science program. Just commit yourself to making health and safety an integral part and important part of the science curriculum.

School administrators usually react quickly on issues affecting the health and safety of students. Yet, there is one area directly affecting the well-being of students and employees — and involving the potential of millions in liability suits — that has received surprisingly little attention from school management. That issue is laboratory safety, and health and safety awareness in general, in the teaching of science.

Most schools do a poor job of protecting the health and safety of science students. Research suggests that accidents are as much as 100 times more likely in an academic science lab than in private industry. That's not too surprising, when you consider that none of the respondents to a nationwide survey of state teacher certification agencies required safety training for science teachers. Very few schools have a written safety policy.

Behind these facts are some tragic stories of students and teachers injured, maimed, and even killed in science activities. Here are a few examples from my too-voluminous file of accidents and hazardous conditions:

- Twenty-three high school students in Bakersfield (CA) are hospitalized when a chemistry demonstration exploded.

- Five high school students in Galesburg, Illinois were injured and two required eye surgery when the ethanol/methylene blue solutions they were distilling exploded. None were wearing eye protection.

- A Tulsa, OK student at Bishop Kelly High School was taken to the hospital for emergency surgery. His thumb was blown off when his teach asked him to help grind a potassium chlorate/sulfur mixture.

An accident does not necessarily prove negligence. However, sizable monetary awards are possible when negligence is found. Among many examples are two, ten million-dollar settlements. One involved an elementary school student badly burned while making gunpowder in class. The other resulted from a fire and explosion that burned two students and blinded one when their middle school teacher quarantined them in the stockroom.

With the stakes so high, why does safety get such a short shrift from school leaders? I believe it has to do with skewed priorities. One typical high school I know about spends $100,000 to dispose of its trash, but zero on health and safety programs.

Safety Priorities

The priorities are very different in industry. When I joined Dow Chemical after earning my doctorate, my supervisor spent the first day introducing me to the company's safety program. I learned more about laboratory safety on my first day than I had in 25 years of public and private education.

When I became a college chemistry teacher in the mid-1970s, my industry experience made the safety shortcomings of academia even more apparent. My response was to found the Laboratory Safety Institute, the nation's only non-profit organization devoted exclusively to promoting the safer teaching of science. As I travel around the country lecturing, conducting seminars, and inspecting facilities in school districts, I find that ignorance of and indifference to basic safety principals is the rule rather than the exception.

Who is to blame for the lack of attention to safety? Safety is everyone's responsibility, but I believe that district administrators have a special role to play. It is they—the boards of education, superintendents, principals and others—who establish the priorities for their school districts. They are not providing the leadership needed to develop and implement programs to protect their students, employees, and the environment.

One major reason for this, I believe, is that school leaders are themselves products of an educational system that ignores management's responsibility to provide leadership in safety. Science teachers, department heads, and science supervisors who attempt to implement change from the bottom up often find it's like trying to push a rope.

Another big reason for safety's low priority is the budge pressures school districts have faced in the last few years. This led them to make some shortsighted decisions regarding safety training and preparation. These pressures have blinded them to the fact that safety is not only good for students, it's good business. Effective safety programs pay for themselves many times over in reduced direct and indirect costs.

You don't have to spend a lot of money to have a safer science program. It can begin with something as simple as thinking through the possible hazards associated with an activity and being ready to deal with them.

Of course, the main reason to pay attention to safety is not to save money but to help improve the quality of your students' and employees' lives. Safety in the science laboratory pays lifelong benefits because it teaches lessons that people can apply to all areas of their careers and lives.

Safety procedures implemented in the science classroom can help improve other safety-related areas in the district. The simple safety concepts developed for the science program can be used to help protect all employees and control losses due to accidents.

Safety Measures

If you need savings as an additional incentive, consider this: Three districts I know spent some $10 million last year on lost-time accidents. The implementation of some fairly simple and low-cost measures could have cut that figure in half.

Here are a few of those simple, low-cost measures your district can take to improve safety:

1. *Put your commitment to safety in writing*.

A *written safety policy* is the cornerstone of a good safety program. It is a statement endorsed and supported by the administration that speaks to the fundamental responsibilities for health and safety in the district.

A sample policy statement might read: "It is the responsibility of our school district and its employees to ensure that our educational programs and activities protect and promote the health and safety of our customers, students, employees, and the environment."

Districts should also develop a *K-12 science safety manual* that covers all the rules and procedures for a safer science program. Require all staff members to sign a statement that they have read, understood and agree to follow these policies and procedures. Most districts will also need to create a written chemical hygiene plan to meet OSHA or state requirements

In addition, *create a rules agreement* for students. Have the student sign a statement that they have read the agreement, understand its contents, and agree to follow the procedures and practices. Keep these statements on file.

Superintendents and principles can *provide a cover letter* for the rules agreement summarizing the district's discipline policy for violation of the rules. A sample rules agreement and administrator letter is available from the Laboratory Safety Institute.

2. Organize a safety committee

Every district should have a safety committee, consisting of employees, supervisors, faculty and staff members, administrators, and students. The committee should meet regularly to discuss safety problems and recommend district policy. Committee members can help to promote interest and concern for health and safety issues. They might be the group responsible for conducting regular inspections, and reviewing accident reports. District administrators need to be responsible for the implementation of the policies.

3. Develop a safety orientation program

All new employees, students, and faculty and staff members should receive a specially designed introduction to your safety program.

This orientation should cover the philosophy, policies and procedures. It should explain how to deal with emergencies and how to use emergency equipment.

4. Make working safely a condition of employment

Once you have trained people on the importance of safety, you should make safety performance an important part of their ongoing evaluation. Make it clear that working safely is a condition of continued employment. Do the words "Safety Performance" appear on your district's performance review form?

5. *Provide regular training opportunities*

Training is essential. Administrators, teachers, staff and students need annual safety training sessions. The content should be appropriate for the hazards that are present. Administrator can benefit from "leadership in safety" training to help learn more about their special role and responsibilities.

6. Inspect and correct

Make sure that periodic lab inspections take place to identify and correct hazardous conditions and unsafe practices. Observe such safety basics as seeing that chemicals and flammable materials are properly stored, that electrical outlets are safe, and that smoke detectors are working. Inspections should be done at least four times a year. Perhaps one of these can be conducted by people from outside your institution. This brings fresh eyes to see the things to which you have grown accustomed.

These are six of the forty key science safety guidelines to ensure that safe learning and safe working are going on in your district. LSI will be happy to send a free copy of the 40 suggestions on request.

There's no magic to science safety. If I had to specify the failing of most science safety programs, I wouldn't point to any one gaffe. It's not just that some teachers or students aren't using eye protection, portable shields or fume hoods, important as it may be to correct those lapses. It's the overall vision that is lacking—an integrative view of how to develop and implement an effective district-wide science safety program. It's a matter of priorities in an area where we need stronger district administration leadership.

… JAK

District Administrator, October 2002

Eye and Face Protection in the Laboratory

Introduction

Choosing eye and face protection in the laboratory is often a challenge. It's a challenge for a variety of reasons:

1. Lab workers (including teachers and students) and their management (administrators) may not understand the relevant regulations and standards.

2. They may not be able to correctly identify the various types of eye protection devices. In particular, distinguishing among some types of goggles and among some goggles and spectacles can be difficult.

3. Many employers (including educational institutions) have not yet accepted and implemented one of the fundamental principles of effective safety programs.

This article discusses each of these areas. In addition, it comments on device selection, face shields, contact lenses, eyewash fountains. It concludes with the recommendation of a simple good sense eye and face protection policy.

Relevant Regulations and Standards

Two documents can help significantly with the challenge: the Occupational Safety and Health Administration (OSHA) 29CRF1910.133 Standard (Personal Protective Equipment Standard: Eye and Face Protection) and the American National Standards Institute (ANSI) Z-87.1-1989-1998R Standard (*Practice for Occupational and Educational Eye and Face Protection*). Let's begin with OSHA.

The OSHA eye and face protection standard, 29CFR1910.133, makes two important points:

1. "The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards …"

2. "Protective eye and face devices purchased after July 5, 1994 shall comply with ANSI Z87.1 - 1989, … or shall be demonstrated by the employer to be equally effective"

Who should decide if a hazard is present, the employee or the employer? OSHA answers this question in 29CFR1910.132. It says it's the employers' responsibility to determine the presence of hazards, select the appropriate device, and train the employees.

These requirements apply to all of the private sector employers in the United States and roughly 75 to 80% of the public sector employers. It's hard to suggest a reasonable argument to justify not doing what's good for about 90% of all employers in the USA just because your employer is not regulated. And, it's equally hard to justify not extending this same protection to students whose eyes and faces are every bit as vulnerable as those of employees'.

ANSI creates many consensus standards by bringing together groups from government, industry, academia, and professional organizations. Some of the standards, like Z-87.1 get adopted by OSHA and then have the force of law. The Z-87.1 standard is actually maintained by a Secretariat at the American Society of Safety Engineers (ASSE).

For more information about the ANSI Z-87.1 standard, contact: Z87 COMMITTEE, PRACTICE FOR EYE AND FACE PROTECTION, AN ANSI ACCREDITED STANDARDS COMMITTEE, 1800 E. Oakton Street, Des Plaines, IL 60018, Phone: 847/699-2929, Fax: 847/296-9221.

Identifying the Types of Devices

There are three major types of eye and face protection devices: spectacles, goggles, and face shields. Within each category there are also several types. The ANSI Z-87.1 standard describes the various types. The following points from the standard help to identify goggles: (italics added)

1. "**6.3 Goggles**. Primary protective devices intended to *fit the face immediately surrounding the eyes* in order to shield the eyes from a variety of hazards. Goggles commonly are available in two styles: eyecup, to cover the eye sockets completely; and *cover, which may be worn over spectacles*. Goggles are commonly available *with rigid or flexible frames*, and are usually ventilated to allow passage of air to minimize fogging."

2. "**7.4.1 Devices with Adjustable Features**. Adjustments should be made on an individual basis for a comfortable fit that will maintain the protective device in proper position. Extra care should be taken in fitting goggles for protection against dust and chemical splash *to assure that they are sealed to the face*. Where manufacturer's instructions are available, they shall be followed."

LSI's understanding of the above passages is that if the device does not fit the face immediately surrounding the eyes or does not seal to the face, it should not be considered to be a goggle. What do you think?

Selecting the Proper Device

The ANSI Z-87.1 standard has a section devoted to protector selection, section seven. This section contains a “selection chart” which shows five major hazards, thirteen types of commonly available devices and indicates which ones are appropriate for each type of hazard. Spectacles with side protectors offer the minimum protection. Where there is the possibility of a chemical splash, a chemical splash goggle is required. If the splash hazard is severe, then the face shield should be added.

First, note that the goggle for chemical splash is a chemical splash goggle (indirectly vented) not the impact goggle which is directly vented. This latter type often has lots of small holes on the sides. Second, the face shield is not a replacement for spectacles or goggles. Rather, it is a supplement. It is worn over spectacles or goggles to protect the rest of the face and the throat.

Reminder, according to the OSHA PPE Standard, it is the employer's responsibility (and not the manufacturer's) to determine which type(s) of device are needed for the hazards presence in the workplace. Both ANSI and OSHA make this point.

Certification of Devices

It is not mandatory for a manufacturer to produce products that comply with the ANSI Z-87.1 standard. It is voluntary but clearly in their best interests. It is the employer who must ensure that the devices comply with the Z-87.1 standard.

Who certifies that a manufacturer's eye or fact protection device complies with the standard? There are two allowed routes: Self and independent third party.

Some manufacturers choose to provide their own certification that the device meets the requirements of the Z-87.1 standard. LSI sees some problems with this approach. We would prefer that this certification be done by an impartial third party.

ANSI recognizes a few organizations to do this independent testing. The Safety Equipment Institute (SEI) is one. SEI visits the manufacturer and does a review of the quality control, etc., and more. SEI then sends the devices to independent testing labs for the technical specification tests.

In speaking with one of these testing labs, LSI learned that their testing does not determine into which category a device belongs. We were told that the manufacturer does this. There have been instances where the testing laboratory disagreed with the manufacturer.

Interestingly, the ANSI Z-358.1 (safety showers and eyewashes) standard in its definitions contains the word “certify”. The definition there is “to test by a third-party to verify performance requirements as specified in this standard.” The Z-87.1 standard does not have this definition use this word, or require this process.

Bottom line … employers should be sure they know what kind of device they need and are actually purchasing. Use caution because there can be confusion. You might wish to know how a manufacturer obtained the certification of its devices and how the category of proper use was determined.

The Fundamental Principle

The folks that have the best safety programs understand that the "working safely is a condition of employment." To say it another way, if you want to play on our team, you play by our rules.

The state of New Hampshire got it about right. Their legislature and governor passed regulations requiring all public and private employers to have a safety program. The safety program must include provisions for verbal warning, written warning, and termination for failure to follow company safety rules and policies.

LSI recommends adding one more step to the process. We encourage including a paid decision-making leave of absence (or suspension from class) after the written warning and before termination. This provides the employee (student) the opportunity to reassess whether he or she is willing to follow the rule without further exception or would prefer to resign (withdraw) at this point.

Three More Important Points

There are three additional issues that should be mentioned briefly in conjunction with this discussion on eye and face protection devices: contact lenses, eyewash fountains, and portable shields.

Contact lenses are now generally accepted in the laboratory. In June of 1998, the American Chemical Society's Council Committee on Chemical Safety published in C&EN its new policy on contact lenses. They joined other professional organizations (Prevent Blindness America and American Optimetric Association) to say that use of contact lenses in labs was acceptable as long as all appropriate eye and face protection devices are worn. Contact lens wearers should wear the same eye and fact protection devices require of everyone else in the lab.

Eyewash fountains are essential emergency equipment for all laboratories where there is risk of chemical splash. The ANSI Z-358.1 (2000) standard discusses both eyewash fountains and safety showers. According to the ANSI standard, the eyewash fountain should be accessible within ten seconds. It should be activated weekly and tested monthly. The water should turn on (and stay on) with the pushing of a lever and the protective covers should automatically uncover the eye pieces.

Many people have never tried to use an eyewash fountain. The worst time to learn would be in an emergency. Have you ever had this experience? You were in the shower and got soap or shampoo in your eyes. What did you do? If you are like most people, you clamped your eye shut, rubbed it, did a little dance and perhaps even cursed. The water was on, right there, aerated, and tempered.

How is this going to go in the lab? You're in pain, can't see, rubbing, dancing and perhaps cursing. But now there's furniture everywhere and a device on the other side of the room that you've never used before. This is a recipe for a disaster.

What's the solution? Practice. And, practice the buddy system. When a person says, "My Eyes," the nearest person guides him or her to the eyewash. The person closest to the eyewash turns it on so that it is ready when the injured person and guide reach the eyewash.

LSI recommends making up a card that says, "You have just splashed chemicals in you eyes." The card is given unannounced to someone in the lab to initiate an eyewash drill.

Portable shields should be used whenever there is risk that a reaction, experiment, or demonstration may cause an injury to an employee (student) or to an audience (class). None of the demonstrations that hospitalized 50 children in 2000 had shields between the demo and the students.

A recent explosion (June 2002) at a college in New England illustrates the need for great use of shields. A graduate student scaled up an experiment involving a reactive material. The experiment was done in a fume hood with the sash down to within one inch of the airfoil. When the explosion occurred, fragments of the glass and shattered metal hotplate bounced under the sash and off the airfoil lacerating the graduate student's chest and face. A portable shield would likely have prevented this injury.

A Good Sense Eye and Face Protection Program

LSI recommends that both academic institutions and other employers adopt the following eye and face protection policy for their laboratories:

Eye protection must be worn at all times in the laboratory. These devices must comply with the ANSI Z-87.1 standard (including being appropriate for the activity). The minimum acceptable protection is spectacles with side protectors. If the hazard is chemical splash or hot liquids (about 60 degrees Celsius), chemical splash goggles should be worn. If the splash or impact hazard is severe, a face shield that covers the face, neck, and throat should be added.

It will be beneficial to have all types of eye protective devices present in a variety of sizes and shapes. No two people have the same size or shape face. Providing an element of choice is very helpful and improves acceptance.

Conclusion

Proper eye and face protection requires understanding the hazards that are present or likely to be present, the relevant OSHA and ANSI standards and the differences between various protective devices. It also requires that management (administrators) make wearing the designated devices a condition of employment (class participation).

If you have questions about eye and face protection, please contact the Laboratory Safety Institute (192 Worcester Road, Natick, MA 01760 Tel: 508-647-1900 Fax: 508-647-0062 Email: labsafe@aol.com Web: www.labsafety.org). Free copies of LSI's *Laboratory Safety Guidelines* are available on request.

References

1. The Code of Federal Regulations, 29 Part 1900 to 1910.999, revised as of July 2000, Government Printing Office, Washington, DC

2. American National Standards Institute, ANSI Z-87.1 1998, (office: 25W. 43rd St., New York, NY 10036; headquarters: 1819 L St., NW, Washington, DC 20036 (www.ansi.org)

3. American National Standards Institute, ANSI Z-358.1 2000

Acknowledgements

The author wishes to thank the many colleagues who assisted with commentary, reviews, and suggestions to improve and insure accuracy in this article: Sandra S. West, W.H. (Jack) Breazeale, Ken Roy, Peter Markow, and Eileen Segal.

… JAK

SOS Summer 2002

Who Pays Your Speeding Tickets

Imagine that you and someone who reports to you are driving to a professional conference. Your colleague is driving

You might be a manager or supervisor traveling with one of your direct reports. You might be a professor traveling with a graduate student or post-doctoral fellow.

You're late for the start of the conference. Your colleague is going 15 miles per hour over the speed limit and receives a $150.00 speeding ticket. Who pays for the ticket?

Imagine now that you return to your office and that you include the ticket in with your travel expense report. What do you think the department head, dean, or R&D Director is going to say.

When they stop laughing, they are going to tell you to pay it yourself. Perhaps they'll question your sanity!

Now, let's change the situation slightly and talk about the violation of the federal regulations concerning the disposal of hazardous wastes from laboratories.

If your company, organization, or institution provides clear training, posts the applicable regulations and requirements in each lab, and requires all employees to sign a rules agreement that indicating that they have read, understood and agree to follow the rules, who should pay the fines.

I believe that we've reached the point where employers should take their employees off of financial out-patient care. They should stop enabling behaviors that are costing the employer hundreds of thousands of dollars.

When I suggest this at one institution, the chemistry department said: "Those are fighting words."

Well, maybe they are. That's what revolutions are all about. This is one whose time has come.

It’s time to rewrite the employment contract, the employee handbook, and the safety manual to include clear statements that once the employee has been trained and the signoff has taken place, the employee is responsible for fine related to violation of federal and state regulations.

What do you think?

… JAK

SOS Fall 2003

Scope of the Problem

I'm not going to try to convince you that safety is important. You wouldn't be here unless you didn't feel that it was important. However, I do want to share with you a perspective; a perspective that is different perhaps than the perspective that you have.

There's more to lab safety than just labs. We're not talking about a student taking a thermometer and shoving it through his or her hand and having to be led off to the nurse to have it removed. We're talking about something very different. We're talking about an idea. Here it is. It's a blinding flash of the obvious: "Life is filled with Hazards." We're not just talking about hazards that are present in science classrooms and science laboratories.

We're talking about hazards that are present throughout all of our lives, and there are nine of them. They are: 1) Chemical, 2) Physical, 3) Biological, 4) Mechanical, 5) Radiation, 6) High/Low Pressure, 7) Electrical, 8) Stress, and 9) Noise.

These are life's nine hazards. When you and I, as lab workers, scientists, and science teachers, take the time to teach our co-workers and students about life's hazards, they have the opportunity to learn how to identify hazards, to learn how to protect themselves, and live safer, healthier, longer lives. That's what lab safety is all about.

Let me give you some examples. In 1979, Richard Wilson wrote in "Technology Review", about risks, that increase our chances of dying by one part per million.

Smoking 1.4 cigarettes increases your chances of dying by one part per million. How many people do you think die prematurely in the United States every year due to cigarette smoking? I'll get you started, I'll give you the boundary conditions. It's somewhere between 0, and the total number of people that die from all causes, accidents and disease, 2.5 million.

The Surgeon General has said that 500,000 die prematurely because of first-hand smoke. I have a favorite National Safety Council poster. It shows a picture of an attractive woman smoking a cigarette, and it says, "Suicide, it just takes longer." That's what smoking is.

You know, a man who smokes, on average, shortens his life span by 2,250 days. That's the consequences. That's the choice that people make.

Living two days in New York or Boston, air pollution increases our chances of dying of one part per million. If you would like a list of over fifty risks that increase your chances of dying by one part per million, send me an email request (labsafe@aol.com)

What about accidents? In 1995 there were 93,500 accidental deaths, 19 million disabling injuries. A third of those injuries were permanently disabling. Think about this. 5,300 people went to work to earn a living and didn't come home. They died at work. Today, six people will die at work in the United States. That's the problem. And, five times as many will die in home accidents.

There is one other factor. I'll bet there isn't a single reader who would disagree with the notion that there isn't enough money available for public and private education.

Think about the millions and millions of dollars that are wasted paying for this. In 1995, 450 billion dollars were wasted paying for this. You know, we can all do something about it. It's not complicated. It doesn't have to be expensive. However it does involve understanding a very simple idea and identifying a simple object.

Do you remember there was a commercial on television where a mechanic held up a Fram Oil Filter and said, "You ought to pay a few dollars to get these changed regularly instead of paying $1,000 in the future to get a new engine?" He said, "You can pay me now, or you can pay me later."

I think that's what we're talking about here. We're talking about continuing to pay 450 billion dollars or more every year. We're talking about paying 93,000 accidental deaths, 500,000 smoking-related deaths, 5,000 work place related deaths, 19,000,000 disabling injuries. In the United States, it's estimated that 100,000 people a year die prematurely due to work-place exposure to hazardous chemicals. That's why we have the OSHA Hazard Communication Standard and the Lab Standard, Occupational Exposure to Hazardous Chemicals in Laboratories.

Some states have an OSHA approved plan of their own. These states are called "state-plan states". In these states, public employers (as well as private ones) are required to comply with this law. They are required to have a chemical hygiene plan and a chemical hygiene officer. To develop a written plan such that if it's followed, people will not be over-exposed to hazardous chemicals.

Many states have chosen to simply enact health and safety legislation similar to OSHA's regulations and have it apply only in the public sector.

In addition to life being filled with choices, life is filled with hazards. Life has certain risks associated with it. Elise Rogers wrote an excellent book for the

Dow Chemical Company called “Life is in the balance: weighing the questions of risk and benefit in today’s world.” I think it’s a very balanced overview of risks and the role of risks in our lives.

All progress depends on risk. You can’t steal second base and keep your foot on first. Well, there is one more thing and that’s the mission of the Laboratory Safety Institute. Let’s *make health and safety an integral and important part of science education, your work, and your lives*.

It doesn’t have to cost a lot of money. But, you do have to be willing, as you are today, to spend the time. It wouldn’t cost you a penny to decide if parts “E”, “F”, and “G” of the next experiment are less important than giving your students or colleagues time to clean up. And, it doesn’t have to cost a lot of money to decide that your priorities in your department are going to be “work safely, clean up, and get results”. When you work with those priorities, you’ll have an excellent safety program.

… jak

SOS Spring 2003

Lab Safety … German Style
(the good, the bad and the ugly)

I had the good fortune to meet Dr. Thomas Brock on the LABSAFETY-L discussion list. Dr. Brock works for the BG Chemie (Berufsgenossenschaft Der Chemischen Industrie).

We had lunch together yesterday at his office in Heidelberg, Germany. I thought our readers might enjoy learning a little about what's going on in lab safety in Germany.

The Good …

BG Chemie is a combination worker's compensation insurance company and OSHA in one. They are mandated by German law. They establish workplace standards, provide lots of training, and enforce the rules. Dr. Brock feels that the fines are too low.

They have "Guidelines for Laboratories." It's available in English both from BG Chemie and from LSI as a photocopied reprint ($20.00 plus shipping and handling). There are other equally excellent translated publications on biosafety, bacteria, viruses, and parasites.

I particularly liked the part in the lab guidelines that said that fume hood's sashes must be kept closed and equipped with a sign reminding users to keep the sash closed. And, another part forbids safety shower valves with chains (see below).

The Bad …

There have been several deaths in laboratories in Germany. Two are recounted in the LSI publication, "70 Years of Progress." The stockroom attendant at the University of Braunsweig who died following the cleanup of a broken bottle of methyl sulfate and the graduate student at the University of Heidelberg who burned to death trying to turn on the safety shower pulling the "off" chain.

In addition there have been two deaths due to exposure to hydrofluoric acid and one when a bottle of chloroformic acid ester exploded. Like concentrated formic acid, it's unstable and decomposes to produce gases in the bottle. In this case, it's hydrogen chloride and phosgene!

The Ugly …

Earlier this month, a micro-biologist was badly injured in a lab explosion at the University of Mainz. The pilot light on the Bunsen burner had gone out unnoticed. The next morning when she arrived, she smelled gas. To check, she struck a match. The lab was destroyed.

… jak

SOS Winter 2003-4

Safe Eye for the Lab Guy

Are you stuck in an old rut? Have you been doing it the same way for years? Is it time to give your lab safety program an extreme makeover? If so, it may be time to call the "Safe Eye."

OK, you're asking yourself, what's the "Safe Eye?" It's any reasonable or perhaps, even better, unreasonable outside opinion.

If you've become immune to everything around you…. If you have been doing it the same way for years, it could be time for some changes.

It doesn't have to cost anything. When was the last time you visited a lab to see how someone else is dealing with the same problems (that we all have)?

Have you ever tried calling OSHA? Shuddering at the thought? I'm talking about the voluntary consultation service for employers. I've used it several times and found it to be very helpful. Fresh eyes and new perspectives.

LSI can provide that "Safe Eye." We look at it differently because we don't live there. And, we have seen the many different ways that folks solve the same problems.

LSI's two newest benefits provide the "Safe Eye."

First is the new Lending Library. LSI is taking its reference library and making it available on loan for all LSI members. And, like LSI's AV-lending library, non-members can rent them.

Now, you don't have to buy the book. You can borrow it. Take a look at the bibliography in section A of the Seminar Notebook. These are the reference materials that are available.

Second is LSI's Lab Safety Program Review, which is free for organizational members. It's a great way to step back from your lab safety program and take a fresh look at what you are doing and not doing.

Your lab safety program gets rated on over thirty program elements. You get a thoughtful discussion and an overall score.

Want to take your program to the next level? Bring in the “Safe Eye.” Invite someone from the outside (preferably from a different industry/discipline) to look under the hood.

… jak

SOS Spring 2004

Pregnancy and the Laboratory

Sounds a little like Peter and the Wolf or Snow White and the Seven Dwarfs. It's not.

It's not a fairy tale and it's not a story set to music. It's a topic that keeps coming up over and over and over.

There is seemingly no end to the number of times this subject appears on the LABSAFETY-L, SAFETY, NAOSMM, and other internet discussion lists.

I first became interested in the subject when I started working at Dow nearly thirty years ago. In the early eighties, I organized a symposium on Reproductive Hazards in the Workplace for an ACS National Meeting.

Very often, when the subject is raised on the internet discussion lists, the question goes something like this: What should we do about pregnant students (or employees) in our labs?

The answers come in a variety of forms that ring very close to the emergency response system in Newburyport, Massachusetts. But, more on that later.

Readers will then describe how they have (1) placed a warning in the course description in the catalog, (2) added a warning in the syllabus for the course, (3) posted a warning sign on the door to the lab, and (4) given the students a list of the chemicals used in the lab and advised them to consult with their physician.

Back to Newburyport where under extreme emergencies they announce a code YOYO… You're On Your Own!

That's enough. I can't take any more! Stop pushing the responsibility onto the student (or employee).

The United States Supreme Court in the Johnson Controls decision (if I've got it right) said that it is the responsibility of the employer to provide the employee (and her unborn child) with a work environment that is reasonably free from recognized hazards.

Get it?

It's time for academic institutions to stop hiding and to take responsibility for providing laboratories in which to work and learn that are reasonably safe for the mother and for her unborn child.

By the way, if I hear one more time that students are not employees … enough!

… jak

SOS Fall 2004

Super Size Your Safety Program

It's time to super size your safety program.

When was the last time you spend an hour or two reviewing the components of your safety program?

What are you doing well?

What needs improvement?

What are you not doing at all?

If you've been to one of LSI's training programs, you've got two tools that can help you with the process.

The first was in the portfolio on the right-hand side, LSI's *Laboratory Safety Guidelines*. Here are 40 suggestions for a safer lab. Some folks like to use it as a checklist to see what they are doing or not doing.

Can you start all 40 at once? Absolutely not. Trying to would likely make you insane. But, could you pick one and say: "OK, this year let's add this component to our safety program. Sure.

Have you misplaced your copy of the Laboratory Safety Guidelines? They are available for free on our website on the services page.

The second took is the *Laboratory Safety Program Review*. You'll find it in your seminar notebook in section T, pages 23-24. Do you have an older notebook? Send me an email and, as a thank you for being a reader of *Speaking of Safety*, I'll send you a complimentary copy as an attachment.

This safety program review form was developed in 2003 for a presentation to Fisher Science Education's sales force. It can be used to structure the review of over 30 safety program elements.

LSI uses this form what we conduct safety program reviews. These reviews are one of the benefits of becoming an organizational member of the Laboratory Safety Institute.

Whether you use the *Laboratory Safety Guidelines* or the *Laboratory Safety Program Review*, its time to have a closer look as your program and see how to make it grow.

Ninety-five percent of the more than 60,000* folks that I've spoken to do not have a new employee safety orientation on day one with the immediate supervisor. Do you?

… jak

SOS Winter 2004-5

*Today, that number is 70,000.

The Price Is Right!

Let's play "The Price Is Right." And, here's your host …

By the way, who was the original host of "The Price Is Right?" No, it was not Bob Barker. It was Bill Cullen!

Well, neither was available so I get to be the host. And, since it's now my game, we get to play by my rules.

I'm going to model this eveningwear-length cheap plastic lab apron. You'll notice that on the front I've written the word, "Put Safety in Front." That's because it's difficult to tell the front from the back. More than once, someone has spilled toxic or corrosive chemicals on one side, then hung it up without cleaning. The next user, unaware, puts the apron on backwards and contaminates his or her clothing. Make sure the front is clearly marked.

Back to the game. The person who comes closest to guessing the true *value* without becoming a MasterCard commercial will win a great prize. No, it won't be the trip to Bimini.

I mention MasterCard because often when we play this game (one of several old game shows) at the seminars and short courses, someone will say "priceless!"

At this point, I usually say something to the effect that sure a life is priceless but the Challenger Astronaut families received only $750,000 per astronaut in the out of court settlement with NASA.

Recently, in Boston, a boxer (dog) named Cassius was electrocuted. The family is suing NSTAR for about $750,000!

So now we have it … Christa versus Cassius. It's a dog's life!

Now, what about the lab apron? It was part of an accident that occurred in the mid-80's in a southern state.

A high school senior in a second year chemistry class was asked to get 55 milliliters of concentrated sulfuric acid from the fume hood and bring it back to her desk. When she got there she realized that she had too much. In the process of trying to pour some out, she spilled it on her wrist, thigh, and calf.

She panicked. She was standing directly under the safety shower.

She could have reached above her head and this article would have been about something else. Instead, the student asked her lab partner to get the teacher.

The teacher, who was not wearing gloves, Goggles, or a lab coat or apron as an example for his students, came right over. But, it was too late. The student, who was not required to wear gloves, goggles, or an apron was badly burned. Permanent scarring.

In the law suit that followed, the student, who had been allowed to participate in the lab wearing her cheerleading outfit (just before practice), received about $35,000 in the out of court settlement.

The apron can be made for pennies in some foreign country. It can be sold for a dollar or two. But what's the value?

If you are not wearing the right personal protective equipment, it can be The Price Is Right.

… JAK

SOS Spring 2005

ANSI Z-87.1: The Multi-Hazard Standard

I was surprised to discover that some people believe that the ANSI Z-87.1 standard is simply an impact standard and that it refers to impact only. I could understand this if it were only some teachers. But the belief seems to be held by some safety professionals and
science /safety educators who teach teachers.

Is the ANSI Z-87.1 standard simply an impact standard that refers to impact only? I don't believe so. But, lets have a look.

In looking at the Z-87.1 (1989) standard itself ... The word "impact" does not appear in the forward or preface (1989).

The Scope and Purpose says, "This standard shall apply to those occupational and educational operations and processes where eye and face hazards (plural ... my words) exist. These include, but are not limited to, machining operations, material welding and cutting, chemical handling, and assembly operations."

The selection chart on page 16 lists five major types of hazards: impact, heat, chemical, dust, and optical radiation. So, it would seem fairer and more reasonable to me to consider the Z-87.1 to be a multi-hazard standard.

Well, let's not just have my opinion. What does OSHA think/say about this? The OSHA 29CFR1910.133 standard says…

"1910.133(a)(1) The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation."

And later ...

"1910.133(b) Criteria for protective eye and face devices."

"1910.133(b)(1) Protective eye and face devices purchased after July 5, 1994 shall comply with ANSI Z87.1-1989, "American National Standard Practice for Occupational and Educational Eye and Face Protection," which is incorporated by reference as specified in Sec. 1910.6."

Now, the important inference that I draw from this is that OSHA believes that the ANSI Z-87.1 standard is good for ALL of these types of hazards (not just impact). OSHA is suggesting that Z-87.1 is a multi-hazard standard.

What do you think? LSI would like to hear your opinion.

… jak

SOS, Winter 2005-6

Rules Agreements: Good, Better, and Best

What does it take to have a good rules agreements?

Well, you can't have a rules agreement if you don't have rules. And, we've argued for some time that the rules need to be in writing our it's just an oral tradition. Plus, the rules need to be enforced or it's just lip service.

Hint: rather than tell folks what you don't want them to do, make all the statements affirmative. Tell people what you want them to do.

How do we achieve agreement? We need to ask the other party, our students, our colleagues to agree. Do we want this to be verbal? Is that sufficient? I don't believe so.

The agreement needs to be in writing, signed, and dated (by both parties). The agreement should say more than that we agree to follow the rules. In fact, I believe there are four parts to a good, complete, and sufficient rules agreement.

First, the employee or student should acknowledge that they have read the rules. You wouldn't want them to claim later that they agreed but never actually read what they were agreeing to.

Second, the employee or student should indicate that they really did understand what the read. You wouldn't want them later to say that the read it but didn't really understand what the read.

Third, the employee or student need to indicate that they agree to follow the rules.

Unfortunately, this is where most rules agreements stop. There is an essential fourth component that is often missing. It's call the "realize."

The best rules agreements have four separate components in addition to the rules: read, understood, agree to follow, and the "realize."

The "realize" goes something like this.

I realize the my failure to follow the rules may result in my being terminated.

I realize that my failure to follow the rules may result in my losing the privilege to remain in this class.

Get it? There have to be consequences for not following the rules. No consequences … no rules.

Increasing numbers of schools, colleges, and employers are getting it (fortunately). And, they are adopting the four-part rules agreement.

Please take a look at your rules agreements and see how they measure up to the four-part standard.

If you are not currently using a rules agreement, please reconsider your position on this. It is an exceptionally good way to demonstrate that the organization is serious about health, safety and the environment.

… JAK

SOS, Spring 2006

Product Stewardship in Philanthropy Revisited

The Laboratory Safety Institute has launched a campaign to make college and university research programs safer. The campaign is based on a variation of the golden rule: "The one with the gold makes the rules!"

How can corporations and foundations insure that the dollars they give to research at colleges and universities will help to protect the health and safety of the researchers and their institution? They can establish a program of Product Stewardship in Philanthropy.

Product Stewardship is not a new idea. Some companies have had programs to ensure the safe use of their products for several decades. The concept was developed twenty years ago by the Dow Chemical Company. Today, increased numbers of companies have such programs. They want to be socially responsible by protecting the health and safety of their customers and of the environment, as well as prudent with respect to issues of liability.

The Laboratory Safety Institute's application of the Product Stewardship concept to research philanthropy is both new and simple. The corporation or foundation implements a program to ensure that their contributions are used to do research in a manner that protects and promotes the health and safety of the recipients and their institution.

A typical Product Stewardship program would consist of:

1. Requiring that research proposals contain thoughtful discussion of the related health and safety issues. This would be one of the selection criteria.

2. Conducting complimentary laboratory inspections for the grant recipients. The implication becomes clear that renewal is unlikely unless an acceptable standard of working conditions and practice is maintained.

3. Presenting complementary lab safety training seminars for researchers, research supervisors, and principal investigators.

The standard of safe research practice at corporate laboratories is significantly higher than at academic institutions. In many cases, the conditions in academic labs are deplorable and border on criminal negligence. An article in **The Scientist** (February 18, 1991) highlights the problems.

It's time for corporations to share their health and safety expertise through Philanthropic Product Stewardship. It's time to use the motivating force of their research grants to encourage improvement in health and safety practices. In return, a significant added benefit for the corporation will be that students hired from these institutions will have had better safety training.

The Laboratory Safety Institute is the only non-profit national center for training and information on lab safety issues. Originally located at Curry College in Milton, Massachusetts (1978-93), the Center has been described in the **Journal of Chemical Education** as "a national resource for safety conscious science teachers."

I see the Philanthropic Product Stewardship concept as a significant new approach to making health and safety an integral and important part of science education. It's sorely needed because, unfortunately, science faculty receive almost no training in lab safety. Surveys by our Center and others suggest that the accident rate in school and college labs may be ten to one-hundred times greater than in the chemical industry.

Perhaps then we would not be faced with the death of more than 75,000 people due to workplace accidents, illness and disease, nearly 100,000 accidental deaths and nine million disabling injuries each year in the United States.

In addition to assisting corporations and foundations with developing and implementing programs of Philanthropic Product Stewardship, the Center provides training programs in the fundamentals of lab safety and safety program development, operates an audio-visual lending library, and offers numerous publications on lab safety including a bibliography, safety guidelines, and a newsletter "Speaking of Safety".

The Laboratory Safety Institute's programs and services are made possible by the support of generous individuals and corporate sponsors including Dow Chemical Company, Union Carbide Corporation, Fisher Science Education and the National Safety Council's Foundation for Safety and Health.

For more information about Philanthropic Product Stewardship or the Center's other programs and services, contact the Laboratory Safety Institute at 508-647-1900

… JAK

SOS Spring 1991; revised Fall 2006

Karen Wetterhahn and Elizabeth Griffin – Ten Years Later

Karen Wetterhahn died ten years ago in June of 1997. When you ask the participants at our training program "Who is Karen Wetterhahn?" most have no idea.

Karen was the 48-year old chair of the Chemistry Department at Dartmouth College. In the fall of 1996, she spilled one or two drops of dimethylmercury on a latex-gloved hand. Seemingly unaware of the danger, she gradually became sicker and sicker. She slipped into a coma and she never regained consciousness before passing away in 1997.

As I recently reread the article that appeared in the Dartmouth College Alumni magazine about her death, I was particularly struck by one sentence. "But how could she have known this?" asked the article's author, Karen Endicott, referring to the danger associated with the one to two-drop spill.

When I first became aware of Karen Wetterhahn's death, many were asking the same question. I wondered too. I called the National Institute for Occupational Safety and Health (NIOSH) on their toll-free number, 1-800-35-NIOSH. I asked for everything they had on dimethylmercury. I asked if they had received any other request for this information recently. The answer … none

Within a few days, I received a free package of reprints, photocopies, and federal documents on dimethylmercury and related topics. As I read through the volumes of readily available and free for the asking material, I was stuck by the frequency with which the phrases "highly toxic" and "extremely toxic" appeared. And then, there was "use impervious protective equipment."

In my mind, the warnings were there. If you want to be sure that you have the right gloves on, you had better make sure. If you are handling materials that are extremely toxic you had better make very sure.

This means using glove manufacturers charts, tables, and data for glove permeability. It may mean contacting glove manufacturers to have permeability tests performed.

Similarly, few remember Elizabeth Griffin. She was 22 years old in 1997. She worked at the Yerkes Primate Research Center in Atlanta, Georgia. It's part of Emory University.

In the fall of 1997, Elizabeth was moving a cage containing a Rhesus Monkey which had Herpes-B virus. The monkey flicked something at her. Maybe it was feces, urine, saliva, or bedding. We don't know. What we do know is that she was not wearing any eye protection and it went in her eye.

Within three weeks she was very sick. Within eight weeks she was dead … the 40th person to die in the United States from exposure to Herpes-B virus from Rhesus monkeys.

At the time, similar questions were raised. Later, in an internet discussion group, one reader commented that "they were doing everything by the book."

I responded that in my "book" you need to wear eye protection. To which I received the retort that it's easy for you to sit there and say that.

I went online to the NIOSH website and looked up Rhesus monkeys and Herpes-B virus. Within minutes, I had located the full text of a 1987 article from the CDC indicating that with Rhesus monkeys researchers should wear glasses, goggles, and a face shield.

I responded to the discussion list that the problem was not that they were doing it by the book. The problem was that they were too lazy to read the book.

The deaths of Karen Wetterhahn and Elizabeth Griffin should never be forgotten. They are sad reminders that the time to really understand the hazard of the materials, equipment and processes is before, not after.

The Laboratory Safety Institute helps researchers throughout the world to understand the hazards and better evaluate the risks. We're always happy to answer questions and provide guidance. Sometimes organizations need more extensive assistance with this process. In these cases, they contract with LSI to provide these services. Please call (before) if you have a question about the hazards of what you are planning to do or want more information about LSI's hazard review services.

… JAK

SOS, Winter 2006-7

The "Thirty Years" War

This is not about that thirty-year war. It's about our thirty-year war. Who are we. We're LSI, the Laboratory Safety Institute.

The 2006-2007 academic year is the thirtieth for Laboratory Safety Institute. For the past nearly thirty years and spanning four decades, LSI has been fighting the battle for safety in science and science education.

LSI began at Curry College in Milton, Massachusetts during the 1977-78 academic year. I had just left the Dow Central Research New England Lab in Wayland, MA on a leave of absence to teach chemistry and coach soccer.

My interest in lab safety was born at Dow. The publication of the "Laboratory Safety Guidelines" by Dow and the request for 250,000 reprints in the first year suggested that we had struck a nerve.

LSI began with symposia on science safety topics. The symposia were followed by training workshops for science teachers, and an AV-Lending Library. Then, in 1987, LSI started publishing this newsletter, *Speaking of Safety*. This year marks the twentieth anniversary of the newsletter.

Thanks to the ERLAB Group (www.erlab.com) we were able to distribute 20,000 copies of the winter 2006-7 issue of the newsletter.

So, what have we learned in our Thirty-Years War? Four things!

First, we've learned that it takes incredible patience. As the Massachusetts Turnpike Authority billboard use to say at the entrance to the "Big Dig", "Rome wasn't built in a day. If it were, we would have hired their contractor."

We say it somewhat differently on page A-5 of our Laboratory Safety and Health Program Notebook with a quote from Jacob Riis:

When nothing seems to help, I go and look at a stone cutter hammering away at his rock perhaps a hundred times without so much as a crack showing in it. Yet at the hundred and first blow it will split in two, and I know it was not that blow that did it – but all that had gone before.

You need to keep trying over and over and over again. If you believe that there is need for a change to make it safer, healthier, and more environmentally friendly, never give up. Wind and rain wears down mountains. It just takes time.

Whether we train groups of hundreds or one at a time, every bit of progress counts.

Second, one detailed story about a lab accident is worth a thousand requests to put on your personal protective equipment. Over thirty years ago, I ask Howard Fawcett (one of the co-founders of the ACS division of Chemical Health and Safety) how with so little progress being made he could sustain his interest and dedication.

Howard said that all he needed to do was think back to that day in the mid-40s when, while working in a lab at DuPont, he went to lunch early. As he left the building, there was an explosion and black clouds of smoke followed him outside. Several of his lab partners were killed in the explosion.

Third, working safely needs to be a condition of employment.

When I was younger, I thought you could simply appeal to people's sense of caring about their own health and safety and the health and safety of others. Today, I still feel that this is very important. And, I do believe that you "catch more flies with honey than vinegar." However, when push comes to shove, if you can't lose your job for failure to follow the health, safety, and environmental rules, then the rules are just a nice idea.

The best EH&S programs are built on the foundation principle that working safely is a condition of employment.

Finally, the words of the "Wizard of Westwood", John Wooden, are as true today as they were 30 years ago: "Don't let what you can't do interfere with what you can do."

We all face barriers and obstacles in our lives. If we spend our time thinking about (worrying about) the barriers and the obstacles, we miss out on the opportunities to make progress in other places.

It seems like yesterday that LSI began at Curry. We've trained over 60,000 scientists and science educators. We've shared ideas and in the process learned much more. LSI's future is bright because of the dedicated staff, volunteers, board members, and you (our members and readers).

We're looking forward to the next thirty years.

… JAK

SOS Spring 2007

The Dean Martin (Paul Crocetti) Chemical Management System

1917-1995
(Joseph Levitch, 1926)

The Laboratory Safety Institute has inducted into its Hall of Fame a new Master of Safety, Paul Crocetti. No, we are not talking about the Dean of Arts and Sciences. We're talking about Dino Paul Crocetti, aka Kid Crocett, Dino Martini or Dean Martin, the singer - comedian (1917-1995).

Few people have been aware of his insight into chemical management or officially recognized the "Dean Martin Chemical Management System." To paraphrase Dino:

Every bottle needs somebody sometime. Every bottle falls and breaks somehow. Something in my heart just told me, that sometime it now.

So there it is. It's that simple. Every bottle needs somebody to be responsible for it.

If you would like to solve three of the major chemical management problems at schools and colleges, just follow Dean's advice for (1) new chemical purchases, (2) existing chemicals in laboratories and chemical storerooms and (the killer) … (3) departing colleagues.

New Purchases …

If someone wishes to purchase a chemical, they need to be willing understand how to (1) handle and use it safely, (2) how to store it safely, (3) how to dispose of it properly, and (4) how to clean it up safely if the whole bottle should drop and break. To signify their acceptance of this responsibility, they agree to have their initials placed on the incoming bottle and in the chemical inventory. In the case of "particularly hazardous substances", they agree to demonstrate their understanding in writing.

Existing Chemicals …

If a researcher or instructor wishes to either retain an existing chemical in the chemical storeroom or in their laboratory, they need to be willing understand how to (1) handle and use it safely, (2) how to store it safely, (3) how to dispose of it properly, and (4) how to clean it up safely if the whole bottle should drop and

break. To signify their acceptance of this responsibility, they agree to have their initials placed on the existing bottle and in the chemical inventory. In the case of "particularly hazardous substances", they agree to demonstrate their understanding in writing.

Departing Colleagues …

When someone leaves (for whatever reason), the chemical inventory is searched. A list is produced of all the bottles that have that individual's initials. Others in the department and at the institution are invited to assume the responsibility (see above … twice was enough). If they do, the bottle stays. If they don't, the bottle is set aside for appropriate disposal.

You will never again have the problem of unwanted and unidentified piles of aging and potentially dangerous (to safety, health and environmental compliance) again. Lab managers and EH&S personnel will be a little less likely to need to be "safety mom or safety dad" for their colleagues.

"Something in my heart just told me, that sometime is now."

Thank you Dino.

… JAK

SOS, Fall 2007

New Employee Safety Orientation (NESO)

I went to school for 25 years. Thirteen years in elementary and secondary school in southern Connecticut. I wanted to be a school science teacher.

Four years as an undergraduate in the Boston area studying chemistry at Tufts. I received my certification to teach high school science. I thought I needed a stronger content base to teach. Someone said go west young man, so, I went WPI in Worcester to graduate school for a master's degree in chemistry.

Six years later, no master's degree. I had a doctorate in organic chemistry. Then, I moved to the "other side" of Goddard Hall to be a post-doc for two years in the Chemical Engineering Department.

When it was all over on the 9th of June 1973, I went to work for the Dow Chemical Company in Wayland, Massachusetts as a process research chemist. A "funny" thing happened on that first day at Dow. My boss, Don Dix, spend the whole first day giving me a new employee safety orientation (NESO).

I learned more about health and safety that day than I had in 25 years of school. Scared the living daylights out of me. I thought I was going to die. Well, I guess I was mistaken. In fact, as time went on, I learned that I was safer and healthier at Dow than almost anywhere else. Why, because we paid so much attention to health and safety.

Trust me, it had relatively little to do with regulatory compliance, liability, and fear of bad publicity. It had a lot to do with learning the importance of and simply caring about not hurting yourself, anyone else or the environment.

How many of our readers had their immediate supervisor sit down with them on the first day and talk about the importance of their health and safety and the importance of working safely?

Not Human Resources. Not the Personnel Department. Not the EH&S folks. Your immediate supervisor. The person who was responsible for your performance review.

Not the first month. Not the first week. The first day.

I've asked that question of what is now rapidly approaching 100,000 scientist and science educators. Only five percent say yes. TODAY

Here's the bottom line. LSI believes that pound for pound and dollar for dollar that the new employee safety orientation is the single most important component in an effective lab safety program.

You can't argue it costs too much. You don't need either a purchase order or a requisition. You just need to decide it's worth doing and then ... do it.

If you would like a sample NESO checklist and a sample cover letter to be signed by your most senior on-site manager or administrator, they are yours on request.

… jak

SOS Winter 2007-8

Bowling In Trinidad

I've was in Trinidad for a week last July (2009) conducting lab safety training programs for the lab technicians at Atlantic LNG. When we arrived last Saturday evening, my wife and I were picked up at Piarco International Airport in Port of Spain and driven about two hours south to Point Fortin where the plant and their Guest House, Clifton Courts is located.

Along the way Marlen, the driver, pointed out the new cricket stadium that is being built in honor of their national cricket hero, Brian Lara. He set the international scoring records.

In Trinidad, bowling means something quite different than it does in the USA. However, our bowling and their bowling have something in common.

If you were to put a screen or curtain in front of the wicket or the pins, wouldn't it be downright unfair to the bowler. In some ways, this is exactly what we do with our employees.

For many years, I've been talking about the importance of New Employee Safety Orientation (NESO). I've asked over 65,000 scientists and science educators whether their immediate supervisor gave them a NESO on day one. Only five percent have said yes (and, it was no different here in Trinidad).

I've also been talking about the importance of including the words "safety performance". I always ask if these two critical words appear on the job performance review form. Again, most say no.

Atlantic LNG has a very good safety (EHS) program. As it was for me at Dow (1973), "safety performance" is not only on the job performance review form, it's the first item on the list.

Is "safety performance" on your organization's job performance review form? If so, where is it on the list?

As we were talking about these ideas in the class, I was thinking about bowling. I was thinking about how unfair it would be to put the screen in front of the wicket, in front of the pins.

Then, a new question occurred to me. When was the first time you got to see the job performance review form? I had a good hunch that I knew the answer. Everyone said, "When we had our first job performance review."

Hmm! This strikes me (no pun intended) a little like putting up the screen in front of the pin. Don't let the employees see the goal until their first evaluations.

Why not give out the job performance review form during the New Employee Safety Orientation?

Maybe I was just lucky. On my first day at Dow, Don Dix my supervisor, gave me a copy of the job performance review form.

Make the performance goals clearer by giving out the form on the first day. Lift the screen. Make it as fair as bowling in Trinidad or anywhere else for that matter.

… jak

SOS Fall 2009

The Student Whisperer

One of the ongoing challenges faced by academic institutions, both pre and post secondary, is getting students to wear their eye protection. You hear it all the time at our training programs.

"The students won't keep their goggles on." "They fog up." "They are uncomfortable." And, so it goes. All the "reasons" why it's not possible to get students to wear those things.

So what do they do? Some allow them to wear nothing. Some decide that safety glasses with side shields are an acceptable substitute because at least the students keep the glasses on.

Safety glasses are not acceptable for chemical splash hazards. Only safety goggles are. See the selection chart in the ANSI Z-87.1 standard and the OSHA 29CFR1910.133 which adopted the ANSI standard.

I'm not sure what prompted this but, I happened to be thinking about this challenge at a recent meeting, when The Dog Whisperer and Super Nanny popped into my head. Have you ever seen either of these?

They have a striking similarity. Although one deals with dogs and the other with children, the issue is the same, behavior. The dogs do not behave the way the owner wants. The child does not behave the way the parents want.

The other striking similarity is that the problem is never the dog or the child. The problem is the dog owner or the parents.

So, let's take a deep breath and get rid of the silly notion that the problem in the lab is the students. It's not. It's the teacher, the instructor, the TA, and the professor.

If we really want to get students to wear the proper personal protective equipment, we need instructors who are very comfortable saying, "This is the way we all do it here."

"It is the policy of our school, college, university. If you wish to remain in this lab, you keep them on. When you take them off it means you are leaving the lab."

"See? I'm wearing mine now all the time in here and I expect you to do the same. It's no big deal. Put them on and leave them on. If you would like to

take them off, prepare to leave the room. Under no circumstances will I tolerate anyone working or visiting in here without them."

"And, you will not be able to pass this course (or complete your graduate research) without them on."

Let's stop trying to treat the symptom and work harder at addressing the real behavioral problem. Need help? LSI is always happy to deliver this message in person (preferably to the senior administration in our Leadership in Safety seminar).

… jak

SOS Spring 2009

Eyewashes and Safety Showers in the Curriculum

Perhaps it shouldn't come as a surprise to me, but, I'm continually amazed at the number of scientists and science educators (science teachers and science faculty) who have never tried activating a safety shower.

In addition to the value of personally understanding how these devices actually work, there is the importance of their use as an integral and important part of the science curriculum. Students (of all ages) need to learn how to use safety showers and eyewash fountains.

A graduate student at the University of Heidelberg in Germany burned to death when he could not activate the safety shower.

It turns out that there are five different types of valves on safety showers. When would be the worst time to learn which type you have?

In the case of the German grad student (who happened to be on fire at the time), the safety shower had two chains attached to the valve lever - one to turn it on and one to turn it off. The "off" chain hung lower than the "'on" chain. In his panic, he pulled the "off" chain. He died from his burns.

In hindsight, it's pretty clear that having only one chain would be better. We'll figure out how to turn off the water later.

Speaking of turning off the water: where is the next value if the safety shower valve fails? When would be the worst time to find out? That's right, during a shower demo or test (and it turns out that the facilities manager is out for the day with the blueprints locked in the office).

So, before you test, demo, or activate the safety shower, ask the facilities director to identify the location of the secondary shut-off for the safety shower and eyewash fountains. Put the information on cards. Laminate the cards. Mount the cards on the wall next to the safety shower or eyewash.

Now, back to safety shower valves. I said there were five different types. The "on/off" lever is number one.

Number two works like the string that hangs from the ceiling to turn on a light bulb. Pull once to turn on and pull again to turn off.

Number three requires that you pull and hold it because it turns off when you let go. As an “amusing” experiment, tonight when you take off your clothes to go to bed, pretend that you are trying to keep the safety shower on with one hand and take off you clothes with the other. Not so easy!

The fourth type of safety shower valve is pulled once and about 20-30 gallons of water is delivered. Then, you need to pull it again for another 20-30 gallons.

Finally, there is five, which happens to be the best. Pull to turn on and push to turn off when you are finished.

As you can hopefully see, a little time taken to better understand how the safety shower works can pay rich dividends for teachers, students and future employees. This information belongs in the curriculum and students need to be involved.

The American National Standards Institute (ANSI Z-358.1) states that safety showers should be activated weekly and tested annually. Here’s how ...

Purchase or make a shower tester (it looks like one leg of the Jolly Green Giants hip waders with a handle). Get a large, water-tight, custodians barrel on wheels. Roll the barrel under the safety shower, place the large end of the tester around the shower head, and the bottom of the tester in the barrel. With full knowledge of where to go if the primary shower valve fails, activate the shower.

Every week, give a different student the opportunity to test the shower (as part of the lab curriculum).

OK … let’s talk about a more sensitive subject … modesty. In the last twelve months, how many of you (readers) said to yourselves in the morning, as you were getting dressed, “today would be a good day to go to work and strip naked in front of everyone!” Probably not many. And yet, that’s exactly what you might need to do if you were to spill concentrated acid on yourself. We’re much more concerned about modesty today than in the past.

In the past, you might have grabbed a student or colleague, hauled them under the shower, and helped them to remove their clothes. You probably would have received a thank you note. Today, we worry about whether we’re going to receive a subpoena for harassment.

Today, you need a written policy approved by your organization’s attorney and signed by the highest ranking official. The policy needs to be consistent with the recommendations of the American Red Cross and the American Chemical Society: Get into the safety shower in less than ten seconds and remove all contaminated clothing immediately. Otherwise, as Ricky Ricardo

used to say to Lucy, “Lucy, you got a lot of ‘splainin’ to do.” You are going to need to explain to the parents of the injured student, to their attorney, to the judge, and to the jury … why your way was better than the American Red Cross and the American Chemical Society.

Next, you need training for all employees in the policy. And, you need practice. However, remember that practice does not make perfect. It makes permanent. Practice with a good teacher/coach makes perfect.

Here’s one good way to practice and deal with the modesty issue. If you have a fire blanket in your lab (and if you don’t … get one), train your students or colleagues to get the blanket. One student holds one end up and the other holds the other end up in front of the safety shower to make a modesty curtain. Whoever needs to use the shower and whoever is going to help them can go behind the blanket. Afterwards, the “victim” can use the blanket as a wrap (for continued modesty and warmth).

By the way, do you have a drawer in your lab or department where you have a spare set of clothes in case someone’s clothes are ruined in an accident? Often, at the end of the year, the physical education department cleans out lockers and throws away sweat suits, socks, sneakers, etc.

Make up a laminated card with the following written on it: “You have just spilled concentrated acid all over yourself.” One, two, or three times a year, drop the card on someone and trigger the fire blanket drill. On that day, if you generate one or two fewer data points, cut one less limb off the frog, or complete one fewer 30 second phenolphthalein endpoint, you have said to your colleagues or students that their health and safety is more important than “making widgets”. You’ve made health and safety an integral and important part of the curriculum.

Alternatively to the fire blanket, some folks are installing large rings around the safety shower head and hanging a shower curtain that is held back by Velcro.

Safety shower units with such rings and shower curtains are readily available.

Now, let’s talk a little about eyewash fountains. The same applies to these as to safety showers. Many scientists, science educators, students, and lab workers have never activated an eyewash fountain. When would be the worst time to learn?

Here’s your assignment. Tomorrow, bring a towel to work and give it a try. But, before you do it, run the water for three to five minutes. Why?

Over 20 years ago, Argonne National Labs discovered that in five out of six eyewashes an amoeba, the Acanthamoeba, that can cause blindness was

growing at the air water interface. If they didn't flush for two to three minutes every two to three weeks, the blindness-causing amoeba would grow to a dangerous level.

The ANSI Z-358.1 standard recommends that eyewash fountains be activated weekly and tested annually. One of the reasons for the weekly activation was the discovery of the Acanthamoeba.

Now think about this for a minute. Have you ever been in the shower and gotten soap or shampoo in your eyes? Of course you have ... along with almost everyone else.

How did you react? You closed your eyes, rubbed them, did a little dance, and even perhaps said "expletive deleted"… four things that didn't really help remove the soap.

Where was the water? It was behind you, on, and tepid. All you had to do was turn and start flushing.

Now, imaging that you are in the lab: eyes closed, in pain, rubbing, dancing, and perhaps cursing. But now there is an additional element … furniture (everywhere). And, on the other side of the room is a device many of you have never used before. This is a recipe for a disaster.

You need a buddy. Not one but two. Your first buddy is the person closest to you who takes you by the arm and leads you to the eyewash. You don't have to find it. You just have to relax enough to be led.

The second buddy is the person closest to the eyewash. His or her responsibility is to turn on the eyewash so that by the time you get there, the eyewash is flowing properly and ready for you to use it.

Make up another laminated card. On this one write: "You have just splashed acid in your eyes." Drop the card on a colleague or student a few times a year and trigger the eyewash fountain buddy drill.

When do you want to be sure that you are going to get clean water out of your eyewash fountain? Probably, every time you use it! I've been in many labs where, notwithstanding regular "monthly" testing, the eyewash simply did not function properly. Therefore …

In the workplace or academic research lab, LSI recommends that each lab worker be assigned to the eyewash for one month. Every day when that lab worker arrives, he/she activates the eyewash (let it flow for 15-20 seconds) either into the drain or a bucket. Then you know that it worked this morning.

Besides delivering two even, gently arching streams that cross in the middle, the covers should remove automatically, the device should turn on in one second or less and remain on hands free, and be located 33” to 47” from where you stand. These are some of the criteria that the ANSI Z-358.1 standard suggests be used for the annual test.

In the science classroom, LSI recommends that the names of all the students in the lab be mounted on the wall behind the eyewash. Every time there is a lab, the next student is responsible to activating the eyewash at the start of the class.

Again, you are saying that being prepared to deal with an emergency situation is more important than “making widgets”. You are making health and safety an integral and important part of education and work.

… JAK

SOS Winter 2008-9

You mean it’s just a matter of priorities revisited

Leadership In Safety

An explosion of a research project at Boston University that sent a graduate student to the hospital and the death of a Texas high school biology student who drowned on a marine biology field trip were in 1993 and 1994 graphic reminders of the risks associated with school and college science laboratories.

The death of a biology professor at Cleveland State University and the severe burns to students in a lab demo gone wrong at Western Reserve Academy in 2005 are continuing and unfortunate reminders.

The Laboratory Safety Institute's (LSI) studies show that the accident rate at schools and colleges is 10 to 100 time that of the chemical industry and 100 to 1000 times greater than that of Dow Chemical or DuPont. As the nation's only international non-profit educational center dedicated to academic laboratory safety, we're often asked why this is the case. The answer is simple. Perhaps it's best told in the following story.

For over ten years, LSI had the privilege to work with Barbara Foots, Science Supervisor for the Houston Public Schools, and her colleagues in the Houston Independent School District. We provided lab safety seminars for their secondary and elementary teachers. We also conducted facilities inspections for nearly 75 junior and senior high schools in the district. The comprehensive inspection reports have included a buyers’ guide to facilitate purchase of supplies or equipment keyed to specific report recommendations.

In the fall of 1993, we added something new - Administrator Training. It's something I consider really critical. In fact, I think it's so important that we sometimes make it available for free in conjunction with our training, inspection, and program development services. We provide one to three hour safety awareness seminars for senior school district, college, and university administrators and senior corporate managers

I can't tell you how many times science teachers and lab employees have written on our seminar evaluation sheet under "additional comments" -- "I wish my principal, superintendent, administration, or management could hear this. Maybe then they would understand what we have to deal with here!" LSI agreed and a few years ago began offering these seminars for administrators and managers.

Other school systems, colleges, universities, and companies have taken

advantage of the offer. In the past year, Texas A&M (College Station), Bluefield State College, Franklin Public Schools, The Blake School (Minneapolis), The Campus Safety Health and Environmental Managers Association (CSHEMA), and the Texas Campus Safety Association have all made this training available to their “management” and members.

The sessions have been eye-opening for the administrators. They learn about their indispensable role in safety excellence - leadership. They become primed to do more to promote health and safety in their institutions and organizations.

But in Houston that October, something special happened. A group of principals gathered on a Thursday afternoon for a two-hour session on "Leadership in Safety". After about fifteen minutes of conversation, one of the principal's faces lit up, following what had arguably been an already too long and trying day and he asked, "You mean, it's just a matter of priorities?" I smiled and replied, "Yes, we can go home now!"

Well, we didn't go home. We all stayed for another two hours to underscore how important that one idea was. Jack Klugman says it in the movie. "When all is said and done - isn't it worth it!" We all find time in our lives for the things we feel are most important. Whether it's our faith, our family, our friends, our hobby, or our work, how we spend our time speaks for itself. What we do is our priorities. It's not the money that's critical. It's our time and how we decide to spend it.

The bottom line is that you don't have to spend a lot of money to have a great safety program. You just have to start spending your time differently. The good news is that you can start immediately. You don't have to wait. There are no purchase orders or requisitions to fill out. The bad news is that you are going to have to spend the rest of your life doing the work.

Today, the Leadership In Safety seminar is more important that ever. Have you ever wished that your administrators or managers cared more about environmental health and safety (EHS)? Have you ever wished they were more actively involved in the EHS program? Have you ever wished they would allocate more resources to the program? The Leadership in Safety seminar can help make your wishes come true.

I hope you'll want to arrange for a Leadership In Safety seminar for your administrators or managers. It won't be easy. Just like most of the rest of us, they never learned in school to care about health and safety, to identify hazards and provide protection, to create a safe and healthy learning and working environment. You'll need to provide them with this educational opportunity and convince them to attend. Your job is to "get them to the water". I'll "make them drink".

Maybe the light will come on again and some of your senior administrators and managers will say: "You mean, it's just a matter of priorities?"

I'll smile and reply, "Yes, it really is just a matter of priorities. We can go home now!"

… jak

SOS Fall 2008

Out of my Mind: Reflections on Lab Safety

For the past 35 years, I've been writing and lecturing on laboratory safety and how to create more effective lab safety programs. Most of the essays and articles have appeared here in this column.

LSI is pleased to announce the publication of a collection of these essays and articles. The title of the collection is *Out of My Mind: Reflections on Lab Safety.*

Here are a few of the themes, ideas, and highlights from the collection.

Give the Whole Rat

Unfortunately, we have far too many ways to tell folks working in labs that they're not doing a good job. And, we have far too few ways to reward good lab safety performance.

LSI created the "Oscar" of lab safety. A squeaky rat with a tag line: "We don't give a rat's rear for lab safety. We give the whole rat. Congratulations, you've just been ratted on. Now, it's your turn to rat on someone else."

What's the Acceptable Number?

Too often folks will say, "I've been here 15 years and we've never had a problem with that." That's really not the issue. The issue is … if you were to work in a lab for 40 years, what would be the acceptable number of times to have "X" happen? Like … glass in your eye or... falling over backwards into glass and sulfuric acid... or having a flask explode and the glass slit your throat and kill you. Most folks say zero.

So what are the simple and inexpensive steps we can take to make it less likely.

Snap, Crackle, and Pop

Those endearing Rice Krispies elves taught us an important lesson about good safety programs. They called one day to invite LSI to Battle Creek, Michigan.

Working safely needs to be a condition of employment. The best safety programs accept this principle.

In this essay, you'll learn how the R&D director at Kellogs encouraged the chemists to wear their eye protection.

Scared Safer

At our training programs, I usually tell numerous stories about lab accidents that resulted in serious injury or death. One such story involves a science teacher who was working alone.

The next day, one of the course participants came in to tell me I'd scared him so much yesterday that when he went into the lab last night he had taken his cell phone with him for the first time.

That's the whole point of the stories … to be scared safer.

I hope you'll enjoy the collection.

Contact Andrealee Burgess (aburgess@labsafetyinstitute.org) for more information.

… jak

SOS Spring 2008

The Same Old Question; New Answers

There's an old joke about a college professor who always used the same questions on his exams and only changed the answers.

Now the jokes on me!

Seven years ago, I was asked the question: *Which chemicals should we not have in our high school labs?*

My answer in the Spring 2003 issue of *Speaking of Safety* was "that's the wrong question".

Last October, Ken Konopa from West Babylon High School (NY) wrote:

We had a school safety presentation yesterday and now I'm wondering if anyone has a list of chemicals that we shouldn't have stored in schools?

It's the same old question. The answer is new.

Here's my start on the list:

1. The ones you did not use last year, didn't use this year, and have no plans to use next year.

2. The ones for which you do not understand how to use them safely.

3. The ones for which you do not have the facilities to use them safely.

4. The ones for which you do not have students with sufficient maturity to use them safely.

5. The ones for which you do not have plans in place to deal with the things which could go wrong.

6. The ones where the labels have fallen off, the bottles are cracked and growing beards, and the cans are corroded and leaking.

7. The ones that arrived white and are now colored or were solid and have become mush.

It was a good start. Edward McGrath, Science Supervisor at Red Clay Consolidated School District (Wilmington, Delaware) suggested two more:

8. The ones with three different labels.

9. The ones in baby food jars or bottles sealed with a wad of paper towel.

Well, that's a good start. You get the idea. Now, here's a simple five-step process to get control of your chemical inventory:

Five simple steps:

1. Make a list of all the chemicals which are currently used in your approved curriculum for experiments, lab activities, demos, and explorations.

2. Dispose of everything else.

3. If a teacher wishes to use a material which is currently not included in #1 above,

   a. Review the hazards of the material.

   b. Consider the types of chemical hazards and develop appropriate district inclusion criteria.

   c. Consider the proper storage, use, spill clean up, and disposal issues to help decide whether you have the experience, facilities, equipment, PPE, and sufficiently mature students to ensure that the educational benefits outweigh the risks.

   d. If the chemical would be considered a "Particularly Hazardous Substance" as defined by OSHA in 29CFR1910.1450 and as modified by your Chemical Hygiene Plan, require the chemical requester to document all the issues in #3c above in advance of the chemical order being placed.

4. Review the chemicals included in #1 to see that they all meet the criteria in #3b above.

5. If they do not meet these criteria, do not use them until the provisions of #3c and #3d can be met. If the criteria cannot be met, dispose of the chemicals.

LSI is often asked “which chemicals should not be used in schools?” There are millions of chemicals that are probably too hazardous to be appropriately and beneficially used in schools. It would be a very long list and never a complete one!

In fact, we still think it’s the wrong question. We think the right question is “which chemicals do you need to teach the science you believe should be taught?”

The five step process described above provides a simple method for selecting chemicals to include in your curriculum. It’s based on a very simple idea. Be responsible for understanding the hazards, proper storage, use, spill clean-up, and disposal of the chemicals used in your curriculum.

If you are unwilling to do that, you can rest assured that others will be happy to serve as your “parents” and tell you what you should and should not do, what you should and should not have.

Use only those chemicals for which you have the understanding, the experience, the training, the facilities, the PPE, the emergency equipment, and students with sufficient maturity so that the educational benefits outweigh the risk.

… jak

SOS, Winter 2010-11

The EHS Colonoscopy

Several years ago, a college in New England received a visit from the Environmental Protection Agency. The resulting notice of violation (NOV) listed several "opportunities for improvement." Fortunately, there were no fines imposed.

LSI was invited to visit the institution and to review not only its practices with chemicals but general occupational health and safety issues as well. I affectionately refer to it as giving them an "environmental health and safety colonoscopy."

Now, if you've ever had the pleasure of having a colonoscopy, you know that it's a rather invasive and uncomfortable look at your waste elimination system.

We look at how their chemistry department ingested chemicals (purchasing); digested chemicals (stored, inventoried and used chemicals); and excreted chemicals (waste disposal). Beyond that, we looked at a host of other occupational health and safety issues as well.

There were two interesting conversations during the visit: one with the dean and one with the chemistry department faculty. In the first conversation, we discussed whether faculty and staff should be responsible for the fines that result from violation of EPA RCRA regulations. The dean suggested that those would be fighting words. His comment prompted me to ask whether faculty and staff are responsible for their parking and speeding tickets when they go to institution-supported conferences.

Since then, I've learned that increasingly, institutions are doing just that. In one case, an eminent professor and principal investigator needed to take a second mortgage on his home to pay the $10,000 fine for improperly shipping hazardous materials.

In the second conversation, I was meeting with the chemistry department faculty to review the preliminary findings and recommendations from the visit. I suggested that it would be good if once a week each of the principal investigators would take a five minute walk through his or her research labs to look for health and safety issues.

One of the faculty members asked if they could hire someone to do that for them. I replied, "not if you want to have a leadership position."

It wouldn't take much more than a consistent five minutes a week of observing, praising, and coaching undergrad, graduate, and post-doc researchers to make it clear that EHS issues are important in this research group. And, if it should turn out that after a reasonable amount of time, one of them still does not get it … well, maybe a dose of discipline would be in order.

One of the results of the visit was "The Golden Rules of Chemical Waste Disposal." It's an 11" by 17" Poster with 13 suggestions on how to obey the RCRA regulations and avoid EPA fines. Copies are free for members.

… jak

SOS**,** Fall 2010

Unprotected Science

Students, teachers, lab workers, and scientists throughout the world are engaging in “Unprotected Science”. Unfortunately, they are paying a dear price for their lack of precaution.

A recent article in the New York Times by Andrew Pollock and Duff Wilson is titled “Safety Rules Can’t Keep up with the Biotech Industry.”

The article mentions how a Agriculture Department researcher spent a month in a coma caused by an e. coli infection; a scientist working in a New Zealand lab lost both arms and a leg following a meningococcal infection; and a University of Chicago scientist died last September following exposure to plague-causing bacteria.

The article reports on a 1979 to 2004 study of lab infections which resulted 36 deaths. This would include the widely publicized and discussed death of Elizabeth Griffin at the Yerkes Primate Center. Other reports show approximately 500 lab-related deaths during the past century from about 8,000 lab-acquired infections.

The Biotech industry is not alone. Schools, colleges, universities, hospitals, R&D and Forensic labs all have their fair share of problems.

The pattern is clear … All were not properly protected. All were engaged in science and science related activities with inadequate protection.

Whether it was Karen Wetterhahn at Dartmouth who wore the wrong glove, Dennis Park at Thiokol who was not wearing a face shield, or the eleven students at Western Reserve Academy, all were inadequately protected.

Engaging in “Unprotected Science” is asking for trouble. And, it’s about to become more expensive. In the past, the average fine was $1,000 for a serious violation, one that could cause death or serious injury. The maximum has now been increased from $7,000 to $12,000. The penalty for willful violations has been increased from $70,000 to $250,000.

According to the National Association of Manufacturers, workplace illness and injuries have increased 54% since 1994. Deaths, they say, have increased 38%.

Employers are responsible for providing safe and healthy places to work and learn. Employers are responsible for ensuring that all the hazards in the

workplace are identified, for selecting appropriate safety equipment and facilities, and for ensuring that they are properly used.

The time has come for every employer to clearly designate their employee who is responsible for ensuring that this important work is done.

The time has come for all administrators, supervisors, and managers to clearly understand their responsibility to enforce their organizations' health and safety policies and procedures.

… jak

SOS, Spring 2010 …

Dieting and the Chemical Hygiene Plan

The warning signs were everywhere. First, the belt started to feel snug. So, you moved the buckle into the next hole.

Then, there was the difficulty in getting the pants to button. So, you went out and bought the next size larger or the ones with the little elastics hidden in the sides (they're my favorite).

The truth was unavoidable. Over the years, you manage to pack on a few extra pounds or ten or twenty. Admit it. You're not the same size 8 or 10 you were in 1990. Well guess what? Neither is your Chemical Hygiene Plan.

Since many were born in the early 90's, they have been packing on the pounds too. What started out as a 25-40 page bantam-weight, is now weighing in at 100-140 page unlimited heavyweight.

It's time to put your Chemical Hygiene Plan on a diet. Particularly, if you would like anyone to take the time to read, understand, and agree to follow it (while hopefully realizing that failure to do so can have career changing consequences).

Ok. What's it going to be? Scarsdale? SouthBeach? Weight Watchers? Nope. You need LSI's breakthrough CHP Flab Roller!

LSI's CHP Flab Roller is designed to suck the fat out of your plan in twelve easy steps… one for each month.

Like any good weight loss and fitness program, you need to do some warm-up before you get to the more strenuous exercise.

One of the places where CHPs pack on some pounds is when policy and rules get mixed with instruction and training. I would recommend saving the latter for your training programs and training materials. The CHP is not intended to be a tutorial teaching you why colligative properties affect vapor pressure, boiling point, freezing point and osmotic pressure. And yes, I have seen this on one CHP.

One of the huge advantages of having an electronic CHP is that you can create hyperlinks to all the tutorials and explanations. In a written CHP, you can refer to a companion tutorial document.

Want to lose more weight? All you need to do is push yourself away from the table. Your CHP can do the same thing. Push all those tables, charts, and lists that are not absolutely essential into appendices (with hyperlinks) or into the tutorial document.

The next step is to both maintain the weight loss and improve understanding. For your Chemical Hygiene Plan, this means focusing on its most important aspects.

Think about the eight required elements in a CHP …

1. Standard operating procedures.
2. Determination and implementation of control measures.
3. Ensuring that fume hoods and safety equipment are functioning properly
4. Information and Training
5. Circumstances requiring prior approval
6. Medical consultation and examination
7. Personnel responsible for the implementation of the CHP
8. Additional precautions with particularly hazardous substances.

These are the eight required elements in a chemical hygiene plan. The employer needs to describe how all of this are to be addressed.

LSI recommends that you work with your chemical hygiene committee (if you have one) to identify the information in your plan that is relevant to these eight areas/elements. Then divide this information into twelve roughly equal size portions.

For each of the portions, ask a member or members of the committee to create a roughly one page summary. The goal here is to reduce the size of the document to twelve one-page summaries. The summaries can be filled with hyperlinks to the relevant sections of the CHP.

The twelve, one-page summaries now comprise a slimmed down and concise version of your plan. All the most important issues are highlighted with hyperlinks to the rest, as well as to supporting information.

Using the twelve, one-page summaries, create a dozen 11” x 17” posters summarizing the most important points. Post one poster each month on your lab safety bulletin board.

Congratulations. You've slimmed down your chemical hygiene plan removing the tables, charts and tutorials. You've created a concise twelve page summary and a set of companion posters. And… your colleagues will have a monthly reminder of your organization's most important chemical purchasing, storage, use, disposal and clean-up procedures and practices.

… jak

SOS, Winter 2009-10

The Language of Safety

James Thurber, in *Further Fables for Our Times*, wrote a great collection of more contemporary fables. One had the title: The Weaver and the Worm.

The weaver watched the worm making silk. He walked over and said: what do you think your doing? The worm replied: you want to make something out of it.

They went their separate ways never understanding the other.

The moral was that a word to the wise is not sufficient if nobody knows what it means.

This brings me to an incident in Oklahoma in the early 90's where a high school science teacher left a bottle of potassium cyanide out on the lab bench for a week and a student stole.

With a second student, they mixed the KCN in a beverage and dared a third student to drink it. The third died and the two others were arrested on homicide charges.

One pleaded guilty and got fifteen years. The other pleaded innocent and was found guilty. He appealed (I don't know to what result.

The family of the deceased sued the teacher and the school alleging negligence in the storage of hazardous materials. The case settled out of court for an undisclosed amount.

In the student's testimony he stated that he did not know what the word "Lethal" meant on the bottle. I found this hard to believe so I conducted an experiment with my college organic chemistry class of sophomores, juniors and seniors.

I walked into class, gave them a blank sheet of paper, and silently wrote the word "Lethal" on the board. Then, I asked the students to define the unspoken word.

To my surprise and enlightenment, four of the eight students (nice to have small classes!) got it essentially wrong. The other four got it varying degrees of right, but not perfect.

Wow. Thurber got it exactly right.

What good is putting a warning on a container if nobody knows what it means? What does this say about the assumptions that we make concerning what people really know and understand? What about reading MSDSs?

In the last few years, I've been putting more emphasis on reading MSDSs. What I'm finding is that in schools, colleges, universities, industry (you name it) is that people do not understand the language.

For example, flammability limits, auto-ignition temperature, flash point, detonation, deflagration, pulmonary, edema … the list goes on. And, the list gets longer when you start looking at the alphabet soup of acronyms.

In one of LSI's three day courses, a participant counted and made a list of 67 that I had used during the course. Subsequently, I prepared a three-page master list as a course supplement.

LSI will be happy to send you a copy of the three-page list of course acronyms. Requests should be sent to aburgess@labsafetyinstitute.org.

And that's not all. (Tell them what else they get.) In the resources section of LSI's website is a gigantic list of occupational health and safety acronyms.

All of this, however, begs the larger question. What are we going to do about lab safety literacy?

First, don't assume that people (students or employees, including those with letters after their last names) understand the language.

Second, have a periodic vocabulary quiz.

Third, sometimes only provide the unspoken word.

Fourth, … don't assume.

… jak

SOS, Spring 2011

A Modest Proposal

A member of our Board of Directors was recently interviewed for an article in a laboratory magazine. In preparation for the interview, he sent me a dozen questions that the interviewer had posed. Being new to LSI's Board, he wanted to know what I thought.

One of the questions was my favorite: "What is the biggest challenge that you face in lab safety?" My answer for many years has been convincing people that you are serious and that it's important.

On reflection, it occurred to me that we might want to try the following approach.

1. Let's require everyone who is starting out the take a course of classroom study.
2. We can require both a written and practical examination.
3. Then we can provide a permit certifying the individual is competent to enter the lab and proceed with work.
4. As a reminder, we will post warning signs.
5. Every few years we'll require the permit to be renewed.
6. Just in case there are some who don't want to follow the rules, we probably should have someone be responsible for enforcement and discipline.

So what do you think? Is this a good plan? I'm not so sure!

This is pretty much what we do with automobiles. How's it working? Not so hot in my opinion. And, regrettably, society has come to accept 35,000 to 45,000 deaths a year as "normal".

So, is it really reasonable to expect that people will behave significantly differently in the laboratory than on the highway. Probably not.

For our part, LSI, partly in response to the tragic death of Michelle Dufault at Yale, created The Lab Safety Memorial Wall. The wall is inscribed with the names of those who have lost their lives due to lab accidents. There are over 300 names.

The Laboratory Safety Memorial Wall can be viewed on the LSI website resources page. … http://www.labsafetyinstitute.org/MemorialWall.html

We hope that this graphic reminder, like the white crosses and flowers along the highway, will serve to heighten our awareness about health and safety in the lab.

Ultimately however, it is the actions or inactions of administrators and management that will make the biggest difference. The dogsled can't go any faster than the lead dog.

First line supervisors, teachers, faculty, principal investigators, etc., must assume the responsibility to for the health and safety of those who report to them. They need to make the importance clear in their new employee orientation and everyday thereafter.

If the rules are not going to be followed, it is the supervisor who needs to provide the discipline (up to and including termination).

Now there's a modest proposal.

… jak

SOS, Fall 2011

Pregnancy and the Laboratory (Revisited)

Introduction

Sounds a little like Peter and the Wolf or Snow White and the Seven Dwarfs. It's not.

It's not a fairy tale and it's not a story set to music. It's a topic that keeps coming up over and over and over.

There is seemingly no end to the number of times this subject appears on the LABSAFETY-L, SAFETY, NAOSMM, and other internet discussion lists.

I first became interested in the subject when I started working at Dow nearly forty years ago in 1973. In the early eighties, I organized a symposium on Reproductive Hazards in the Workplace for an ACS National Meeting.

Very often, when the subject is raised on the internet discussion lists, the question goes something like this: What should we do about pregnant students (or employees) in our labs?

The answers come in a variety of forms that ring very close to the emergency response system in many cities and towns. But, more on that later.

Readers will then describe how they have (1) placed a warning in the course description in the catalog, (2) added a warning in the syllabus for the course, (3) posted a warning sign on the door to the lab, and (4) given the students a list of the chemicals used in the lab and advised them to consult with their physician.

Back to those unnamed cities and towns where under extreme emergencies they announce a code YOYO… You're On Your Own!

That's enough. I can't take any more! Stop pushing the responsibility onto the student (or employee).

The United States Supreme Court in the Johnson Controls decision (if I've got it right) said that it is the responsibility of the employer to provide the employee (and her unborn child) with a work environment that is reasonably free from recognized hazards.

Get it?

It's time for academic institutions to stop hiding and to take responsibility for providing laboratories in which to work and learn that are reasonably safe for the mother and for her unborn child.

By the way, if I hear one more time that students are not employees … enough!

Critical Steps

Here are a dozen critical steps organizations can take to create a more reproductive friendly working and learning environment:

1. Create a chemical inventory
2. Compare your inventory to the Oak Ridge National Laboratory list of "particularly hazardous substances".
3. Flag all the chemicals in your inventory which are reproductive toxins, select carcinogens and highly toxic substances.
4. Think very carefully about whether you really want to continue using these substances.
5. Identify less hazardous alternatives that can produce similar results.
6. Make sure your chemical hygiene plan is up to date and revise the section on "particularly hazardous substances".
7. If you work in one of the 16 states that does not require following the OSHA lab standard (AL, AR, CO, DE, GA, ID, KS, LA, MA, MS, MO, MT, NH, PA, SD, or TX), do it voluntarily (or don't use these substances). You must have a clearly written plan detailing how this work will be done safely.
8. Consider carefully whether your organization's employees have the background, experience, necessary facilities, and students of sufficient maturity to use the particularly hazardous substance(s) with the appropriate degree of precaution..
9. Create a designated area where these substances will be used.
10. Provide training in the use, storage, disposal, cleanup, and emergency procedures.
11. Require prior approval (as outlined in your chemical hygiene plan) of every experimental protocol (protocol change) involving particularly hazardous substances.
12. If after all these precautions have been taken, the employee or student is not comfortable with the risks associated with working with particularly hazardous substances, provide an alternative and less hazardous assignment.

… jak

SOS Fall 2004, Revised 12/08/11

Enforce the Policies

In July, I attended the National Association of Scientific Materials Managers (NAOSMM) conference and exposition in Minneapolis. LSI provided two pre-conference-day professional development courses (Lab Safety and CHO). This was the 14th time that LSI has participated. It's a great meeting and a super organization. I would encourage all lab managers to join. Visit www.naosmm.org for more information.

The presentation this year was on *How to Create A More Effective Chemical Hygiene Plan (and other old standards)*. In part, we were celebrating the 20th anniversary of the deadline for developing and implementing the chemical hygiene plan (CHP). The CHP is the centerpiece of the OSHA lab standard, *Occupational Exposure to Hazardous Chemicals in Laboratories*, 29CFR1910.1450.

At the conference , the conversation and questions were animated. We ran out of time before the topic got the full discussion it deserved. I thought I would prepare the following summary for both *NEWSLINE* (the NAOSMM newsletter) and LSI's *Speaking of Safety*.

Here, in no particular order, are 17 suggestions for creating a more effective chemical hygiene plan (and program).

1. Enforce the policies. If you don't enforce your chemical safety (and other) policies, you don't have policies; you have lip service. Adults will eventually figure it out that you are just bluffing and then they will do whatever they like. Working safely needs to be a condition of employment.

2. Describe everyone's responsibilities. Start at the top of the organization and work your way through all the major levels in your management "food chain". The chemical hygiene officer's (CHO) responsibilities belong here as well. Remember, the dog sled can't go any faster than the lead dog.

Don't forget to include your students. You can't adequately protect your faculty and staff when you've got 20-30 students following a lower standard of care. And, if faculty and staff need to observe OSHA PELs (ACGIH TLVs and NIOSH RELs), how do we justify exposing students to higher levels.

3. Enforce the policies. Oh yeah! I said that already (wink).

4. Serve as an advisor. The CHO is not a cop. There is nothing in the definition of a CHO that says enforce. It says assist with the development and implementation of the CHP. Enforcement belongs to the supervisor, not the CHO. Supervisors give praise, bonuses and promotions to their employees. Faculty give praise and grades to their students for their work and behavior. They are the ones who need to enforce the rules and discipline their supervisees if necessary.

5. Create a rotating CHP review team. The CHP is supposed to be reviewed at least annually and revised as needed. Every year appoint a new team of four to ten employees (depending on the size of your organization) to do the CHP review.

Ideally, everyone who is covered under the plan will do this once every five to ten years.

This is much better than having the same folks do it over and over and over until they turn blue in the face. Make it everyone's responsibility. Include some students to enrich their education and make them more valuable (and safer/healthier) future employees.

Invite all the members of the review team to a CHP review luncheon to discuss their ideas (on a full stomach). Ask a very senior manager/administrator to send all the "volunteers" a thank you note.

6. Enforce the policies. Oops!

7. Create a lab safety bulletin board. Every month (or week, or …) post a brief (large font) summary of a section of your CHP. Why wait for the refresher training? Make the bulletin board a passive learning center. Also include accident stories, off-the-job safety information, the emergency procedure of the month, and the MSDS of the month.

8. Pay your CHO. This is not a volunteer position. It is a federal or state requirement. Provide release time. Provide reduced load. Provide appropriate overtime or additional compensation. This is should not be a volunteer position.

9. Define the CHO's time commitment. The CHO and her/his supervisor need to have a clear delineation of how much time the CHO is expected to spend per week or month on the CHP/CHO responsibilities. Any misunderstanding here leads to problems. Once management/administration has decided how much manpower resources to allocate to this position, there can be a better understanding of what can reasonably be accomplished. The tasks that can be reasonably completed in the available time can be defined and the CHO can be fairly evaluated.

Any compliance tasks that cannot be completed are management's responsibility, not the CHO's. Management is responsible for making business decisions on how to allocate resources and how much compliance it wishes to have and at what pace.

10. Summarize prior approvals. One of the required parts of a CHP is to describe the circumstances that require prior approval. Some plans list them all in one section. Some like to include them throughout the document.

LSI recommends that if such information is spread out throughout the CHP that you have a separate major section of the plan that briefly lists all the prior approval circumstances and refers the reader to the appropriate section where they are described in more detail. If your plan is electronic, make it a hyperlink.

11. Require prior approval for new PHS. The OSHA lab standard asks the employer to describe the additional precautions that should be taken when working with "particularly hazardous substances" (PHS). LSI recommends that prior approval be obtained for both purchasing new PHSs (ones not currently in the inventory) and using ones you have never used before.

12. Review eye and face protection language. Make sure that the CHP is clear about the types of eye protection that should be used. Only ANSI Z-87.1 compliant indirectly (or non-ventilated) cover goggles are appropriate for protection against chemical splash. Face shields are used only in addition to eye protection, not instead of. They protect the rest of your face and throat. Face shields are not primary eye protection.

13. Distinguish between "must" from "should". The plan needs to clearly indicate those policies and practices over which the plan users have no discretion. They must do it that way. Other policies and practices may offer some user discretion as how to best proceed. These latter policies contain the word "should".

14. Separate policy from instruction. The CHP should focus the reader's attention on when he or she needs to do. LSI recommends that all the instructional information and explanations of why we do it this way be placed in a separation document. If your plan is electronic, there can be a hyperlink to the explanations and instructions.

15. Identify your occupational medicine provider. The employer should have its own occupational medicine provider/clinic where employees can be seen by professionals who understand chemical exposure. Their name, address and phone number should be in the plan.

16. Develop the CHP together. Employee/faculty/staff acceptance of the CHP will be greatly enhanced by their involvement in the creation of the plan. Invite their participation.

17. Enforce the policies. OK. Enough!

Good luck with your CHP. LSI assists organizations with the development and review of chemical hygiene plans.

Please call or email if you have any questions. … **JAK**

SOS Winter 2011-12

"Whose Line Is It Anyway?"

Do you remember Drew Cary's comedy show with Ryan Stiles, Colin Mochrie, and Wayne Brady? "Whose Line Is It Anyway?" I was thinking about it last month as I was talking to a group about personal protective equipment (PPE). The OSHA general requirements for PPE are found in 29 CFR 1910.132.

Here's one of several important sections: hazard assessment:

1910.132(d) Hazard assessment and equipment selection.

1910.132(d)(1) The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, the employer shall:

1910.132(d)(1)(i) Select, and have each affected employee use, the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment;

1910.132(d)(1)(ii) Communicate selection decisions to each affected employee; and,

1910.132(d)(1)(iii) Select PPE that properly fits each affected employee. Note: Non-mandatory Appendix B contains an example of procedures that would comply with the requirement for a hazard assessment.

1910.132(d)(2) The employer shall verify that the required workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment; and, which identifies the document as a certification of hazard assessment.

I want to focus on the part that says: The employer shall assess the workplace to determine if hazards are present.

Ok, you've been patient. Here's the punchline … "Whose Job Is It Anyway?" I have the sinking feeling that at many organizations it is not the least bit clear whose job responsibility this is. When I speak with folks working in labs, they have no idea.

Normally, when an employer has a job that needs to be done, the employer will hire an employee, list the job responsibilities in the employee's job description, and pay them to perform these duties.

Want to have some fun, visit your HR director and ask whose job description covers workplace hazard assessment.

By the way, if you want to see that this is accomplished in one of the worst possible ways, try this. Ask each PI and faculty member to do it for their research or course. You might end up with 10, 50, or 500 different ideas about what's needed for PPE with concentrated nitric acid.

The risk for the entire organization is being assumed by the employer itself. Therefore, LSI recommends that the organization designate a specific employee with the authority to establish minimum guidelines for health and safety including the selection of PPE.

In many organizations this might be the director of environmental health and safety. Others my feel it's more appropriate to have it be the decision of a committee. Regardless of how it is done, it is critical that assignment of the responsibility be clear and that it is not a free-for-all that's justified in the name of "academic freedom".

How is it being done at your place? Please drop us a line to let use know how it's going. Don't forget to sign it so we know "Whose Line Is It Anyway?"

…. JAK

SOS Fall 2012

The King and I

Richard Rodgers and Oscar Hammerstein II wrote and composed the classic stage musical, “The King and I”. Remember Yul Brynner as the King and Deborah Kerr, who played Anna in the movie version of the show.

The musical was based on the 1946 drama film, “Anna and the King of Siam”, which starred Rex Harrison and Irene Dunne.

Well, that was Siam (now Thailand). I’m actually talking about Saudi Arabia! And the King? I’m talking about the King Abdullah University of Science and Technology (KAUST) in Jeddah.

And Anna… we’re not talking about her either. In this case, the “I” is the internet.

I just spent the last week (February 2012) in Jeddah, Saudi Arabia at the King Abdullah University of Science and Technology.

By chance, I happened to sit in yesterday morning on the University’s new-employee orientation. Before Paul Hutter, the Manager of EHS, spoke, there was a gentleman, Roger Larson, talking about Internet Use Privileges. Roger is the Vice President for Information Technology.

What Roger told the new employees was pretty simple and straight- forward. If you violate the rules, it can cost you the right to use the University’s internet facilities. The next morning at about 4AM, I woke up thinking about what he had said.

Everyone cheerfully accepts the notion that the use of the University’s internet facilities is a privilege. Break the rules and lose the privilege.

Here’s KAUST’s policy: http://www.kaust.edu.sa/footer/termsofuse.html.

What about Texas? Texas Tech’s is very similar: http://www.net.ttu.edu/eraidershim/bn_game/.

How about Alaska? Here’s what the Regents say at the University of Alaska System:

B. Violations of the standards for user conduct:

1. may subject employees to disciplinary action including termination;

2. may subject students to disciplinary action including expulsion according to

the Student Code of Conduct procedures; and

3. may also subject violators to criminal prosecution.

I'm sure you can see where this is going.

What about the use of an academic institution's laboratory facilities? Is there really such a big difference between internet privileges and laboratory privileges?.

Maybe the similarities need to be made clearer. Break the rules … lose the privilege.

What do you think? Please call or email to share your thoughts.

SOS Spring 2012 … **JAK**

Safety As A Second Language

For the past several years, I've been concerned that scientists, science educators, lab workers, and lab supervisors do not understand the Language of Safety.

In conversations with people throughout the world, I find a lack of comprehension of some of the most basic lab safety vocabulary. Here's an example.

I was a university in the United States talking to 15 departmental chemical hygiene officers. I was planning to give them a lab safety vocabulary test. On reflection, I decided that it would be too embarrassing. So, I settled for putting 15 words on the white board.

I asked the group: "Are there any words here with which you are not familiar?" Everyone put his or her hand up. To his everlasting and endearing credit, the first hand up was that of a full professor (and department chair) who had attended because he was interested.

We went through all the words and discussed them. When we had finished, I said: "Now I need to tell you a little secret. All if these words are from the MSDS (SDS) of Methanol.

If you don't know the words, how can you understand the MSDS? How can you understand the warning?

At another institution, I read from an MSDS that it caused "pulmonary edema". None of the ten industrial lab workers understood either word.

And, there is another aspect to this dilemma. At a college this summer in discussing my concern about the language of safety, one of the participants recalled fondly the words of her high school English teacher.

"If I know words that you don't know, I can think thoughts that you can't think."

What's to be done? Let's offer a course in Safety as a Second Language! It's not different from learning French, Spanish, German or Italian. You must learn the vocabulary

In the absence of such courses, here are some simple suggestions:

1. On your departments (research groups) lab safety bulletin board, have a section devoted to vocabulary. Every time you find a new word, write it on a 3x5 index card, put the definition on the back, and post it. When there are 25 new

words, the department chair (or PI) needs to treat everyone to ice cream. The chair or PI need to post the first word!

2. Join LSI in creating a free, online lab safety dictionary. There's more about this 2013 initiative on the last page of the newsletter.

3. In future issues of SOS, we'll include a vocabulary quiz so you can test your LSIQ. Please submit the vocabulary quizzes you create.

4. Produce a deck of lab safety language flash cards with words on one side and definitions on the other. Study them!

Mark my words (sorry). If you'll do any one of these faithfully, you be on your way to a safer and healthier science in 2013. …. JAK

SOS Winter 2012-13

A National Academic Lab Safety Award

At universities throughout the United States, EHS departments send the lab safety staff to inspect research laboratories. They come with checklists, handheld devices, and tablets— all designed to identify and record violations and to facilitate providing a report of conditions and practices that don't measure up to university policy.

It's time to change the paradigm.

It's time to balance some of the "what's wrong" with "what's right". How about a little praise? How about saying thank you?

The Laboratory Safety Institute is creating a national award for the Academic Principal Investigator whose research group has the best lab safety program.

Our plan is to ask Environmental Health and Safety departments at universities to nominate the PI at their institution with the best lab safety program.

We recommend that they pick the best one every month and then have their Provost send a letter of praise and a certificate. At the end of the year, we would like their university's President to invite all twelve winners and their research groups to a lab safety program recognition luncheon. The best of the twelve is presented with an award and is nominated for the LSI National Award.

What is the simplest and expensive award that you can give an employee and that does not require a purchase order or requisition? It's a simple "Thank You".

We need more opportunities to say "Thank You". This National Award will be a wonderful way to do it. And if LSI can identify a generous sponsor, we would like the award to include a prize of $10,000.

Half the prize will be given to the PI and the other half to the nominating EHS department. The funds must be used to improve the lab safety programs in the research group and in the EHS department.

Each of the recipients will be expected to provide a written report within one year outlining how the funds were used.

The laboratory safety program components and their evaluation criteria are published in LSI's "Audits and Inspections: a summary of recommendations and program review criteria". There are 33 program components on the program audit checklist.

An independent panel of judges from industry, professional organizations, and government (depending on the discipline of the researchers who are eligible for the award) would review the submissions and visit the labs of the finalists.
As LSI continues the celebration of 35 years of working to improve safety in science and science education, this awards program has the potential to make a lasting and significant impact on the growth of the culture of safety in academia.

We hope you will encourage your academic institution to participate and your company to consider becoming an award sponsor.

Your comments and suggestions are welcome.

SOS Spring 2013

The Power of Praise

Late one evening I was flying back to Boston. The flight attendant offered me a beverage. When he handed me my diet Sprite, I said “Thank you”. He looked at me and replied: “I’ve been flying since this morning and you’re the first person who has said ‘thank you’.”

I found that pretty disheartening to think that you could provide good service for any entire day and no one could muster a single ‘Thank you’.

A few years later, I was invited to speak at “LabTech2008” in Bahrain. It’s a lab conference and expo for middle east countries. I met many wonderful folks from Saudi Arabia, Qatar, Jordan, Oman, and more.

KLM was one of the major sponsors of the conference. They provided complimentary flight tickets for the keynote speakers.

When I went to the exhibit hall on the first day that It opened, I saw the KLM booth. I walked over and introduced myself to a young man and thanked him for the plane tickets. He said: “You are welcome”.

Two years later, I was invited to LabTech2010 which was again at the Gulf Hotel in Bahrain’s capitol city, Manama. This time I bought the tickets myself and was later reimbursed by the conference.

When I entered the exhibit hall, I saw the KLM booth. I walked over to see what they were doing.

A young man got up and walked toward me smiling. Unfortunately, I did not recognize him. I said, “hello” and he replied, “I know you.” I said, “You do?” He replied, “You were the only one who thanked us for the plane tickets!”

Whether it’s a fifty cent can of soda or a $2,000 plane ticket, people appreciate it when you say thank you. In both of these cases, it’s hard for me to imagine that it is seemingly so rare. What’s your experience?

When it comes to the workplace, surveys consistently have shown that being appreciated for the work you do is one of the highest ranking factors in job satisfaction (often ahead of pay).

So, if you are wondering how you can motivate others to pay more attention to health and safety, think about praise.

Give more compliments for good safety performance. Say “Thank you” for getting it right. Try more carrots and fewer sticks.

Identify the best lab of the month and ask the dean or provost to send them a thank you.

Remember the power of praise.

SOS Fall 2013

The LSI Story

I went to school for 25 years (elementary, secondary, college, graduate, and post-doc). Forty years ago (June 9, 1973), I went to work for the Dow Chemical Company (Wayland, MA). On that first day, I learned more about safety than I had learned in 25 years in school.

My supervisor, Don Dix, spent the whole day doing nothing but talking about safety; about my health and safety. Why did he need to spend so much time talking about safety? I thought, this must be the most dangerous place in the world. What I came to realize was that there is no magic to safety, just brute force paying attention.

Either you decide to pay more attention to safety or you don't. If you do, you get better at it. If you don't, you just take your chances.

Two weeks later, I turned my round-bottom flask with condenser and calcium chloride drying tube into a roman candle with purple flames and black smoke. Everyone (50 employees) was out on the lawn looking at me and asking what I had done. No one was injured. There was no property damage. I had already extinguished the fire (with potentially the wrong type of extinguisher!).

The next morning, we were all in the conference room. The lab director said: "We want to thank Dr. Kaufman for his display of pyrotechnics. But we hope he'll confine it to the 4th of July." I wanted to hide under my chair. Then, he added: "We pay you to do three things. Work safely, do your research, and write your reports and patent disclosures."

Working safely wasn't something extra. It was one of the primary colors. It was **integral.** It was **important.**

Two weeks later, I was driving home to my apartment in Marlboro. I heard on the radio that there had been an explosion at WPI. I drove back to Worcester to Goddard Hall. I walked up to the second floor to Paul Merrithew's lab.

The fluorescent lights had been blown off the ceiling. The windows had been blown out. The corner of the stone-topped bench with the oak cabinets underneath was gone. It looked like someone had passed a hot knife through butter. And, Jim Guererra, a grad student, had blown off parts of both hands doing six things that I had learned at Dow on the first day that you just don't do.

As I looked around, I realized that there was no way that my 25 years in school had prepared me to work up to the standards of the Dow Chemical Company. I decided to try to share what I was learning at Dow with schools and colleges.

My new supervisor, Sue McKinley, encouraged me to write some lab safety guidelines. I did. I wrote "Laboratory Safety Guidelines". Dow sent the publication to 2000 colleges and universities in the mid-seventies. Within one year, Dow had received requests for a quarter of a million reprints. We had struck a nerve in academia.

Today, more than three million copies of those "Guidelines" have been distributed. They are available in ten languages (four more are in the works).

The Guidelines present simple no-cost and low-cost ideas that can create a more effective lab safety program. Some people like to use them as a checklist to see what they are doing and not doing. Could you start all 40 at once? No. You would make yourself crazy. But you can do something. Pick one. Get started and improve your lab safety program.

I worked at Dow for four years becoming increasingly interested in lab safety. One of my most important questions was (and still is) "How do you convince people to care about lab safety?"

The theme of the World Safety 2013 Conference in Kuching Malaysia was "Convincing People to Care".

I left Dow in the Fall of 1977 (on a one-year leave-of-absence) to "teach" soccer and "coach" chemistry at Curry College (Milton, MA). That academic year, I started the Men's and Women's soccer program, created a Chemistry Major, and created the "Laboratory Safety Workshop". The leave was extended and I resigned from Dow spending the next 20 years at Curry.

Our primary goal then, as it is today, was to share with schools (and anyone else who would listen) the simple and inexpensive ideas on how to improve lab safety programs and how to get more people to care. We wanted to create safer, healthier, and more environmentally friendly places to learn work and live. Our mission was then, as it is today, to make health, safety, and the environment an **integral and important** part of education, work, and life.

Up until 1990, LSW focused primarily on elementary and secondary schools. In my private consulting practice (Kaufman & Associates) I was beginning to work more with university, industrial, medical, forensic, and R&D labs.

With grants from Union Carbide and the National Safety Council, LSW began a program for colleges and universities. In 1993, LSW moved off campus and was incorporated in 1994 as a 501(c)(3) non-profit organization and a Massachusetts Public Charity.

I left Curry in the Fall of 1996 (on a one-year sabbatical) and began work full-time on lab safety. The sabbatical was followed by a one-year leave of absence (with benefits) and then by my resignation. In 1995, we opened our office at 192 Worcester Street in Natick.

In 1999, the organization name was changed to "The Laboratory Safety Institute". Over the next decade, K&A's clients were invited to be served by LSI as I began devoting all my energies to ensuring the growth and success of the Institute. One K&A client remains, the Department of Defense Education Activity. However, the work is sub-contracted to LSI.

The work with DODEA took me overseas to Germany, Italy, Japan, Okinawa, and Korea. Other opportunities beginning in the '90's resulted in my teaching courses and consulting in Mexico, Canada, Thailand, Guam, Taiwan, India, and Spain.

In 2008, one attendee at our Pittcon courses was from Saudi Arabia. His interest and appreciation of LSI's approach to lab safety spawned a host of opportunities in the Middle East, not only in Saudi Arabia, but also in Bahrain, Qatar, and Abu Dhabi.

Our involvement with the International Council of Associations for Science Education has led to presentations and courses in Australia, Estonia, and Malaysia. Agilent Technologies has supported presentations in both Beijing and Shanghai.

The realization that 95% of the world's eyes and ears are outside the USA (combined with the economic decline of 2007-8) led LSI to increasingly seek opportunities to share our ideas with the rest of the world.

Today, LSI serves a broad and diverse range of both academic and non-academic organizations throughout the world. We are an educational organization dedicated to providing educational programs that help others who are interested to create more effective lab safety programs. Our goal is to help others live safer, healthier, longer, and more environmentally friendly lives.

Like all other non-profit educational organizations, LSI is supported by the educational programs and services that we provide to our students (the individuals and organizations that wish to learn from us). Like other educational

organizations, LSI has a bookstore (online), accepts contributions, and has subscribers as well as individual and organizational members. Occasionally, we apply for and receive grants.

LSI wants to change the way science is taught and practiced. We believe that learning about lab safety has life-long and societal benefits well beyond the lab. Our mission remains unchanged after 35 years: Making health, safety, and the environment an integral and important part of education, work, and life.

That's our story. But wait … that's not all. There's more!

Currently, we have an open post-doctoral position for a chemist with excellent teaching skills who would like to make lab safety an **integral and important** part of his or her career. Please contact LSI if you would like to apply.

…. JAK

SOS Winter 2013-14

What do CHO's really need to know?

In January, LSI began free copies of the school version of its Model Chemical Hygiene Plan available to K-12 Schools and Two-Year Colleges. I began including some advice for the CHOs and their chemical hygiene programs.

The advice included some starter suggestions and the answers to common CHP questions asked at our courses, email correspondence and phone calls. I would like to share these with you

Starter Suggestions for Developing and Implementing Your CHP

1. Designate a lab "employee" to serve as the CHO.

2. Have a clear, written understanding of the tasks to be performed and the number of hours per week to be spent on this responsibility.

3. This position should be compensated with release time from other duties or a separate stipend. This should not be a volunteer or "Voluntold" position.

4. Keep a time log of time spent and what was accomplished.

5. Read the "Laboratory Standard" to become familiar with the regulation and its requirements.

6. Review the school's chemical inventory. Know which chemicals are present.

7. With the help of department colleagues, modify the model plan to your policies and procedures.

8. When the CHP is customized, have a training session for all personnel covered in the plan. Be sure to cover all nine of the information and training requirements.

9. Invite the Principal and Superintendent to approve the document and to attend so they can learn what this is all about.

10. Conduct a laboratory inspection of all science facilities to insure that the policies in the plan are in fact being followed. Correct any deficiencies.

11. Call or email LSI whenever there are questions.

Questions and Answers

Q. Is a lab safety manual a chemical hygiene plan?
A. No. A lab safety manual addresses all policies and procedures for working/learning safely in a lab. It addresses all nine lab hazards. The CHP addresses only chemicals.

Q. Are students covered under the OSHA Lab Standard?
A. No. The standard applies only to employers and employees. However, under the school's duty of care, it is hard to imagine a compelling argument that would classify students as a lower life form not deserving of the same degree of protection. As it says in the MCHP introduction, "What's good for the teachers is good for the students".

Q. When should information and training be provided?
A. At the time of employment, whenever the nature of the hazard changes, and as often thereafter as the employer feels is necessary. LSI suggests at least every two years.

Q. How often should the CHP be reviewed?
A. At least annually. Review the CHP whenever unsafe conditions or unsafe practices suggest that the policies are not being followed. The CHP should be updated as needed.

Q. What is the liability of the CHO?
A. Many school districts indemnify and hold harmless their employees while performing the duties of their position. This is why LSI strongly recommends that there be a clear job description for the CHO indicating the tasks to be performed and the contracted hours for these duties.

Compliance with health, safety, and environmental regulations is the responsibility of the employer, the school district. Districts hire custodians to remove trash and keep the buildings clean. They do not seek volunteers for these positions. They should not seek volunteer CHOs. This should be a properly compensated position. It is a position mandated under State and Federal Regulations.

It is not unforeseeable that some school districts will be unwilling to provide sufficient financial support/staff time to achieve full compliance. Therefore, it would be wise to have a clear understanding of the tasks that are the CHO's. The rest are the responsibility of the school district, the employer. Civil and criminal penalties for non-compliance belong to the Board of Education, the Superintendent, and the Principal.

Q. Is watching a third party lab safety video or online lab safety course sufficient to meet the information and training requirement of the OSHA

Lab Standard?

A. No. Much of the required information and training is site specific. What are the specifics of your CHP? What are the hazards of your chemicals? What are your resources and references? How do we respond to emergencies? And much more.

Q. Who is responsible for enforcing the policies in the CHP?
A. In LSI's opinion, it should not be the CHO. We believe that the CHO should be very knowledgeable. He or she should be an advisor to help ensure that the plan is developed, implemented, and understood.

We believe it should be the employee's supervisor, not a colleague. The Principal is the school's "Chief Executive Officer" and is responsible for everyone's performance. Whoever performs the job performance review for the teacher should be ensuring that his or her performance in consistent with school policies.

Teachers are responsible for ensuring that their students follow the lab safety policies and procedures.

Assistance

LSI can help you with the development, revision, and implementation of your chemical hygiene plan. We write them, review them, inspect science facilities, evaluate lab safety programs, and provide training for both teachers and administrators.

For more information about LSI services, contact Mary Thompson:
mthompson@labsafetyinstitute.org

SOS Spring 2014

…. JAK

About the Laboratory Safety Institute

The Laboratory Safety Institute (LSI) is a non-profit educational organization whose mission is to make health and safety an integral and important part of science education, work, and life. LSI provides educational programs, member and non-member services, publications, audio-visual and reference materials, and responds to requests for information.

LSI was founded in 1978 as The Laboratory Safety Workshop by James A. Kaufman, Ph.D. His experience working for the Dow Chemical Company convinced him that schools and colleges were not doing enough to encourage health and safety. Studies by LSI and others have shown the accident rate at schools and colleges to be 100 to 1000 times that of Dow and DuPont.

Since 1978, Dr. Kaufman has trained over 100,000 science educators and scientists. His brand of safety training is a unique blend of technical information, practical and inexpensive solutions, humor, and accounts of accidents drawn from a collection of over 5,000 examples. In 2002, LSI organized the first international conference on safety in science education. Future conferences are scheduled for Kuching (2013), Australia (2014) and Canada (2015).

LSI has produced two lab safety, training audio-visuals: The One-Day Lab Safety Audio Course (5.5 hours) and The Two-Day Lab Safety Video Short Course (eight, 90-minute DVD diskettes).

LSI publishes a newsletter: "Speaking of Safety" (three issues per year).

LSI offers lectures, seminars, short courses (CEUs and academic credit), audit and inspections, and regulatory compliance and safety program development consultations throughout the world for academic, industrial, medical, and government laboratories.

LSI operates an Internet discussion list, LABSAFETY-L, and maintains an informative website (http://www.labsafety.org).

LSI is supported by corporate sponsors, agencies, associations, generous individuals, its members. Members receive a newsletter subscription, use of the audio-visual and reference lending libraries without rental fee, a 10% discount on most LSI publications, a 5% discount on training and consultation services, and use of the Toll Free, 24-hour Lab Safety Information Hotline. Organizational members receive a teleconference review of 33 elements in their lab safety program.

The Journal of Chemical Education called The Laboratory Safety Institute "A national resource for safety conscious science teachers". If you would like to help support the efforts of The Laboratory Safety Institute: (1) Subscribe to

"Speaking of Safety", (2) Become a member of LSI (partially tax deductible), (3) Make a contribution (tax deductible), and Become a Volunteer.

Free copies of our “Laboratory Safety Guidelines”, Publications List, Audio-Visual Lending Library List, and Introduction to The Laboratory Safety Institute (containing seminar schedule and membership Information) are available on request. For more information about LSI, contact:

The Laboratory Safety Institute
192 Worcester Road, Natick, MA 01760
508-647-1900; Fax: 508-647-0062
Email: info@labsafetyinstitute.org.
Website: www.labsafetyinstitute.org

About the Author

Dr. James Kaufman is President/CEO of The Laboratory Safety Institute, President of Kaufman & Associates and former Professor of Chemistry at Curry College. He received his bachelors degree in chemistry from Tufts University and his doctorate in organic chemistry from WPI.

After two years as a post-doctoral fellow in the WPI Chemical Engineering Department converting garbage into fuel oil, Dr. Kaufman joined the Dow Chemical Company's New England Research Laboratory as a Process Research Chemist. During his four years with Dow, he became increasingly involved in laboratory safety related activities. He authored "Laboratory Safety Guidelines". Originally distributed by Dow, now over two million copies of the widely requested and reprinted brochure are in circulation.

Dr. Kaufman is the founder and President/CEO of The Laboratory Safety Institute - a national, non-profit center for safety in science and science education. LSI's lectures and training programs, AV. lending library, and publications help academic institutions throughout the world. LSI is supported by grants from individuals, foundations, companies and professional societies.

LSI conducts seminars, short courses, audits and inspections for schools, colleges, and companies. They also provide advice on regulatory compliance, safety program development, facilities design and editorial commentary on laboratory texts.

Dr. Kaufman is a former, ten-year member of the American Chemical Society's (ACS) Council Committee on Chemical Safety and is past-chairman of the 2,500 member ACS Division of Chemical Health and Safety. He is the author-narrator of the ACS Audio Course on Laboratory Safety and editor of "Waste Disposal at Academic Institutions" from Lewis Publishers. He recorded and edited the "One-Day Laboratory Safety Audio Seminar" and "Two-Day Lab Safety Video Course." Most recently, he edited the LSI publication, “Safety Is Elementary: the new standard for safety in the elementary science classroom.”

If you would like to talk about lab safety, Dr. Kaufman can be reached by phone at 508-647-0900 or online at jim@labsafety.org.

How You Can Help

There are three ways to help: (1) Subscribe to our newsletter, *Speaking of Safety*, (2) Become a member, (3) Make a donation, or (4) Become a volunteer. For more information about volunteers, subscriptions and memberships, please visit out website (www.labsafety.org) or call 508-647-1900.

The Laboratory Safety Institute gratefully acknowledges the generous support of our sponsors. Since 1978, our major benefactors have been:

ACS Council Committee on Chemical Safety, ACS Division of Chemical Health and Safety, Cabot Corporation Foundation, Carolina Biological Supply Company, Dow Chemical USA, Fisher Science Education, Flinn Scientific, Honeywell-Bull, Lab Safety Supply, National Safety Council Foundation for Safety and Health, Northeastern Section of ACS, Polaroid Foundation, and Union Carbide.

As we expand both the number and scope of our services, we need the voluntary support of those who enjoy and appreciate our efforts. Furthermore, it is vital that our professional and corporate supporters see their commitments to the Laboratory Safety Institute matched by the enthusiastic financial support of individuals. May we invite you to help by becoming a "Friend of the Laboratory Safety Institute"

Please be generous. It is a worthy cause.

* * * * * * * * * * * *

Donation Form

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Phone _____ Email _____

___ Please contact me. I would like to discuss how my company might help LSI.

Please return to: Laboratory Safety Institute
192 Worcester Street, Natick, MA, 01760

Checks should be made payable to the LABORATORY SAFETY INSTITUTE. The Laboratory Safety Institute is a tax-exempt organization under Section 501 (c)(3) of the IRS Code.