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President's Message

Ask not only what OHAO can do for you, but what you can do for OHAO and your profession.

Membership renewal time is generally a time when OHAO members are asking themselves whether they get good value for their membership fees. The OHAO executive is also in the process of reviewing the Association's Bylaws and this has also had me going through the exercise of what OHAO's mandate is, and how that benefits me as a member.

For me, over the years, I've had numerous benefits from my OHAO membership. The spring and fall symposia and PDCs allowed me to update my knowledge and skills, and have of course given me essential certification maintenance points. The newsletter gave me an opportunity to keep in touch with the community and current topics and events. The networking opportunities have been outstanding and have provided me with inspiration, information and ideas for addressing a broad range workplace health and safety issues. Having other professionals to toss around ideas with, get advice from, or commiserate with when facing challenging situations have shown me what a great support system the Association presents.

You may not be see the work that OHAO members do behind the scenes, particularly in events to market the Association and its professionals, or in liaising with governmental agencies such as the Ministry of Labour, or participation in stan-

dards setting organizations such as the Canadian Standards Association.

All of the above benefits fit into OHAO's mandate to promote and develop the occupational hygiene profession. An association such as ours, however, is very much dependent on the participation and contributions of its members. As a group, we can have a significant presence in activities that indeed promotes and develops the profession. We ultimately work to make workplaces healthier and safer, and whether we do this directly within our own workplaces, or we do this by influencing government or standard setting agencies, we do this with the efforts of our individual members.

I thank you for renewing your membership and helping OHAO maintain its presence. I can most assuredly say that in addition to renewing your membership, if you actively invest time and effort in OHAO activities, you will find that you and your profession will get a tremendous return on the investment.

Many of our committees are still eager to get new members. Think about how you can participate with the Newsletter Committee, the Membership Committee, the Program Committee, or the Public Affairs and Education Committee. Having sat on a few committees over the years, I have seen the great boost in energy when new mem-

continued on page 3

OH FORUM

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OH Forum is published quarterly by the Occupational Hygiene Association of Ontario, and distributed free of charge to all members.

Deadlines for articles and advertising are as follows:

Issue	Deadline
February	10 th of January
May	10 th of April
August	10 th of July
November	10 th of October

Enquiries or suggestions should be directed to:

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The Occupational Hygiene Association of Ontario is an Ontario-based organization whose members are dedicated to the practice of occupational hygiene. Occupational hygiene is concerned with the protection of people's health from hazards arising in or from the workplace.

To develop and promote the profession of occupational hygiene, and to serve the interests of our members by:

- sponsoring professional development, training and research;
- promoting public and legal recognition;
- developing partnerships with stakeholders;
- providing public education;
- fostering communication and networking through publications and meetings.

President's Message... continued from page 1

bers come on board with new ideas, all to the benefit of the entire OHAO membership.

2007 Fall Symposium and PDCs

The Fall Symposium and PDCs in October were again a great success with two days of excellent topics and speakers. The Program Committee, chaired by Jason Hoffman, and the Public Affairs & Education Committee, chaired by Ray Ilson, are to

be commended for all of their hard work. At the Symposium, Len Hong and Marvin Faber encouraged good audience participation during their talks. Attendees gave very positive feedback, asking for more of these interactive sessions. Both committees have already started planning next year's Spring Symposium and PDCs.

Upcoming Activities

There are many activities on the horizon, including the upcoming AIHce in Toronto in 2009, and we'll need volunteers from

all of Canada, but particularly from our OHAO members.

As we move into the AGM in March, seriously think about putting your name in for a position on the Board.

Have a great 2008!

Margaret Fung, MHS c CIH
mfung@wesa.com



Editor's Message

It's a busy time again for all of us. I hope you are all refreshed in this new year to take on the important work all of you do in our day to day, making sure that there is a culture of health and safety in the organizations where you work.

In this issue, there are so many diverse topics, I hope you will enjoy reading them as I have. I am pleased to say that the membership survey results are presented. We also have a couple of case studies, news about sunscreen labelling, a new perspective on noise exposure as it pertains to headphones, the risks of construction, the importance of backing up your information.

I want to thank Margaret Fung and the staff of Fletcher Wright Associates Inc. and all the contributors new and old to help keep me on track with this my second issue as editor. And finally, the invitation continues to go out to anyone who is interested in contributing to the newsletter, or to make any suggestions, to contact me at csidhom@mtsina.on.ca. I always look forward to hearing from you.

Happy reading.

Christine Sidhom

EDITORIAL TEAM

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Health Physics

—Column Editor—

Michael Grey, CHP, ROH
SAIC Canada



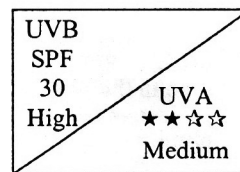
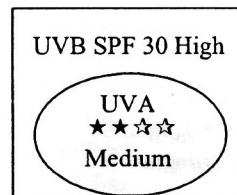
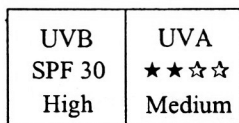
UV Radiation and Sunscreen Labelling

The US Food and Drug Administration has proposed changes in the way that sunscreens are formulated, tested and labeled. The Proposed Rule, published in the Federal Register (Volume 72, No. 165, page 49070) on August 27, 2007, would allow additional combinations of ingredients in over-the-counter sunscreens, change the way that UVB Sunburn Protection Factors are measured and reported and introduce a new UVA protection rating.

Currently, labels on over-the-counter sunscreens are required to display a SPF (Sunburn Protection Factor) rating that describes the level of protection provided for the UVB (280-315 nm) radiation. Most 'broad spectrum' sunscreens also provide protection against UVA (315-400 nm) radiation but the level of protection but the level of UVA protection is not reported on the label. The Proposed Rule would require that labels on over-the-counter sunscreens report the level of UVA protection on a one to four star system with one star indicating 'low protection' and four stars indicating the 'highest protection'. Products that do

not offer at least a low level of UVA protection would be required to display the phrase 'No UVA Protection' on the label.

The Proposed Rule does not strictly prescribe the design of the label but it does



show four alternatives. These are reproduced below.

The proposed UVA labels are similar to those currently required in the European Community. Health Canada has not announced if it plans to introduce similar labeling requirements.

The scope of the FDA's Proposed Rule is limited to over-the-counter products intended for consumer use; it does not extend to occupational exposures. Recommended limits on occupational exposure to ultraviolet radiation were issued by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) in 1989

and reaffirmed in 2004. These recommendations form the basis for the regulatory limits in most countries. The ICNIRP, working in cooperation with the World Health Organization and the International Labour Organization, has expanded on,

but not changed, its recommendations in a recent publication entitled "Protecting Workers from Ultraviolet Radiation". This document presents a thorough discussion of the hazards of UV exposure and describes the basis for the recommended Occupational Exposure Limits, methods that can be used to assess the UV dose to workers and ways of reducing UV dose. "Protecting Workers from Ultraviolet Radiation" is available as a free download from the ICNIRP website at www.icnirp.de/documents/Uvworkers.pdf.

Fall Symposium – October 17th 2007

Jason Hoffman, Chair, Program Committee

Based on the comments, both in conversation and on the event's evaluation forms, the October 17th symposium program was very well received. 83 audience members and 8 exhibitors made their way to the Black Creek Pioneer Village, which continues to be the venue of choice for this event because of its great accessibility and high quality buffet.

John Murphy, long time OHAO member and Resource Environmental Associates founder, gave the first presentation which was entitled "Lessons in Legionella". The talk covered essential background on issues surrounding legionella contamination, infection, and control touched on case studies of recent outbreaks in Ontario.



John Murphy

The second speaker, Julie Anceriz, a recent U of T MHSc graduate who works at GE Canada, spoke on the range of parameters that need to be considered in assessing nanoparticle exposures as well as the current methodology and range of instrumentation to perform the measurements.



Julie Anceriz & Jason Hoffman

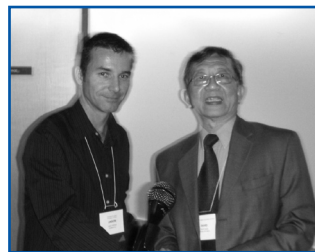
The 3rd presentation of the morning

was delivered by Dr. David Leong, Provincial Hygienist from the Ministry of Labour. His presentation touched on MOL hygiene initiatives, regulation updates, key target substances as well as GHS and is posted at ohao.org.

Kerry Piccolotto, the Technical Advisor for Occupational Health and Safety in the Ontario region for Human Resources and Development Canada, updated the audience on a recent amendment to the Canadian Occupational Health and Safety Regulation called the Hazard Prevention Program (also posted on the web site).

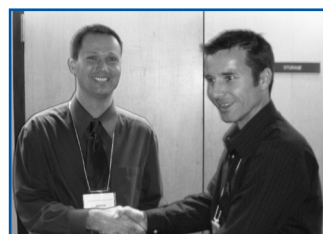
Len Hong, the President and CEO of the Canadian Center for Occupational Health and Safety explained the evaluation criteria for the Robert W Campbell Award, which honours organizations that achieve high levels of excellence by integrating safety, health, and environmental management into all aspects of business. Len challenged occupational hygienists to build on and use the skills they currently possess to help lead their organizations in integrating OHS into the core business. An open discussion

on this subject added an interactive element to the afternoon's program. See website for presentation. After the afternoon break, Beth Walpac, 2006 OHAO president and HSE specialist for Nalco Canada gave a talk entitled Canada's New Chemical Management Plan and the Occupational Hygienist which outlined the basics of the plan, the challenges and how hygienists might play a part. This presentation is posted on the web site also.



Jason Hoffman & David Leong

The final Speaker of the day was Dr. Marvin Faber, EHS Director and toxicologist for Patheon Inc.. The presentation looked at the unique health and safety challenges posed by pharmaceutical manufacturing, including toxic substances which lack OELs, the utilization of control banding principals, and extensive controls required for highly toxic materials.



Marvin Faber & Jason Hoffman

Rob Robinson donated Toronto Maple Leaf tickets on behalf of Stantec Consulting Inc., as a door prize which was drawn to conclude the day's events. Thanks to all the organizers, attendees, and exhibitors for their part in the successful day.

PDCs – October 16th 2007

Ray Ilson, Chair, Public Affairs and Education Committee

The Public Affairs and Education Committee of OHAO presented three professional development opportunities on October 16 at BCPV.

Dr. Bhawani Pathak of the CCOHS presented a full day course on Noise Control in the Workplace to 14 attendees. Topics included assessment of noise exposures, estimating risk, NIHL, implications of noise exposure limits and

exchange rates and control options.

Cecilia Chan of the CASSEN testing laboratory presented a 4-hour course on Recent Advances in Measurement of Airborne Organics. A total of 19 attendees heard Cecilia's discussion of biological monitoring, process emissions, investigating transient odours and providing solutions to workplace exposure issues and indoor air problems.

Michel Crepeau of WESA Limited presented a 4-hour course on Confined Spaces to 17 attendees. Michel reviewed the new Ontario regulation defining confined spaces and discussed atmospheric hazards, IDLH, permits, entry procedures, workplace party responsibilities and hazard controls.

On the Hygiene Front



—Column Editor—
*Jim Desormeaux, OHST, COHC
Ontario Power Generation*

Have Canada Geese Problems?

Canadian Geese are territorial, and they are creatures of habit. Their natural instinct is to return to their favorite haunts hours or minutes later. Dr. Philip C. Whitford a Ph.D in biological sciences in the field of animal behavior at Capital University in Columbus, Ohio. Dr. Whitford has been studying goose behavior and vocal communication for decades. Dr. Whitford found that geese recognize and respond instinctively to alert calls signifying uneasiness about potential threats and alarm calls indicating immediate danger. Reacting to either call, they evacuate without waiting to identify the source. If you would like to learn more about this technology please contact Bird X at 800/662-5021 or check out the web site at www.bird-x.com.

New Bump Test

Industrial Scientific, a global leader in gas detection and monitoring instruments, systems and related services, is pleased to announce a new "bump" test feature for the GasBadge® line of personal and dockable single gas monitors. In a function or "bump" test, the user exposes the instrument to a known concentration of gas to determine if the sensor response is within a safe operating range. If the bump test is unsuccessful, the user must calibrate the instrument before further use. Routine "bump" testing is a vital aspect of any gas monitoring instrument program. The only way to be certain that your portable gas detector will adequately respond to a hazardous condition is to test it with a known concentration of the target gas. The GasBadge line of gas detectors includes the GasBadge® Plus and the GasBadge® Pro. Offering low-cost personal monitoring and full-featured dockable options, this instrument line provides exceptional protection

from atmospheres with unsafe levels of oxygen or any one of several toxic gases. Contact: David Wagner, Director, Portable Products or Email: dwagner@indsci.com Phone: 1-800-338-3287 or (412) 788-4353

If you have any news, gossip, new products that you would like to pass on contact Jim Desormeaux at jimdesormeaux@hotmail.com.

Spring Symposium

March 25th - 1/2 Day Panel Discussion PDC on Health and Safety Management Systems and 1/2 Day of Technical Presentations with Debbie Dietrich, SKC "Unsolved IH Mysteries" followed by "New Considerations for Sampling Metals"

March 26th - 1/2 Day of Case Study Presentations and a 1/2 day Annual General Meeting followed by a "social" (Finger foods and Cash Bar)

Both days held at Black Creek Pioneer Village. Watch your mail for details.

Noisy News



—Column Editor—
Alberto Behar, PEng, CIH
Adjoin Professor,
University of Toronto

Noise Exposure From Headphones

Introduction

In most occupational settings, the noise energy is generated at a relatively long distance from the ear of the exposed person – by a machine, tool, vibrating surface, etc. The measurement of the noise exposure in such cases is done following the CSA Standard Z107.56¹. The standard describes the instrumentation to be used as well as the procedures to be followed and how to evaluate the results from the measurements.

There are, however, some occupations, where the acoustical signal is generated by a headphone applied directly to the ear. This is the case of call centers operators, receptionists, airport control tower operators, etc. Although strictly speaking, this is not noise, but the acoustical energy contained in the signal can still be damaging to the hearing. In those cases, the above-mentioned standard cannot be applied and an alternative way of measuring the exposure has to be used.

There is an ISO² Standard that deals with this issue. It makes use of an acoustical manikin (HATS³) equipped with artificial ears⁴. Their output is an electrical signal, equivalent to the output of a microphone exposed to the same sound pressure in a free field. In other words, if the artificial

ear's output is 85 dBA, this will be the sound level the HATS is exposed to.

Measuring noise exposure as per the ISO standard allows for obtaining the most precise results. However, the instrumentation needed is quite expensive and requires specialized knowledge of the measuring technique and instrumentation. Also, the HATS is relatively bulky as to be carried into the workplace.

To overcome those difficulties, a Working Group was established within the Acoustical Group at the Canadian Standard Association - CSA with the objective of preparing a survey-type, simple procedure that could be carried in a workplace without a specialized knowledge. Although the accuracy of the results is lower than the obtained by using the ISO method this will be a procedure that could be carried out by an audiometric technician.

The procedure is intended to be an Annex to the CSA Z107.56 and, as such, its use will not be compulsory.

The Principle of the Survey Method.

A signal identical to this going to the operator's headphones will be fed in parallel through an identical headphone to an artificial ear (normalized by the International Electrical Committee) of the type used for the calibration of audiometers. The output of the artificial ear will be fed into an Integrating Sound Level Meter and a correction will be applied to the measured result. This correction is needed to equate the sound pressure on the artificial ear with the one that will generate the same value if it was done in a free field. The rest of the

procedure is contained in the main body of the CSA standard.

The WG is now right in the middle of writing the Annex, that will have to go through the consulting and voting process before being approved.

References

- ¹ CSA Z107.56:
- ² International Organization for Standardization, ISO 11904-2: Acoustics — Determination of sound immission from sound sources placed close to the ear — Part 2: Technique using a manikin,
- ³ HATS – Head and torso simulator
- ⁴ Devices designed for measurements in the audiometric and related fields.

Correction Notice:

In the last issue of OH Forum, the article author in the Noisy News column was improperly identified. The article was written by Alberto Behar, PEng, CIH and Tim Kelsall.

F1

—Column Editor—

*Jim Desormeaux, OHST, COHC
Ontario Power Generation*

Do You Have a Backup?

Imagine if you had a costly wedding ring somehow slip off your finger and straight down the drain never to be seen again.

Imagine now that you don't have a worried look on your face. The reason; you have a backup ring that is identical. You go get it, slip it on your finger and away you go. If life was that simple.

In a way it can be. At least for your files on your computer. Many of these files are extremely important to you. You have emails, financial, appointments in your calendar, word documents, photos, mp3's, etc. Those files would be pretty hard to replace... unless you backed up all your files. According to Interbaun (www.interbaun.com) a hard drive crashes every 15 seconds, 2,000 laptops are stolen or lost every day, 32% of data loss is caused by human error, 31% of PC users have lost all of their PC files due to events beyond their control, 40% of Small and Medium Sized Businesses don't back up their data at all. What is even worse is that 60% of all data is held on PC Desktops and laptops. Files are so large today compared to even five years ago, and that is why a backup utility is needed. But will any backup utility do? For home use probably most any backup utility will do. However if you depend on your computer for a living a better "than

average" backup utility may be needed that offers data encryption and network support.

STEP 1 Do you want to use back up software (designed to only back up the files and folders you designate by using software from such software companies as Sonic's Simple BackUp (www.sonic.com) or Eazy Backup 3 from AJSsystems (www.ajsystems.com) or drive-imaging (create a copy of your entire hard drive from software from such companies as Image 9.0 Home by www.acronis.com or Symantec's Norton Ghost 10.0 at www.symantec.com). Look for backup software that lets you schedule recurring backups, so the software automatically backs up data at the time you specify; better software delays this process if it detects you are working on the computer, so it doesn't slow your computer to a crawl just when you need maximum performance.

Of the packages that automatically create backups, look for those that support the various types of backups: a full backup (backs up all files), an incremental backup (backs up any new and changed files since the last full backup), or a differential backup (backs up any new and changed files since the last full or incremental backup). This saves a lot of space and it also saves a lot of time. Make sure that the software doesn't use a proprietary format to create the backup files (i.e. only the backup software you used to create the backup can be used to access the backup files). If you access multiple computers or if for some reason you won't have the backup software

installed in the future and need to open the backup files could end up a major problem.

It is better to look for backup software that saves files in their native format, which will allow you to simply drag and drop files from the backup location to another folder on your computer. Another option is to use software that creates backups as EXE (executable) files, which will automatically open when you run them on any computer. In addition, the best backup packages can back up copies of certain parts of Windows so that you can restore everything—from your Desktop icons to the entire OS—should disaster strike.

STEP 2 find a software package that can make backups directly to the type of backup media you want to use. Some of the media that you may consider is rewritable or recordable cd, dvd or tapes, external hard drives or internet based services (www.CanadaWebHosting.com or www.storagepipe.com).

STEP 3 check out the compression and encryption used. Make your choice

STEP 4 Initially do a full backup while the following backups can be incremental or differential.

If you have any comments, suggestions or advise contact me at jimdesormeaux@hotmail.com

September 21 Board Meeting - Report

Mike Grey, CHP, ROH, OHAO Director

The OHAO Board of Directors met at 1:00 p.m. on the afternoon of Friday, September 21, 2007 in the offices of Fletcher Wright Associates in Mississauga, Ontario. All of the members of the Board were present. The agenda included two issues arising from the minutes of the June 15th Board Meeting and the reports from the Committees after which Board members raised two new issues for discussion.

During the course of the meeting the Board approved motions to:

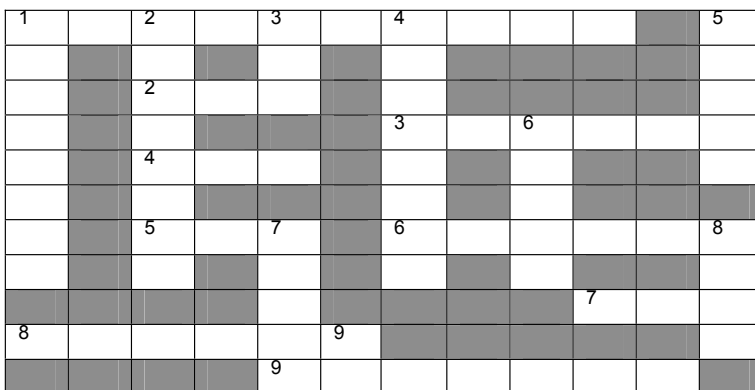
- Accept two application for membership and one application for reinstatement; and
- Support all CCOH professional development activities through postings in the “Upcoming Events” section of the OHAO web site and via an email blast of members.

The Board was provided with an update on preparations for the 2007 Fall Symposium and the CCOH webinar on the CSA Z1000 standard scheduled for October 10th. Other issues that were discussed included possible topics for the 2008 Professional

Development Courses and Seminars, the possibility of holding an OHAO event in conjunction with the 2009 AIHce in Toronto and the progress of the OHAO history task force lead by Neil Murray. The meeting adjourned at 2:35 p.m. The next meeting of the Board will be held Friday, December 7, 2007. Among the topics scheduled for discussion at this meeting is the revision of the OHAO Bylaws.

Crossword

prepared by Ray Lawrence, BSc, CIH, CRSP



Across

1. Key mindset for H&S
2. milligrams _____ meter cubed
3. _____ and illness
4. UV radiation source
5. X-_____
6. Old 8-hour dBA limit
7. Standard setter
8. Gravel in a CS can _____ a person
9. What a gas monitor does

Down

1. Part of PPE
2. Acceptable _____
3. Affected by noise
4. Key prevention action
5. _____ chloride
6. _____ HSC
7. Traffic safety sign
8. Good for Young Workers
9. Chemical name for iron

See page 16 for answers

Construction Hazards

Karin Suppelsa, BSc, Group EHS

Construction is one of Canada's major industries, employing nearly 1 million Canadians. Construction workers face numerous hazards on work-sites that are in a constant state of change. Construction site accidents typically occur when a hazard is not adequately controlled. Accidents are rarely the result of one single cause, more often they are a result of a chain of circumstances that develop over time.

Factors that may contribute to an accident include:

Factor	Example
Human	Human errors, fatigue
Material	Using the wrong material for the job
Equipment	Equipment mal-functions
Environmental Conditions	Poor weather
Process	Correct procedure is not established or not followed

Common construction site health and safety risks include:

- Overexertion and working in awkward positions
- Contact hazards working with hand tools, powered tools and heavy equipment
- Electrical/Lockout hazards
- Working at heights
- Slips and trips
- Exposure to moulds, lead, asbestos, silica, paints and solvents
- Extreme temperatures
- Confined spaces
- Exposure to high noise levels

In order to control these risks, companies need to establish and maintain adequate risk management systems. Employers are responsible for establishing safe work policies and procedures, supervisors are responsible for ensuring employees follow safe work procedures and employees are responsible for using the safe work procedures. Employer, supervisor and employee responsibilities are intertwined and form a chain of interlocking duties.

On a typical construction site standard risk management measures should be in place for:

- Working at Heights e.g. travel restraint, fall arrest, guardrails, covers, etc
- Lockout Tagout e.g. procedures, locks, keys, signage etc.
- Confined Space Entry e.g. procedures, permits, ventilation, rescue equipment
- Site Traffic Control e.g. traffic flow, signage, hi-visibility vests, pedestrian walkways, etc.
- Site Control: entry permits and orientation, fencing, lighting, waste flow, etc.
- Noise e.g. plugs, muffs, signage, etc.
- Heat Stress e.g. cold potable water, monitoring systems, scheduling, etc.
- Chemical Exposure and Designated Substances (i.e. asbestos, silica, lead) e.g. ventilation and PPE, exposure assessments, etc.

Safe work practices when established by employers, re-enforced by supervisors and used by employees will minimize the occurrence of incidents and accidents on construction sites.

Karin Suppelsa is an EHS Counsellor with GroupEHS.

2007 Membership Survey Results

Jason Hoffman, Program Committee

Thank you to all the members who took the time to complete the membership survey, we had the best response in recent years.

For the first time, the survey was completed on line (through “Survey Monkey”) and the complete results can be viewed by accessing the link <http://www.surveymonkey.com/Report.asp?U=291058815859> which is also found on the home page of the OHAO website at ohao.org.

The salaries are following an upward trend based on respondent’s information, with an average of just over 84K compared to 75K in 2004 and 70K in 2002. See trend and range salary graphs below. For the graphs that don’t have a label on the Y axis, the values represent the number of respondents choosing that particular answer.

Employment in industry is still the most common for our respondents at 38.3% (42% in ’04), followed by consulting at 24.3% (28 % in ’04) and graduate degrees were more prevalent than other educational backgrounds (63.6% vs. 46% in ’04).

It’s no surprise that the most common answer to the question “what is your primary responsibility” was occupational hygiene but it appears that the percent has increased to 57.6% from 44% in 2004.

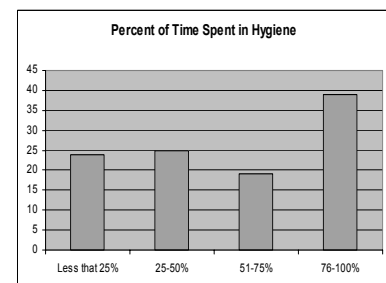
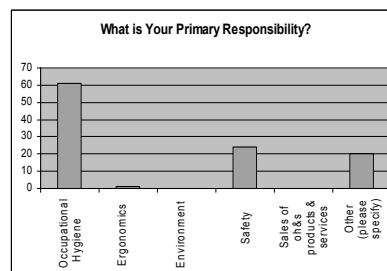
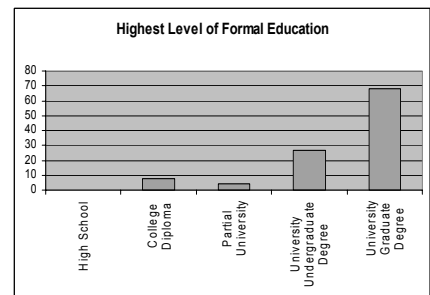
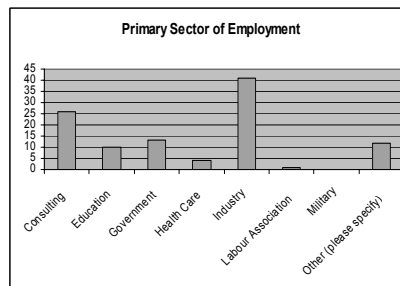
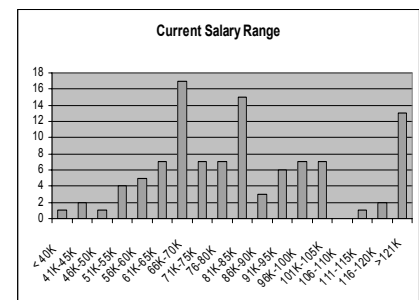
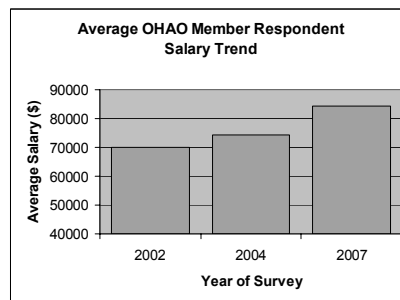
Considering the general feeling that many H&S professionals are being pushed into wearing a multitude of hats rather than focusing on one discipline it was not an expected upward trend. It’s obvious from the primary responsibility results as well as the percentage of time spent in the hygiene discipline that we continue to have a high

proportion of occupational hygiene specialists in our ranks.

There were slightly more CIHs (55.8 %) than ROHs (48.4%) followed by the CRSP (32.6%), PEng (8.4%) and the OHST (5.3%).

The Symposiums, the Forum newsletter, and the consultant directories were most popular services offered by OHAO (question 11 in the survey). Although the individual comments to some of the on

line survey questions can’t currently be accessed at the results link, there was some important member feedback. Generally speaking people want to stay in touch with current technical and regulatory happenings and would prefer if the material was available in a number of forms. As webinars and other convenient technologies become easily accessible/available we will need to ensure that we optimize the methods of reaching the whole organization.



Case Study – Cleaning Solutions

James Miuccio, M.S., Occupational Hygienist, The Occupational Health Clinics for Ontario Workers (OHCOW)

Nosocomial infections and sterile fields are terms associated with hospitals. Preventing infections from being spread in hospitals is achieved by disinfecting patient rooms, equipment and common areas. This is a component of overall hospital hygiene and is maintained by the disinfecting agents used by the housekeeping staff. However, the chemicals that are used for sterilizing and disinfecting can be toxic. In this case a 37 year old female was a nine year employee of a hospital who worked in housekeeping and experienced symptoms related to exposure to the cleaning products.

The hospital is a full service, primary and secondary care community hospital. The housekeeping staff uses chemicals to keep the hospital environment visibly clean, free from dust and acceptable to patients, their visitors and staff. A recent change to the cleaning process included the use of microfiber mops for a bucketless cleaning system. There are many reasons to switch to using the microfiber mopping system including the ease of use, eliminating the heavy pails and mops, time savings and it is more environmentally friendly because it is a system that uses less water.

The storage room for the cleaning chemicals was the same as the housekeeping staff break room where food was prepared. Many times the containers were left open. In this room the cleaning chemicals were diluted with water and poured into small spray bottles. In the areas to be cleaned

the cleaning solutions were sprayed onto the floor and are then mopped up. This is where the bucket of water is eliminated, however, the spraying action created an airborne mist that was inhaled, ingested and this method also allowed for skin contact with the chemical mist.

Since the change, the housekeeping employee presented with chest discomfort, a burning sensation in the upper chest region, and difficulties breathing while on the job. She became symptomatic when mixing the chemicals and, symptoms would occur even when she walked by the cleaners. Her symptoms resolved after going home and she was asymptomatic on the weekends and when away from work.

The main disinfectant used contained quaternary ammonia compounds. According to the material safety data sheet it is corrosive to the eyes, skin and respiratory system. It is also harmful if ingested where it can cause burns to the mouth, throat and stomach. Concentrated solutions of these compounds can cause burns to the skin and mucous membranes. Exposure to diluted solutions can cause respiratory and skin irritation; they are also potential sensitizers that can cause asthma.

Another surface cleaner used by the hospital cleaning staff was a liquid, 2-butoxyethanol, which is also known as ethylene glycol monobutyl ether, ethylene glycol butyl ether, ether and butyl Oxitol. People exposed to high levels of 2-butoxyethanol

for several hours reported irritation of the nose and eyes, headaches, a metallic taste in their mouths, and vomiting. It is also easily absorbed by the skin. Exposure to it can irritate the eyes, nose, and throat. Higher exposures may cause you to become dizzy, lightheaded, and to pass out.

Investigations by the OHCOW occupational physician included pulmonary function studies, which were normal and Chest x-ray which was unremarkable. The patient had also undergone a methacholine challenge test which was negative and therefore asthma was not present. It was concluded that her symptoms were irritant caused.

Many recommendations were made to improve the health and safety of the housekeeping staff. The priority was then to substitute the cleaning chemicals for non-toxic environmentally friendly products. There are many new non-toxic, environmentally friendly products on the market that can provide a high level of disinfectant. A reliable source of information on this topic is the Sustainable Hospitals Program (SHP) (www.sustainablehospitals.org) which is a program of the Lowell Center for Sustainable Production and it is affiliated with the University of Massachusetts - Lowell. This program provides technical support to the healthcare industry for selecting products and work practices that eliminate or reduce occupational and environmental hazards. Further recommendations included, WHMIS training, storing the chemicals in a designated room that is cool,

well ventilated and away from all food and beverages along with keeping all of the containers tightly closed at all times. The use of personal protective equipment was also recommended when mixing and pouring the chemicals and should include the use of chemical splash goggles and chemical resistant gloves. Since the uniforms are standard hospital issue scrubs chemical resistant sleeves should also be used. Sleeves and gloves incorporated into the uniform would also prevent skin contact during the spraying of the floor. Using a hard spray setting on the nozzle instead of the mist setting would decrease the amount of chemicals that become airborne.

The housekeeping employee was fortunate and did not develop asthma. The chemicals that are used for sterilizing, cleaning and disinfecting can be substituted in any environment to prevent exposure to the toxic compounds in them.

Not Another Mould Article

Michael Warnock

There is no shortage of mould-related articles circulating in cyberspace, the local newspaper, or the Journal of Irreproducible Results. Many of these are written so as to draw your attention to the health hazards that may be associated with mould growth in the indoor environment. The assumption is that growing moulds will produce spores which enter the air system of the building, and are inhaled by human occupants. These spores may have some quantity of mycotoxins, and very probably other compounds that serve as allergens, all of which, if the dose is sufficient, may result in an undesirable health outcome. Typically, it is respiratory tract irritation, although there can be more dire outcomes for people in hospitals if opportunistic pathogenic fungi are involved. The usual suspects in most cases of indoor mould growth might include fungal genera such as *Aspergillus*, *Cladosporium*, *Penicillium*, and *Stachybotrys* (just to name a few). Most of these organisms, while sporting different names, tend to follow a similar lifestyle strategy in terms of colonizing the built environment. Initially, there is a water intrusion (burst pipe, leaking roof) or other event that increases environmental moisture (elevated humidity in a shower area or marijuana grow operation) to a level that is sufficient for fungal

organisms to grow. Because fungal spores are ubiquitous throughout the environment, it is virtually guaranteed that the spores of fungi capable of digesting building materials are present in the built environment where the water problem has occurred. With the addition of water, many of these spores will germinate on the lush bed of cellulose-based materials that we typically construct our buildings with. Ceiling tiles, drywall, oriented strand board, plywood, and all the many other engineered and natural wood products around us serve as an excellent source of nutrients for a wide range of fungal organisms. Most strategies for dealing with indoor mould growth begin with identifying the areas affected by mould growth and identifying the source(s) of elevated moisture. The cause of the elevated moisture needs to be addressed so that the environment returns to a normal dry state. Building materials affected by mould should be removed, or, when this is impractical, the surfaces of the affected materials must be cleaned so that all mould growth has been removed.

I think that if all indoor fungal growth followed this one strategy, and if remediation strategies were always so straight forward, I would have become bored with building mycology years ago, and taken up extreme snowboarding. I am thus delighted to introduce (or perhaps re-acquaint) you with an indoor fungus that violates virtually all these patterns of growth, presents an entirely different hazard to human health,

Changing Information?

Title, employer, address, telephone, email changing?

Don't forget to advise the OHAO office so the appropriate changes can be made to our records.

and confounds traditional remediation strategies.

My first experience with this fungus started on a cold February afternoon a few years ago. I received a phone call from a hygienist who was puzzling over a set of air sample results he had received after a mould remediation in a century-old church. A roof leak had led to mould growth on an interior wall, and the standard routine for remediation had been followed. With all the once visible mould growth removed from the containment area that had been set up, a sample of air was collected to verify that there was no evidence of mould amplification from within the containment. An air sample was collected adjacent to the containment as an indoor reference, and from outdoors as well. In this case, the air sampling method used was a spore-trap method. The collected samples were all clear of mould spores, but the sample from inside the containment had a high count of basidiospores, the sample adjacent to the containment had these as well, but in a lesser quantity, and the outdoor sample had none. Now, if you should call any one of the over 200 laboratories in North America that perform mould sample analysis and ask them what basidiospores are, and why they are present on your indoor samples, you are likely to receive a rather standard response:

1. Basidiospores are fungal spores produced by mushrooms, not by moulds.
2. Basidiospores present on an indoor air sample are most likely there as carry-over from an outdoor source.

I can't disagree with either of those two statements, and they certainly hold true



Figure 1: A single basidiospore of *Serpula lacrymans*. Bar = 10 μ m

most of the time. But the hygienist managing this remediation had noted that the quantities of basidiospores from the indoor samples were quite high (several thousand spores per cubic meter of air), and that while he was familiar with seeing basidiospores on indoor samples out of season (remember that normal dust accumulation in buildings are a reservoir of fungal spores found in the air throughout the entire year), there were no other spores types present that were consistent with the profile one would normally associate with outdoor air samples (and thus indoor dust) in Ontario. Besides, it was the middle of a Canadian winter, and there doesn't tend to be a great deal of mushroom growth with a foot of snow on the ground. As his reasoning was sound, I proposed that the site be re-sampled and that the samples be sent directly to me for analysis so that I could have a more informed look at the spores that had been classified as basidiospores¹. Shortly thereafter, the sample set arrived, and I finally had a glimpse of these mysterious spores. It didn't take long to find a basidiospore from the indoor sample, and more were found in quick succession. Indeed, the original analyst had correctly identified basidio-

spores on the sample. What was significant, however, was two additional facts that hadn't been provided. First, the basidiospores were all of the same morphology, and thus likely from a single source. Second, the type of basidiospore present was unlike any I have encountered from mushrooms that grow in Ontario (Figure 1). They were, however, consistent with the morphology of the spores produced by Northern Europe's most dreaded indoor fungus - *Serpula lacrymans* - the dry rot fungus.

Wood rotting fungi are present throughout the world. Without them, our forests would be choked out with dead trees that persisted indefinitely. The task of breaking down dead timber primarily goes to fungi that fall within the basidiomycete division. Unlike moulds that are commonly found growing on the surface of timbers, wood rotting basidiomycetes send their hyphae (vegetative component) deep into the wood to extract the various components of interest. *Serpula lacrymans*, a "brown rot" fungus, colonizes wood, and consumes the cellulose in it. It often grows unnoticed in wood as in works below the surface, invisible to the naked eye. This leaves behind the other major component of wood – lignin, which gives the rotted wood a darker brown hue than its pre-rot state. This is a fairly common strategy employed by a number of basidiomycetes, and finding wood that has been stripped of its cellulose content is hardly grounds to declare that *Serpula lacrymans* was the fungus responsible. The

easiest way to do that is to find the fruiting body (the mushroom) in the affected building. Because the basidiospores were present in the air samples, there had to be a fruiting body somewhere in the building.

On a cold, snowy February morning, I stood inside an enclosed containment area on the ground floor of a grand stone church built in southern Ontario during the late 1800s. Stone walls with a lathe and plaster finish had been thoroughly cleaned, and in some areas completely removed, by a mould abatement crew. The plank wood floor looked sound, and there was not a trace of rot on any visible surface. The containment, however, was under negative pressure, and that opened up the possibility that the source of basidiospores was outside of the contained area. On the ground floor of the church, however, things looked much the same. The plaster covered walls were free from signs of visible water damage and fungal colonization. The plank wood floors appeared sound, but a faint draft did flow up from the many cracks. The containment, under negative pressure, would draw air from the crawlspace as well as the ground floor. A few minutes later, as I made my way across the cold dirt in the unlit (I had a small flashlight) crawlspace, I noticed the first clue that something was amiss. The cross bridging between the joists, present for most of my initial crawl beneath the floor, was now absent from joists as I made my way closer to the area beneath the containment. My second clue that something was amiss was the absence of entire joists as I closed in on the wall immediately below the affected area. Normally, I'd say that the missing section of support beam along the wall caught my attention next,

but it



Figure 2: *Serpula lacrymans* fruiting body on a stone slab in the crawlspace of a century old building in Southern Ontario

didn't. Instead, my attention was fully drawn to the rather large (3 foot diameter) fruiting body of *Serpula lacrymans* that was growing from a slab of stone immediately below the containment. That's never a good thing (Figure 2).

Serpula lacrymans has earned its reputation as the dry rot fungus for several reasons. First, it has a fantastic appetite for cellulose, and its rhizomorphs (a vegetative structure) can extend a great distance from a moisture source in search of more cellulose, and of more water. Second, the fungus, once established, can continue to persist at a relatively low moisture content level in wood that would normally be inhospitable to fungal colonization. Finally, the fungus is quite adept at utilizing a water source in a remote location to support its growth in dry locations. In this particular scenario, the stone slab and mortar

along the wall of the crawlspace was such an excellent (stable) source of water that the fungus used that location to produce its fruiting body.

As I was carving off a section of the fungus to bring back to the lab for confirmation on my identification, I heard a terrible hissing sound behind me. Turning quickly with a knife in one hand, a flashlight in the other, I watched as a wall of thick smoke ebbed towards me. Thinking of the church above me, and the devious nature of the organism that was rotting its foundation, I quickly called upon whatever God might listen to intervene in my defense, given the just cause that I had undertaken. As the vapours engulfed me, I was quite surprised that they smelled not of imminent death, and in fact seemed quite consistent with something far more common – steam. Now feeling brave again, I made my way back towards the source of the hissing and found that it was

nothing more than a pressure release valve for the boiler system that heated the church. I watched in silent fascination as the cool timbers around me served as a cold glass of beer might on a warm summer day. Within minutes, they were all dripping with condensed water. I had found what was likely the source of moisture for the initial growth of *Serpula* on these timbers.

I don't know what the health implications are for the inhalation of *Serpula* spores. Probably, at high enough levels, they might elicit a sneeze or a runny nose. I can speculate, however, on what the health implications will be when you remove several joists and a section of the support beam from beneath a floor that occasionally is used to hold up throngs of wedding-goers, funeral-goers, and choir singers. Any significant change to the support structure of a building is a major deficiency, and it is one that can result in serious harm to occupants. The determination of the presence of a wood rotting basidiomycete in a building requires that a hygienist change the template, and think not only of a bio-aerosol-based hazard, but also of potential structural deficiencies. Whereas mould growth is typically indicative of a moisture problem on the material where it is present, a dry rot fungus may be colonizing building materials over 10 meters from the location of the fruiting body. Stone and mortar are a poor match against the rhizomorphs of *Serpula lacrymans*. Removing the fruiting body from the surface of a stone slab does nothing to stop the growth of the fungus through a colonized timber on the floor above or below you, so an extensive survey of all wood timbers in a large radius around the areas of visible rot is critical.

Strategies for dealing with dry rot have not been well developed in North America, where this is an uncommon problem. The British, Russians, and most of the section of Northern Europe between them have had more extensive dealings with this problem, and are likely your best bet for remediation solutions should you ever encounter this fungus. In the last seven years, I have encountered *Serpula lacrymans* only three times. As we head into the fall and winter seasons, I encourage you to watch the basidiospores on your mould analysis reports. Typically, they persist in indoor air as carry over from the previous season. But if the numbers seem too high, give your lab a call and ask them a few more questions about consistency in the morphology of the spores. You might have stumbled upon something far more interesting, and the dull routine of writing a report is always made better when you don't already have a template.

¹ I should note here that, regrettably, there are no standards for the classification of spores from spore trap samples, and that I, and anyone else who analyses spore trap samples, use a definition for each spore classification type that may not be the same as any other given analyst. A fungal spore from a sample at one laboratory may be classified as a "colorless spore", at another laboratory as a "basidiospore", and at another laboratory as something else entirely. Each laboratory's spore classification system may vary regardless of participation in a proficiency testing program, and regardless of laboratory accreditation (October 2007).

Crossword Answers

¹ P	R	² E	V	³ E	N	⁴ T	I	O	N		⁵ V
E		X		A		R					I
R		² P	E	R		A					N
S		O				³ I	N	⁶ J	U	R	Y
O		⁴ S	U	N		N		O			L
N		U				I		I			
A		⁵ R	A	⁷ Y		⁶ N	I	N	E	T	⁸ Y
L		E		I		G		T			W
				E					⁷ C	S	A
⁸ E	N	G	U	L	⁹ F						P
				⁹ D	E	T	E	C	T	S	