Issues surrounding the health impacts of Indoor Air Quality (IAQ) have been in the spotlight recently. Discussion on IAQ related issues among our staff members and residents has flourished long before the summer heat. Staff members’ concerns over the health impacts as a result of exposures to indoor air pollutants in offices, radon in specific, have resulted in the launching of 3 independent studies by the University to address some of these concerns. The reports of the studies are accessible at the following site:

http://www.iaq.ust.hk/

As many of the residents may know, radon is a naturally occurring, odourless, colorless, radioactive, noble gas produced by the radioactive decay of radium-226. Exposure to high levels of radon and its progenies has been identified as the main cause of lung cancer cases among miners. Although the health effects of exposures to low-dose radiation, typically at the radon levels we are currently exposed on campus, are still very much in debate in the academic arena, it is a prudent approach to minimize radon exposure whenever it is practically achievable. In Hong Kong, potentially high indoor radon level is expected as one of the major building materials, granite, contains substantial amount of radium and could contribute significantly to indoor radon level. Currently there is no internationally agreed action level on radon exposure. Recommended Action Level varies from country to country ranging from 800 Bq/m$^3$ (21.6 pCi/l) in Canada to as low as 150 Bq/m$^3$ (4 pCi/l) recommended by the Environmental Protection Agency of the U.S. According to the Indoor Air Quality Guidance Notes recently published by the Indoor Air Quality Management Group, HKSAR, offices with average radon less than 200 Bq/m$^3$ or 150 Bq/m$^3$ are considered as good or excellent respectively. It is the goal of the University’s management to meet the relevant recommendation and to go even further where resources allow.

While addressing the radon levels recorded in offices, the University has also paid much attention to the radon levels reported in the quarters. Unlike the office environment, the radon levels in quarters vary significantly with the life style of the residents and thus present some difficulties in formulating a uniform control suitable for everyone. From the results of the past and recent radon surveys, the radon levels recorded at well-ventilated apartments are generally less than 90 Bq/m$^3$ (2.4 pCi/l) as compared to levels over 200 Bq/m$^3$ (5.4 pCi/l) generally observed in apartments having all the windows shut most of the time. In the worst case, readings of over 1000 Bq/m$^3$ were recorded in an apartment where occupant purposely closed all windows to keep humidity low. The results demonstrate that campus apartments are not unique in term of radon emission and our radon measurements are comparable to
results obtained from similar surveys conducted by the Hong Kong Environmental Protection Department (HKEPD) and several investigators in the mid nineties.

There are various methods mentioned in literatures for controlling radon. These methods focus on either preventing radon entry into the indoor environment, such as applying wall paper and sealing cracks on the concrete surfaces, or removing radon from the indoor air using a ventilation system. However, the effectiveness of many of these techniques has not been well documented and application of these techniques has to be assessed on a case by case basis. Increasing ventilation seems to be the most effective and simple solution among various options mentioned.

IAQ issues related to radon might have taken the centre stage for much of the last few months, however, residents are reminded not to overlook the importance of other relatively lesser known indoor air pollutants such as formaldehyde, volatile organic compounds, biological contaminants, etc. In fact, some of these contaminants are capable of causing imminent health impacts which radon is incapable of. Take the example of formaldehyde, a common indoor air pollutant in furniture materials and a proven human carcinogen, exposures to high levels of formaldehyde may cause serious irritation to the eyes and respiratory tract and prolonged exposures may lead to the development of cancer in the upper respiratory tract as well. Formaldehyde is found in many interior household and decorative items such as books, pressed-wood products, particle board, carpet, furniture, upholstery, etc. As a rule of thumb, residents’ exposures to formaldehyde can be reduced by increasing ventilation, removing indoor emission sources or airing out new furniture in a well-ventilated place for a period of time. From time to time, the University has received residents’ complaints about unpleasant smell noticed in quarters especially at locations where maintenance work is carried out. The smell is often associated with a diverse group of organic compounds generally referred to as volatile organic compounds (VOCs). Some of the more common indoor VOCs sources include furnishing materials, household cleaning agents, pesticides, solvents and cigarette smokes. Residents’ exposures to significantly high level of VOCs may result in adverse health effects. Again, removing the source and/or increasing ventilation can help reduce residents’ exposures significantly.

Biological contaminant is one of the leading causes of the Sick Building Syndrome which is a term often used to describe symptoms experienced by occupants of buildings with poor IAQ. Indoor biological contaminants including bacteria, fungi, viruses, and dust mites, are well known for their potential to cause health problems especially among allergic and immuno-compromised individuals. Proliferation of biological contaminants in an indoor environment does not only raise aesthetic concerns, it may also cause significant property damages. Indoor environment with heavy biological contamination problems often demands enormous amount of resources to uproot the problem and results in serious loss in time and monetary terms. Maintaining good ventilation and thorough housekeeping efforts are crucial in minimizing indoor biological contaminations. In addition, maintaining low humidity is an effective approach for keeping microbial population (such as bacteria and fungi) in check. As homes are generally not serviced by central air conditioning, home dwellers are advised to enhance natural ventilation to avoid the building up of indoor air contaminants but at the same time, devise ways to keep humidity in check by means of dehumidification.

The Hong Kong Environmental Protection Department (EPD) has released a series of pamphlets providing information on the health impacts of these pollutants and suggestions on how to reduce exposure. Copies of the following pamphlets can be accessed at the EPD website at:


1. Healthy Renovation
2. Indoor Air Quality and You
3. Biological Contaminants and You
4. Environmental Tobacco Smoke and You
5. Volatile Organic Compounds and You
6. Radon and You
7. Formaldehyde and You
8. Improve the Indoor Air Quality in Your Home

Additional information may also be obtained from previous issues of Safetywise:

1. Improving Dispersion of Laboratory Emission by Virtual Stacks
http://www.ab.ust.hk/sepo/sftywise/200209/page3.htm
2. Indoor Air Quality at HKUST  
http://www.ab.ust.hk/sepo/sftywise/199912/page3.htm

3. Indoor Air Quality Objectives - Rad  
http://www.ab.ust.hk/sepo/sftywise/200412/page2.htm

4. Radon at the HKUST  
http://www.ab.ust.hk/sepo/sftywise/199704/page4.htm

5. Radon Survey on Campus  
http://www.ab.ust.hk/sepo/sftywise/199504/page1.htm

6. Radiological Hazards of Radon and its Decay Products in Hong Kong  
http://www.ab.ust.hk/sepo/sftywise/199310/page7.htm

HKUST Accident/Incident Statistics For 2004

Number of Work/Study Related Injuries

A total of 41 work/study related injury cases were recorded in 2004. Among the cases:

- 30 cases involved staff members
- 6 cases involved students
- 5 cases involved contractors

A comparison of accident numbers and accident rates over the past 10 years is shown in Table 1 below.

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<tbody>
<tr>
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<td>37</td>
<td>33</td>
<td>32</td>
<td>54</td>
<td>39</td>
<td>28</td>
<td>28</td>
<td>25</td>
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<tr>
<td>Staff Accident Rate per 1000 at Risk</td>
<td>15.5</td>
<td>13.9</td>
<td>12.3</td>
<td>19.8</td>
<td>14.2</td>
<td>10.1</td>
<td>10.7</td>
<td>9.5</td>
<td>8.7</td>
<td>11.4</td>
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<td>5</td>
<td>9</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>10</td>
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<tr>
<td>Student Accident Rate per 1000 at Risk</td>
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<td>0.8</td>
<td>1.3</td>
<td>0.6</td>
<td>1.1</td>
<td>1.1</td>
<td>1.5</td>
<td>1.0</td>
<td>1.0</td>
<td>0.9</td>
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Lost Workdays

A total of 123.5 lost workdays were incurred by the 30 staff injury cases, representing an average of 4.1 lost workdays per case. This is a significant reduction as compared with that in the year of 2003.

Among all the 30 staff injury cases, 9 cases did not incur any lost workday, 13 incurred 3 or less lost workdays and 8 cases incurred more than 3 lost workdays.

A comparison of lost workdays over the past 10 years is shown in Table 2 below.

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<tbody>
<tr>
<td>Total Number of Lost Workdays</td>
<td>122.5</td>
<td>217</td>
<td>181.5</td>
<td>630</td>
<td>237.5</td>
<td>453</td>
<td>71.5</td>
<td>190</td>
<td>382.5</td>
<td>123.5</td>
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<tr>
<td>Average Lost Workdays per Accident</td>
<td>3.3</td>
<td>6.6</td>
<td>5.7</td>
<td>11.6</td>
<td>6.1</td>
<td>16.2</td>
<td>2.5</td>
<td>7.5</td>
<td>16.6</td>
<td>4.1</td>
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</table>
Causes of Work/Study Related Injuries

Figure 1 summarizes the causes for all work/study related injuries in 2004. "Sharp Objects" remain to be the major cause for staff and student injuries. There were 10 injuries caused by "Sharp Objects" which were about 28% of the total staff and students injuries. All of the 6 cases of student injuries were caused by "Sharp Objects".

Of the 36 staff and students injury cases, 12 of them were concerned with laboratory activities whereas the rest were associated with other work activities including workshop, building operations, etc.

Besides classifying causes of injuries in terms of physical sources and energies involved, investigation of the injury cases also revealed some common underlying root causes. These root causes are summarized in Figure 2.

Figure 1. HKUST Cause of Work and Study Related Accidents in 2004

Figure 2. Common Root Causes of Accidents
Non-injury Incidents

Besides injury cases, SEPO also keeps statistics on non-injury incidents on campus.

A total of 11 non-injury incidents were recorded in 2004. Among them:
- 3 involved staff members
- 5 involved students
- 2 involved contractors and
- 1 involved a visiting research personnel

Among the 11 incidents, 7 occurred in laboratories, 1 in a student hall and 3 in other locations.

For the 7 laboratory incidents:
- 2 involved spillage of mercury from broken thermometers.
- 2 involved release of chemical vapors to the atmosphere due to improper conduct of experiments.
- 1 concerning suspected contacts with hydrofluoric acid.
- 1 involved the bursting of a chemical waste container by excessive pressure build-up internally due to mixing of incompatible chemical wastes.
- 1 involved the leaking of acidic liquid from the neutralization tank of an equipment.

For the other incidents:
- 1 fire incident in an apartment of the student quarters caused by an electric blanket.
- 3 flooding cases in different locations.

Prevention Of Sharp Object Induced Injuries

The accident statistics summary for 2004 indicates that "sharp objects" was a major cause of injuries among staff and students. In fact, it has been the major cause of injuries for the last 3 years – 9 cases (out of 32) in 2002; 11 cases (out of 30) in 2003 and 10 cases (out of 36) in 2004. Among these cases, most of them were caused by broken glassware, cutters and needle sticks. We have been fortunate that most of these injuries were relatively minor in nature. However, any of these cases could have been ended up with more serious consequences if the cut was deeper or if the sharp objects had been contaminated with more damaging hazardous or infectious substances. We must take these cases seriously and take all necessary steps to prevent them from happening again.

Most of the injuries caused by sharp objects can be prevented by following proper laboratory/work practices. Please consider the need to change our way of operating various work procedures where applicable.

Glassware

1. All glassware should be checked to ensure that they are free from cracks and flaws before use.
2. Damaged glassware should be properly repaired or disposed of in the "broken glass" bin. Never dispose broken glass in ordinary waste bins.
3. Never use bare hands to pick up broken glass. Pick it up with forceps or use a brush and dustpan.
4. Fitting glass tubing to corks or rubber stoppers (including fitting pipettes to bulbs or other types of pipette fillers) is a common cause of cuts.

- Lubricate the end of the glass tubing (and the stopper if necessary) with water (or soap water if necessary) before inserting it into a stopper. Hold the tubing as close to the stopper as practicable and gently push the tubing into the hole. Protect your hand with a cloth and keep your palm out of the line of the glass.
tubing. If you need to use significant force to push the tubing, the hole may be too small.

- Removal of the tubing from a stopper can also be hazardous. Protect your hand with a piece of cloth. If necessary, cut the stopper rather than trying to reuse it.

5. When attaching a pipette to a pipette-filler:

- Lubricate the end of the pipette.
- Protect your hand with a piece of cloth.
- Hold the pipette as close to the filler as practicable.
- Keep your palm out of the line with the pipette.

6. When fitting rubber tubing to glassware:

- Lubricate the tip of the glassware (especially for ground glass).
- Soften the tubing by immersing it in hot water briefly to make it easier for the insertion.

7. Carrying glassware:

- Large pieces of glassware, especially those containing a heavy load, should be lifted with both hands with one hand being under the base of the glassware.
- Do not carry a large flask only by holding its neck.

8. Storing glassware:

- Avoid storing glassware above shoulder height.
- Store heavy glassware at bench height.
- Store tall vessels at the back of shelves with smaller ones in front.

9. Cleaning glassware:

- Wear heavy duty water-resistant rubber gloves for cleaning glassware. Gloves with texture or slip-resistant palms are recommended. Safety glasses should also be worn.
- Use plastic core brushes that have soft non-abrasive bristles or sponge for cleaning inside of deep glassware.

- Rubber sink and counter mats can help reduce the chance of breakage.
- Do not place round or odd shape glassware on countertops or other flat surfaces where they might roll off and break. Use proper drying racks instead.

### Needle Sticks

- Needles should not be used unless there is no alternative.
- Fit needle into syringe while it is still in its sheath.
- Needle must not be bent or broken before use.
- Keep hands behind needle tip at all times.
- Minimize handling needles with bare hands. Avoid passing a needle from hand to hand.
- Never re-sheath a needle unless it is absolutely essential for the process and this should be done with a device that can allow re-sheathing to be done using one hand.
- Avoid disconnecting needle from the syringe before disposal. Discard as a single unit.
- If removing needle from the syringe is essential for the process, the needle should be re-sheathed using the device mentioned above before removal.
- Do not leave needles on work surfaces. Used needles must be placed immediately and directly into a proper sharps bin. Never dispose needles into ordinary waste bins.

### Cutters and Blades

- Do not use a blade without a proper handle.
- Used blades must be placed immediately and directly into a sharps bin. Do not leave blades on work surfaces or in drawers.
- Avoid using blunt force when using a cutter. Keep the free hand away from the cutter blade as far as practicable.
- Do not use a paper cutter for chipping objects. Use other appropriate tools instead.
Good Personal Hygiene Practices Are Keys To Preventing Infections

During SARS, our community was well aware of the need for practicing good personal hygiene in order to prevent the spread of respiratory infectious diseases. Frequent hand washing and use of hand sanitizers to keep hands free of germs were commonplace. People suffering from respiratory illnesses wore masks to prevent infectious droplets and aerosols from spreading. Many frequently touched articles and facilities in public places were covered by plastic sheets to enable easy and frequent cleaning by disinfectants. People refrained from talking or laughing out loud in crowded or confined situations like the lifts. Not surprisingly, the number of upper respiratory illness cases dropped significantly during that period.

Unfortunately, such memories are short-lived and the good hygiene practices have, for the most part, vanished along with the threat of SARS. While it is most fortunate that SARS has not reappeared and hopefully will not reappear, threats of common cold and influenza viruses continue, with the avian flu virus, meningococcus and swine streptococcus bacteria appear to be waiting in the wings to wreak havoc in various communities. To help ourselves and others, we urge members of our campus community to continue to be vigilant in adhering to good hygiene and sanitation guidelines including:

- Cover mouth and nose when sneezing or coughing and wash hands afterwards
- Wear mask if suffering from respiratory illness and avoid going to crowded places
- Wrap sputum or nasal discharge in tissue paper, dispose properly and wash hands
- Wash hands frequently after touching public objects and avoid touching eyes, nose and mouth before hand washing
- Maintain good ventilation, rest well, exercise, eat a balanced diet and stay healthy

Proper hand washing has been identified as a key to preventing flu and colds. Rubbing one’s eyes and nose with hands contaminated with these viruses is a common route of infection. The contaminated hands are also effective vehicles for spreading germs to other people and articles. Besides respiratory ailments, the hands can also play a significant role in the transmission of a variety of diseases including hepatitis A, meningococcal meningitis, infection of the gut, etc.

An interesting clip on the importance of hand washing can be accessed at:

http://www.microbe.org/washlan.mov

The US CDC has issued the following tips for proper hand washing:

1. Wet hands with warm water

2. Apply a generous amount of soap and lather hands well
3. Rub hands together for 20 seconds, paying special attention to the areas between fingers and under nails.

4. Rinse hands thoroughly with warm water.

5. Dry hands with a disposable towel.

6. Use the disposable towel to turn off the faucet and open the door.

A recent study once again confirms that simple hand washing with soap can save children’s lives. A press release and discussions by US CDC on this study can be accessed at:

[http://www.cdc.gov/od/oc/media/pressrel/r050714a.htm](http://www.cdc.gov/od/oc/media/pressrel/r050714a.htm)

The promotion of the importance of frequent and proper hand washing in preventing disease transmission is an important public health agenda. The WHO will be launching a world-wide campaign shortly to promote this concept and to recommend an affordable and effective germicidal soap formulation. In the meantime, remember to wash your hands frequently to keep them clean, and stay tuned…

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**HOW TO CONTACT SEPO**

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<thead>
<tr>
<th>Role</th>
<th>Ext.</th>
<th>E-mail</th>
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<tbody>
<tr>
<td>SEPO General Enquiry</td>
<td>7229/6509</td>
<td>SAFETY</td>
</tr>
<tr>
<td>Environmental Health &amp; Safety Management</td>
<td>Director: Dr. Joseph Kwan 6451</td>
<td>JOEKWAN</td>
</tr>
<tr>
<td>Fire Safety, Electrical Safety, Ergonomics, Accident Reporting, Safety Training</td>
<td>Engineer (Safety) 6511</td>
<td>TSLI</td>
</tr>
<tr>
<td>Ionizing Radiation Safety, Non-ionizing Radiation Safety</td>
<td>Health Physicist</td>
<td>JOEKWAN</td>
</tr>
<tr>
<td>Biosafety, Chemical Safety, Laser Safety, Medical Surveillance, Regulatory Affairs, Safety Publications, Indoor Air Quality, Hazardous Waste Management, Analytical Services</td>
<td>Senior Engineer: Dr. Samuel Yu 6547</td>
<td>SAMYU</td>
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<tr>
<td>Construction Safety, Contractor Safety, Food Hygiene, Machine Shop Safety, Environmental Issues, Recycling</td>
<td>Engineer: Mr. Pak Ip 6538</td>
<td>SEPOPCIP</td>
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<tr>
<td>Environmental Health &amp; Safety Team, Field Services, Compliance Monitoring</td>
<td>Health &amp; Safety Officer: Mr. C M Li 6485</td>
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<td>Team Leader: Mr. Percy To 6507</td>
<td>PERCYTMT</td>
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SEPO homepage: [http://www.ab.ust.hk/sepo](http://www.ab.ust.hk/sepo)

Please feel free to contact us via phone call or e-mail, if you have specific safety or environmental related questions.
Clearing Drains

A serious accident several months ago raised the community’s attention to the potential danger of drain cleaning chemicals, especially when used improperly or without appropriate personal protection. A clogged up drain is a problem that all of us face every so often both at the workplace and at home. We either roll up our sleeves and take on this problem ourselves, or we call in professional help. Either way, there are a few things that we should keep in mind.

The correct priority

- Prevent clogging
- Check drain trap
- Use a plunger
- Use mechanical means
- Use chemical drain opener or ask for professional help

Prevention

- Always use restrainers to trap debris and hair
- Pour hot water down the drain periodically will help cut the grease in a drain pipe, a handful of baking soda may be added for better effect
- For bathroom drain, use hot water with half a cup of white vinegar to help dissolve soap and hair

Checking drain trap

For plumbing fixtures that have a drain trap underneath, it is a good idea to check for objects or materials that may be blocking the flow. Basically you only need a bucket underneath the trap to capture the water and debris when you remove the trap. Remember NOT to attempt removing the drain trap if you have already applied chemical drain openers. You should also inform the plumber about the chemical so that he or she can take appropriate precautions.

Using a plunger

The plunger is a useful tool, but don’t expect the water to rush down the drain after casually pumping up and down a few times. Here are some useful tips:

- Don’t use a plunger if chemical drain opener has already been applied to the fixture
- Make sure the suction cup of the plunger is large enough to completely cover the drain opening
- Make sure there is enough water in the sink or tub, at least to completely submerge the plunger cup
- Use petroleum jelly on the rim of the cup to get a better seal
- Block all other outlets, such as the overflow hole, the second drain in a double sink, etc with wet rags
- Put the plunger in at an angle to minimize air trapping
A plumber’s auger (or "sewer snake") is probably the safest way to clear a stubborn clog. The auger is simply a flexible wound-wire cable that can be turned into a pipe either by hand or by motor. If a plumber’s auger is not available, a simple piece of wire may help unclog a drain pipe sometimes.

Using mechanical means

- Apply 15 to 20 forceful vertical strokes
- If it doesn’t work, repeat 2 or 3 times

Using chemical drain openers

There are many reasons against using chemical drain openers, which are usually highly corrosive chemicals. Chemical safety of course is a prime concern, storing such dangerous chemicals at home also creates a latent hazard, especially for children. The strong chemicals when used are also damaging to the environment, and may affect the operation of local sewage treatment facilities, such as septic tanks, which rely on microbial activities.

Therefore if a plunger or mechanical means does not work, you should consider calling for professional help right away. However, if you really want to try chemical drain openers as a last resort, observe the following precautions:

- Only use chemical drain opener that has clear instructions and safety precautions
- Wear rubber gloves and preferably also safety glasses
- Ensure there is adequate ventilation, open windows or turn on exhaust fans
- Remove or allow draining of as much water from the clogged fixture as possible. Adding chemical drain openers to a large volume of still water will only dilute the chemical and will not help clear the clog
- Carefully follow instruction on the package of the product
- Don’t look down the drain after pouring a chemical. Stay away and avoid breathing near the drain. The mixture often gives off toxic fumes and may boil up with splashing chemical droplets
- Never use a plunger or try to remove the drain trap if a chemical drain opener is present in the drain, otherwise you risk splashing yourself with corrosive solution
- Never mix chemicals. Mixing of an acid and an alkaline cleaner can cause violent chemical reaction

inside the cup (remember air is much more compressible than water, so any air remaining in the cup will absorb part of the force applied on the plunger)