Health and Safety

Happy New Year one and all!

About a year ago, nearly to the day, I was replacing a light fixture in our bathroom and cracked the mirror -- a long, serpentine, running crack from upper left to lower right. I'm not superstitious, but one has to wonder about something so ominous happening on January 2nd.

So, I've been extra careful for the last year, not wanting to have anything terrible happen that could be blamed on the bad luck generated by my mirror misadventure. (I'm assuming the bad luck is amortized over the seven-year contract and that the consequences of my clumsiness diminish over time, thus allowing me to talk about it after surviving the first year.)

So it was with an extra sense of urgency that I changed all the batteries in our smoke detectors last year and again this year. Likewise, I rechecked my emergency supplies. I realized that I have lost my camping water filtration device (mentioned in this column, September 2005) that is part of my backpacking gear / emergency response kit. (I'm ordering another online as I write this.)

So, even if you haven't broken a mirror, I would encourage you to sit back and think about your own health and safety. In the last year, what have you done to improve both?

When you work on a project, or better, when you plan a project, do you consider the personal safety ramifications for you? For your co-workers? For the planet at-large? Do you think about potential hazardous materials that may be a part of the piece you are working on? Lead? Arsenic? Pesticide residues? Cadmium? Mold toxins, spores, or allergens?

Are you breathing fumes you shouldn't? Are you using solvents you shouldn't? Do you know the health hazards of the solvents you are using?

What about ergonomics? Are you being good to your body while working? (I wasn't! I lifted and twisted while picking up a large painting and have been regretting that lapse for the last couple of weeks.) Not to sound too much like an old codger, but: You youngsters out there – your easily ignored injuries in youth come back to torment you in your middle and later years. So take care of your physical plant now. (Guess who turned 50 last year.)

Do you have access to a HEPA filtered vacuum? Do you use it?

There is a new, albeit expensive, HEPA vacuum on the scene. The manufacturer, Hazard Technology, has solved one of the dirty little secrets of vacuuming hazardous waste -- changing the filter bag can expose you to the very hazards you are trying to contain.

When working with truly hazardous waste (arsenic, lead, asbestos, etc.), the removal and containment of the stuff inside of the vacuum is problematic, to say the least. Nilfisk recommends changing the filter bag inside a very large glove-bag. There is still the issue of contaminating the exterior of the vacuum while opening the interior. There is also the problem of the filters between the collection bag and the HEPA filter having been contaminated.

Hazard Technology's "Containment Vacuum" solves this problem by replacing the filter bag with a HEPA filter. It's expensive, but you throw away the HEPA with the stuff that's been vacuumed up. There is a second HEPA filter on the exhaust, so the Containment Vacuum is every bit as clean as a Nilfisk. The really cute trick is that when you open the vacuum to remove the disposable HEPA element, you keep the vacuum turned on, keeping the crud in the filter in the filter. A cap/plug is placed over the opening of the HEPA filter before the vacuum is turned off. Thus the contaminant is completely contained.

The bad news: this puppy is pretty pricey. The unit sells for $2,075.00, including all of the amenities. You can request a hose with an air-bleed, but this is not standard. The vacuum does not come with a motor speed control, however running the unit with a speed controller will not harm the vacuum's motor. The filters cost $205.00. For non-hazardous vacuuming, the HEPA filter/collector can be replaced with a paper bag filter. When using the paper filter, you are still protected by two pre-filters and the HEPA exhaust filter to clean the air stream before it is released back into your breathing zone.

One more possibility that the changeable HEPA containment filters allow: You can have different filters for different classes of hazardous waste. The filters can be stored and switched until full and ready to be disposed of. This also allows different hazardous wastes to be kept segregated which might help with disposal.

While a conventional paper filter bag is inexpensive, if you add the cost of the glove-bag necessary to safely change that filter bag; the additional disposal cost of the glove-bag and the wipes to clean the outside of the vacuum; and the time to change the filter in a glove-bag, the cost of the disposable HEPA filter/collector may not be as exorbitant as it sounds. (OK, the time is money argument doesn't really sound that credible for conservators, but the glove-bags run about $50 each.)

The unit is rather large – 18.25 pounds and 43 inches tall on its wheeled cart. You should also know that the design necessitates that the hose plug into the top of the unit preventing the vacuum from being pulled around by the hose.

The specs for the vacuum, for those of you keeping score at home: Airflow: 80 CFM; Waterlift: 90.2"; Filter capacity 0.67 gal; Wet/Dry: dry; Filter Efficiency 99.99% @ 0.3 microns; Weight: 18.25 lbs; Motor: 1.4 hp; Noise level: 61 dB; # Filter Stages: 4.

For more information, contact: Hazard Technology; (800) 852-3698, www.hazardtechnology.com.

Oh, and Hazard Technology also makes portable and vented fume hoods and down draft tables fitted with activated charcoal (to removed organic solvent vapors) and/or HEPA filters.

Chris Stavroudis, column editor

Using a HEPA filtered vacuum in the conservation studio for general clean-up insures that any hazardous crud that may have made its way into you lab will not make its way into your breathing zone while cleaning up. The reason this is important is body burden.

Health hazards are synergistic. Exposure to two hazards is worse that being exposed to each separately. Each exposure adds to our body burden, making the next exposure slightly worse than it would otherwise have been. In these modern times we are so heavily exposed to toxins that we need to be extra careful about work exposures. Our bodies are truly burdened.

The extent of the body burden in modern humans is documented in the October 2006 issue of *National Geographic*. It makes for fascinating and frightening reading. "The Pollution Within" by David Ewing Duncan (with photographs by Peter Essick) documents the author's "journey of chemical self-discovery." The tag-line for the piece is: "Thanks to modern chemistry, eggs don't stick to the pan, underarms are fresh all day, SUVs hit 60 in six seconds. But such convenience has a price: Chemicals that suffuse modern life – from well-known toxins to newer compounds with unknown effects – are building up in our bodies and sometimes staying there for years."

National Geographic paid for the author to be tested for the presence of 320 chemicals, retail value $15,000. The tests required 14 vials of blood, as well as urine. (He tells of feeling woozy during the blood draw.) Of the 209 PCBs tested for, 97 were detected in the author's blood. 25 PBDEs (polybrominated diphenyl ethers) of the forty tested for were detected; 16 of 28 pesticides, 10 of 17 dioxins, all 7 phthalates tested for were found, 7 of 14 PFAs (perfluorinated acids) and 3 of the 4 heavy metals were found. Neither of the two bisphenols tested for were detected in his blood.

One of the more disturbing images in the article is an x-ray of a child's abdomen showing white (x-ray opaque) flecks in her intestines – ingested lead-based paint flakes.

The PFAs come from non-stick coatings on cookware, Scotchguard fabric protector, and probably other sources. Scotchguard was taken off the market because 3M became concerned by the release and buildup of PFAs in the environment.

Perhaps one of the most surprising test results were the PBDEs which are used as flame retardants. The author tried to determine the source of his high levels of these contaminants. The PDBEs, the experts concluded, came from his frequent flights in commercial airliners. The seats are still made of flammable materials, but now they are heavily treated with PBDEs to prevent them from burning in a disaster.

One of the more frightening experiments the author, not normally a fish eater, performed on himself was to dine on fish and have his blood re-tested for mercury. His level went from 5 μg/l before to 12 μg/l after having halibut for dinner and swordfish for breakfast. (The fish were caught off the San Francisco coast.)

There are many themes in the *National Geographic* article that will sound familiar to readers of this column – estrogen mimics (xenoestrogens); dioxins; lead, arsenic and mercury; phthalates; pesticide residues. The reason I mention the article here is to remind us that all of these nasty things are already present in our bodies. That may mean that we have a whopping body burden before we even step into the conservation studio. Add to that any occupational exposure from our work and we may be pushing our luck.

Be safe – have a Happy New Year!

Chris Stavroudis is a conservator in private practice.

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