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Environmental Management

PRACTICAL AND CURRENT INFORMATION FOR ENVIRONMENTAL, HEALTH AND SAFETY PROFESSIONALS

ARIZONA

WORKING (AND TRAVELLING) IN A WORLD OF BED BUGS

DAWN H. GOUGE

*Professor & Specialist - Public Health IPM
University of Arizona Pg 4*



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OVERVIEW: Philip McNeely, Director, MCAQD
PLANNING: Rule Updates -- Ozone and Beyond;
Emissions Inventory
PERMITTING: Emissions Bank; New Source Review
Changes and Modeling Requirements
HONEYWELL: How to Conduct an "Air Permit Review" (Greg Bopp)
OUTREACH: Travel Reduction; Ozone Campaign; Clean Air
Make More; Proactive Compliance Assistance
INTEL: Improving Your Emissions Calculations (Craig McCurry)

LUNCH / NETWORKING

AFTERNOON

PING: Starting a New Chemical Process;
Bringing in New Equipment (Melissa Schmaltz)
MONITORING: Data Collection and Reporting; Air Quality
Index; New Near Road Monitors; Fire Response
COMPLIANCE: Common Violations; Inspections and
Recordkeeping; Enforcement; Rapid
Response Program

BACK AGAIN! (OPTIONAL)

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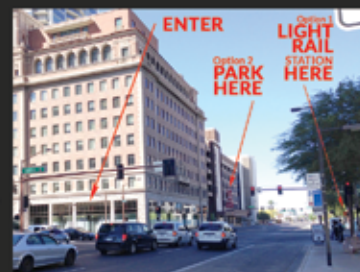
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What do Cleopatra (30 BC Egyptian pharaoh), Aristotle (322 BC Greek philosopher), Former President Bill Clinton (42nd U.S. President), Howard Stern (current-day American media personality), and my Aunt Mary all have in common? They, along with 1 in 5 Americans have battled bed bugs.

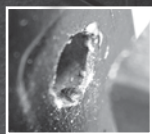
by Dawn H. Gouge

THE PERFECT PARASITE

Bed bugs (*Cimex lectularius*) are biting insects that feed on the blood of people while they rest, and they are not known to spread disease causing pathogens, under normal living conditions. As a result, entomologists negotiating the complexities of blood-feeding pathogen vectors, like mosquitoes and ticks, tend to consider bed bugs as relatively unimportant.

In many respects the common bed bug is indeed the perfect ectoparasite. They take small blood meals, adults taking about 0.06 ml per feeding. They feed painlessly, and fast (around 10 minutes), using anesthetics and anticoagulants, and hide the rest of the time. While a single drop of our blood is an insignificant loss to us, it's around six times the weight of a bed bug. Making one bed bug meal the equivalent of a 150 lb man drinking 108 gallons of beer, during one NBA quarter.

WORKING (AND TRAVELLING): IN A WORLD OF BED BUGS



BED BUGS IN
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BED BUGS

Bed bugs have been our bed-mates for thousands of years. Archaeologists found fossilized bed bugs while excavating a 3,550-year-old site in Egypt. There is no doubt that the common bed bug has influenced human history in many ways.

FROM HEALING POTION TO HATED PEST

Bed bugs were not always considered a scourge. The Roman philosopher Pliny 77 A.D. describes the medicinal use of bed bugs to heal snakebites, and ear infections. But the human/bed bug dynamic of today is pretty clear, and most people in the U.S. proclaim veritable hatred of the insect. Charles Darwin in *The Expression of the Emotions in Man and Animals* (1872), describes hatred as an intense form of dislike, but hatred for many, is a distinct understatement.

As a public health entomologist, with 16 years of bed bug experience, it's likely I have interacted with thousands of residents, each with their own unique story to tell. Although each individual's physical and emotional reaction to bed bugs is specific to them, there are distinct attitude groupings.

The "bed bugs don't both me" group genuinely don't appear to care, rarely react to bites, and often insist they are not being bitten, despite obvious evidence to the contrary. This group of individuals may be apathetic in general, and may show signs of specific mental health challenges such as clinical depression, schizophrenia, or dementia. These residents have bigger issues, and may want to be left alone, refusing or prolonging infestation remediation efforts.

The "concerned citizen" group seek knowledge, want to make informed decisions, and play an active role in remediation. They take responsibility in making strategic changes to their behavior in order to avoid future bed bug infestations. These residents lose sleep, suffer anxiety and stress, but usually recover once successful remediation is undertaken and confirmed.

Finally, the "bed-dread" group suffer severe stress. Residents report significant impacts on their quality of life, long-term emotional injury, and recovery can take extended periods of time without supportive therapy. Residents desperate for relief may take bed bug control efforts into their own hands, using excessive and/or inappropriate chemicals in their homes, placing themselves and their families at great risk.

BED BUG PTSD

At this point there are several groups of scientists documenting the psychological ramifications of living with bed bugs. University of Montreal researchers report that tenants with bed bugs were far more likely to report anxiety and sleep disturbances than those without. Mississippi State University researchers analyzed online posts, grading entries using a checklist to assess Post-Traumatic Stress Disorder (PTSD). 81 percent of people submitting posts described psychological and emotional effects associated with PTSD, like hyper-vigilance, paranoia, obsessive thoughts, and depression.

Our own University of Arizona research team concluded that living with bed bugs can cause economic, social and human

Continued on next page

GOUGE: WORKING IN A WORLD OF BED BUGS

CONTINUED FROM PREVIOUS PAGE

health costs. More than 700 residents completed questionnaires to help us document risk factors and impacts. We truly expected that none of the findings would be terribly surprising, but we were wrong.

SUMMARY OF RISK FACTOR FINDINGS

Residents reporting more bed bug infestations:

- had lower annual income
- move home more often
- stay with friends and/or family more often
- host visitors more often
- are twice as likely to have acquired second hand articles
- report more people per household
- report a disability more often

SUMMARY OF IMPACT FINDINGS

- 17% of residents had bed bug bite reactions requiring medical treatment
- 89% of residents with bed bugs report sleep loss
- 38% could not fulfill work duties as well as usual
- 17% could not care for dependents as well as usual
- 64% report financial losses
- 47% with infestations felt isolated
- 27% who no longer had bed bugs, still felt isolated
- Residents with bed bugs are more likely to report increases in alcohol consumption, smoking, prescription and illicit drug use
- 26% of residents report a decline in health
- Residents with bed bugs use significantly more over-the-counter pesticides
- 24% with bed bugs reported using do-it-yourself treatments with hazardous chemicals such as gasoline

Open-ended questions gathered narrative entries, including reports of pathological fear of bed bugs, delusions of parasitosis, excessive and inappropriate pesticide use, use of gasoline, kerosene, and other chemicals on beds and furniture. Reports of complete desperation, isolation, helplessness, self-harming, and suicidal ideation resulted in modification of the survey tool and a survey relaunch.

HUMANS ARE HARD-WIRED TO OVERREACT

By far the most significant health threats occur due to depression, over-all destabilization of mental health, and extreme use of chemicals on beds, and in homes. However, I am a firm believer that for many

residents, hearing that bed bugs are not likely to make them ill, is not reassuring or helpful. Neither is being told that excessive or inappropriate chemical use can be dangerous. For those feeling real hatred of bed bugs overreaction, and even irrational action may be rooted in basic anthropological instinct.



SOLUTIONS

By far the best solution, is not to acquire bed bugs in the first place. While many of us live in multifamily housing, and have no control over our neighbors, there are a number of things all of us can do to reduce the chances of giving a lift to hitchhiking bed bugs.

TIPS FOR TRAVELERS

- When sleeping in a new-to-you bed, check for signs of bed bugs (see #3, AZ1625) on mattresses and box springs. If you are in a hotel or motel, and find fecal spotting or bed bugs, ask for a new room, away from the first. Using a flashlight to inspect for bugs, helps enormously.
- Park your suitcases or bags on a hard surface if possible, table tops or laminate flooring is best.
- Even if you don't find bed bugs, treat your luggage as if you had. Vacuum suitcases and bags, and store them in a garage or external storage cupboard if possible. Avoid bringing bags into bedrooms to unpack clothing. If you must store your travel bags inside your home, consider using collapsible bags that can be placed in the clothes dryer upon your return.
- Launder or dry-clean all clothes upon returning. The washing of bed bugs does not kill them, it is the clothes dryer that does the job.
- Items that cannot be laundered may be placed in the freezer for a few days, vacuumed, or carefully inspected.

WORKING IN HOMES OR LOCATIONS POTENTIALLY INFESTED WITH BED BUGS

- Take a minimal amount of your own belongings into a location. Place items you have to bring in on hard surfaces when possible.
- If you can avoid sitting on couches, beds or carpet, that is ideal. However, many people have jobs that require them to interact with residents, their belongings, and their home intimately e.g., social service or maintenance staff. **Don't let a fear of bed bugs alter how well you do your job. Just plan on taking the appropriate precautions to avoid infestations in your own home. It's very simple.**
- If you need to interact with children, and typically do that on the floor, consider bringing a sheet or blanket that you can place on the floor. After the visit place the floor-covering in a plastic bag, and place in the clothes drier as soon as you are home, on

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JOURNAL OF Environmental Management ARIZONA

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FROM THE EDITOR



Our feature article this issue of the Journal, “Working (and Travelling) in a World of Bed Bugs”, by Dawn Gouge, University of Arizona, addresses an increasingly important subject not only to the public, but also to businesses, safety managers, and environmental managers. With the now unfortunate, but commonplace, presence of bed bugs in many hotels and on items such as

luggage, employee safety and comfort while travelling for business is an important issue. Bed bugs are, perhaps, an unpleasant subject for discussion -- but in her article, Dawn helps us by addressing the practical approach to avoiding, and getting rid of, bed bugs.

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Thank you to all our readers, contributors, columnists, and our advertisers!

Sincerely,
Jim Thrush, M.S. Environmental Management
Editor & Publisher 480-422-4430 x42
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MORE INFORMATION ON BED BUGS:

1. Bed Bug Survey <http://cals.arizona.edu/apmc/public-health-IPM#bedbugs>
2. Gouge, D. H., C. Olson, A. Fournier and P. Baker. 2012. Working the Bugs Out, Bed Bug Control—What Landlords and Tenants in Multi-Family Housing Need to Know in Arizona. University of Arizona Cooperative Extension AZ1563, pp. 6. <http://cals.arizona.edu/pubs/insects/az1563.pdf>
3. Gouge, D. H., Li, S., Nair, S., Stock, T., Bryks, S., Foss, C., Romero, A., Young, D. J. and Code, A. 2014. Bed Bugs. University of Arizona Cooperative Extension. Publication no. AZ1625, pp. 47. <http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1625-2014.pdf>
4. Sutherland, A., D-H. Choe, V. Lewis, D. Young, A. Romero, H. Spafford, D. Gouge. Sep 2015. Capturing the ABCs of professional bed bug management in low-income multi-unit housing: a summary of survey responses. Pest Control Technology Magazine. <https://www.pctonline.com/article/pct0915-bed-bugs-multi-unit-housing>
5. Bed Bugs: Get Them Out and Keep Them Out. EPA <https://www.epa.gov/bedbugs>
6. Parasites - Bed Bugs CDC <http://www.cdc.gov/parasites/bedbugs/>
7. Best Management Practices for Bed Bugs – NPMA <http://www.bedbugbmps.org/best-practices>

a high heat for 30 minutes. If you are visiting multiple locations, make sure you do not transfer bed bugs from one location to another, inspect your shoes or use disposable booties, and use separate floor coverings for each home.

- Even if you don't see bed bugs, assume you may have been exposed to some and upon returning home launder or dry-clean all clothes immediately, and take a shower.
- Consider having designated “work shoes” that you keep in your garage or an outdoor storage area.
- Consider bringing a change of clothes to work if you know you have to visit multiple locations, or must return to the office before going home.
- Infestations in vehicles are rare, but possible if you spend hours in your vehicle every day. Changing clothes, and double-bagging clothing effectively containerizes bugs until you can launder or place items in a clothes drier on a high heat for 30 minutes.

PERSONAL PLEA

I work with bed bugs in a laboratory. I work in heavily infested homes gladly, I hug and comfort distressed people with bed bugs on their person. Taking very simple precautions I can do my job well, without fear, and have never brought them into my own home. I cannot say that I love the bed bug, but I can say that I do not hate them. I do however, utterly and unreservedly hate mosquitoes!

Dawn H. Gouge is Professor and Specialist – Public Health IPM, at the University of Arizona, Department of Entomology. Dawn can be reached at dhgouge@email.arizona.edu.

ASSOCIATIONS PAGES

The Journal of Environmental Management Arizona invites environmental, health and/or safety organizations in Arizona to contribute news articles about their associations. Contact the editor at 480-422-4430 x42.



WWW.SAEMS.ORG



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ARIZONA FORWARD

ARIZONA FORWARD.ORG

SAEMS would again like to congratulate all of the 2016 SAEMS Scholarship Winners. This year SAEMS was able to award \$10,200 in scholarship funds to 10 University of Arizona students. Over the course of the summer, our winners will be attending our monthly luncheons to receive their scholarship certificates and to provide a brief presentation on their research and studies.

Special appreciation also goes out to our sponsors and all who attended the 2016 SAEMS RCRA Seminar at the Hilton East in Tucson, Arizona. It is your participation that allows this event to be so successful year after year and your generosity that allows us to award scholarships to future EHS professionals.

I would also like to personally thank SAEMS for allowing to me to serve as their President for the last year. It has been an honor and a privilege and this will be my last submission before I turn over the reins and the highly coveted SAEMS Presidential golden bung wrench to our next President, Michael McGovern. I would also like to extend thanks to the other board members, committee chairs and members, and to all our volunteers who did such a fantastic job over the last year. Thank you.

Please consider attending SAEMS Luncheons and Events for informative presentations and networking opportunities. Also please note that SAEMS is now offering free memberships to students so they may begin networking with environmental professionals while still pursuing their educational goals. For more information regarding SAEMS and upcoming events please visit our website.

Best Regards!

Derek Koller
President



Our June meeting featured Laura Malone from ADEQ and was hugely successful with over 60 in attendance. Laura shared details on the new UST Revolving Fund and recent changes to the Waste Programs Unit work chart structure. EPAZ Members can find her presentation on the "Members-Only" section of our website. EPAZ and ASSE postponed their joint networking mixer that was originally planned to be held in June. We hope to pull the mixer together in September and are actively looking for sponsors for the event.

Upcoming Events:

August 11, 2016 - Our monthly meeting will feature Chuck Graf from ADEQ and he will present on the report that is being generated by the "Advisory Panel on Emerging Contaminants".

September 8, 2016 - Our monthly meeting will feature Rosanne Albright, City of Phoenix, Kenny W. Harris P. E., Harrison Properties and Paris Masek, Green on Purpose Inc. and they will present on "Brownfields for Economic Growth and Healthy Communities".

October 13, 2016 - Our monthly meeting will feature Disha Gadre from Trinity Consultants and she will present on "Environmental Life Cycle Assessments".

EPAZ hosts monthly luncheon meetings on the second Thursday of the month from 11:30 AM to 1:00 PM at the SRP PERA Club.

For the most up to date information, event details and reservations please visit our website at www.epaz.org.

Lisa Culbert
Association Manager



WWW.AWMA-GCS.ORG

AWMA Grand Canyon Section had a great field trip for our May meeting (photo below) to the ASU MacroTechnology Works in south Tempe. We learned a lot about the manufacture

of Flexible Displays and the environmental consequences of their manufacture. Thank you to Al Brown and the other folks at ASU that put it on, and Kale Walch of our group for getting everything set up.

I would also like to give a big thank you to Richard Sumner, Permit Engineering Manager, MCAQD for giving a presentation on Permits 101 (or How to Get Your Maricopa County Air Quality Permit Faster) for our June 24 meeting.

We will not be having a July meeting, but July 28 will be our next Happy Hour. For our August meeting, we will be getting a speaker from ASU. Check our website www.awma-gcs.org for details.

Mike Sonenberg, PE
Chair



SPOTLIGHTING ENVIRONMENTAL EXCELLENCE

Arizona Forward has been showcasing environmental excellence in the region for almost 40 years, recognizing contributions to quality of life and raising the bar for future development.

We are thrilled to open all entries in Arizona Forward's Environmental Excellence Awards, presented by SRP, to projects statewide for the second year. We were urged by our brethren in Northern and Southern Arizona to expand our awards program geographically and open all categories statewide on transitioning Valley Forward to Arizona Forward in 2013. It's a natural evolution for this iconic competition, which has grown significantly to become the largest and most prominent of its kind in Arizona.

Seeded in 1980, the awards recognize exemplary contributions to sustainability in eight broad-based categories, including the Governor's Award for Arizona's Future and the SRP Award for Environmental Stewardship. Other categories encompass: buildings and structures, healthy communities, energy and technology innovation, site development, art in public places, and environmental education/communication.

This year's gala will be held on Sept. 10 at the Arizona Grand Resort. The program is open to the public but reservations are required.

Arizonans should take comfort and pride in knowing that sustainability has become an integral component in the operations of public, private, educational and non-profit interests throughout our state.

Last year, the Sun Link Tucson Streetcar earned the coveted President's Award (Best of Show). Jurists gave it top honors because it's vital to improving the look and feel of downtown Tucson while providing environmental benefits and a much-needed boost to the community's infrastructure.

First place Crescordia winners, awards of merit and even those submittals that do not make the finalist list, pay tribute to virtually all facets of how we live, work and play, ranging from green buildings and magnificent desert vistas to livable communities, innovative public art, sustainable technologies and environmental education.

Join us in celebrating projects that set the standard for achieving a balance between the built and natural environment in our state's physical, technical, social and aesthetic development.

Your presence among a gathering of the best and brightest minds in sustainability is encouraged. Join design professionals, property owners, municipalities, corporations, educators, artists, environmental consultants and others who eagerly seek the coveted first-place Crescordia in the

Academy Awards of the environmental community!

For more information, visit arizonaforward.org.

Diane Brossart
President





AZ.ASSE.ORG

The Arizona Chapter ASSE welcomes our incoming President, Marc Tomeoni, beginning his term in July. We will not meet in July or August, but we have

a great presenter coming up on September 2nd, 2016, at Gateway Community College, Building SO, Room 1330, to speak on Zika Virus. Please check website at az.asse.org for registration information.

Melissa Schmalz
President



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The Arizona Environmental Strategic Alliance and the Maricopa County Air Quality Department will co-host the annual one-day Maricopa County Air Quality Permit Compliance

Assistance Seminar in Phoenix on Thursday, July 14th, 2016, at the Maricopa County Security Building at 234 N. Central in the 8th Floor Ballroom. Seating is limited so register soon!

Attendees will participate in presentations by both Maricopa County Air Quality Department staff and industry professionals. If your facility has an air quality permit in Maricopa County, or you are a consultant working with a regulated source in Maricopa County, this seminar is for you! For more information, see our full-page advertisement in this issue of the Journal (on page 3) or visit our website at www.azalliance.org.

For more information about the Alliance, you can contact me at Gregory.Bopp@Honeywell.com or contact the Alliance at our office at 480-422-7392.

Greg Bopp
Chair



WWW.SESHA.ORG

The Semiconductor Environmental Safety and Health Association (SESHA) is having a planning meeting for all that would like to participate on July 6th beginning at 0900 hrs.

The meeting is to focus on planning and scheduling for upcoming mini-

conferences and annual conference. All are welcome. The meeting will be held at Western Technologies Inc., 3737 East Broadway Road, Phoenix, Arizona 85040 in Building A – Classroom.

Vicky L. Aviles
AZ Chapter
President



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US EPA AWARDS NEARLY \$2.7 MILLION TO ASSESS AND CLEAN UP CONTAMINATION IN AZ, CA, AND NV

❖ The U.S. Environmental Protection Agency announced recently that projects in Arizona, California and Nevada will receive a combined \$2,692,000 in federal funds to assess and clean up historically contaminated properties, also known as brownfields, for reuse and development. Awarded through the Assessment, Revolving Loan Fund and Cleanup (ARC) grant program, these funds are part of \$55.2 million being invested in 131 communities across the country.

“EPA is committed to helping communities safely clean up abandoned and contaminated sites and transform them into assets,” said Alexis Strauss, EPA’s Acting Regional Administrator for the Pacific Southwest. “These projects will provide valuable economic support to these communities while protecting public health and the environment.”

ARC grants can be used to either assess a brownfield site (including inventory work and cleanup planning) or to conduct cleanup activities. This helps communities to recycle vacant and abandoned properties for new, productive reuses.

The Arizona recipients: Gila County Industrial Development Authority (Ariz.) - \$400,000 Assessment Grant: The Industrial Development Authority (IDA) will conduct 50 assessments at former industrial and commercial properties in the rural mining towns of Globe, Miami, and Claypool. The assessments, which will occur along 6 miles of US 60, will focus on commercial properties that can provide economic redevelopment opportunities. The IDA intends for the assessments to complement existing grassroots efforts set forth by the community.

These grants advance EPA’s broader commitment to coordinating federal investments to help environmentally overburdened, underserved, and economically distressed communities address local priorities. Aligning federal resources allows agencies to better meet communities’ needs and communities to more effectively reap the benefits of collaborative investments. ARC

grantees demonstrate a high level of preparedness to undertake specific projects, as they have firm commitments of leveraged funds to move projects forward.

There are an estimated 450,000 abandoned and contaminated waste sites in America. Since the inception of the EPA’s Brownfields Program in 1995, cumulative brownfields program investments have leveraged more than \$20 billion from a variety of public and private sources for cleanup and redevelopment activities. This equates to an average of \$17.79 leveraged per EPA brownfields dollar expended. These investments have resulted in nearly 109,000 jobs nationwide. EPA’s Brownfields Program empowers states, communities and other stakeholders to work together to prevent, assess, safely clean up, and sustainably reuse brownfields sites.

More on EPA’s Brownfields Program: <https://www.epa.gov/brownfields>. More on successful Brownfields stories: <https://www.epa.gov/brownfields/brownfields-success-stories>.

ADEQ LAUNCHES NEW PROGRAM TO REMOVE UNDERGROUND STORAGE TANKS (USTs) FREE OF CHARGE

❖ *ADEQ program reduces potential negative public health impacts while promoting environmentally responsible economic growth by facilitating land reuse and removing barriers to redevelopment.*

Arizona Department of Environmental Quality (ADEQ) officials announced recently the launch of a new program designed to remove, free of charge, old and potentially leaking underground



Example of UST Removal

Photo Courtesy of US Army Env. Command, Creative Commons, do Flickr.com.

storage tanks (USTs). Most gas stations throughout the state store gasoline or diesel fuel in large USTs. Leaks of gasoline or diesel from USTs into surrounding soil or groundwater can result in a public health hazard and often hinder the sale and redevelopment of properties where these tanks are present.

“This new program will allow ADEQ to mitigate potential future public health impacts from gas and diesel contamination,” ADEQ Waste Programs Division Director Laura Malone said. “In addition, these tank removals have a great potential to increase the market value of the properties from which the tanks are being removed.”

Based on new authority created by the legislature last year, the new program enables ADEQ to remove old or unused tanks, conduct soil sampling near the removed tanks to determine if a leak has occurred and develop a baseline assessment of the property. Based on a recent ADEQ evaluation, the majority of reported releases are associated with USTs installed more than

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Larry Olson, PhD.

IT'S ALL ABOUT CHEMISTRY

FUKUSHIMA – FIVE YEARS LATER

I've been on a family vacation on the northern coast of Oregon, where some days it hasn't gotten out of the 50's! But there are signs all over for Tsunami Hazard Zone, and I can't help but remember March 11, 2011 when as many as 19,000 people, just like me, were going about their normal routines in Japan but didn't survive to see the end of the day. A 9.0 earthquake about 135 miles offshore from the city of Sendai, the largest ever recorded to hit Japan, was followed less than an hour later by a tsunami that in some places reached almost 40 meters high. As tragic as this loss of life was, it pales in comparison to the 230,000 people lost in 2004 in the Indian Ocean tsunami that also followed an earthquake of at least 9.0.

Unbelievably, the Japanese earthquake and tsunami were just the beginning of a horrible day. A wall of water at least 13 meters high breached the 10 meter protective wall around the Fukushima Daiichi nuclear power plant located on the coast. The plant had six 1960s era GE designed boiling water reactors, but three were shut down at the time in preparation for refueling. The three operating reactors had been SCRAMMED safely right after the earthquake, meaning the chain reaction fission process had been stopped. But the radioactive decay processes continued to generate heat in both the spent fuel rods in reactors 4, 5, and 6 and the operating fuel rods in reactors 1, 2, and 3, requiring continuous cooling water. All external power to the plant had been lost following the earthquake, so back-up diesel generators kicked in and were working as designed until the tsunami wave breached the plant wall and flooded the generators which were located in the basement of the turbine building. Only one generator survived, which continued to supply cooling water to the spent fuel in reactors 5 and 6. There was a DC battery back-up system for reactors 1-3, but it was never usable for reactor 1 and within 2-3 days there was loss of cooling water for reactors 2 and 3.

So now there was no power for water pumps or controls and no way to remove heat that continued to build up for reactors 1-3 and fuel rods that had been removed in reactor 4. Since the roads were destroyed, it was very difficult to bring in equipment or personnel.

Remaining water inside the reactor cores turned to steam as the temperature rose, and the increased pressure was released into the dry Primary Containment Vessel (PCV). As the water level dropped, the zirconium cladding on the fuel rods was exposed to the hot steam resulting in an oxidation-reduction reaction that produced hydrogen gas. On the day after the earthquake, a hydrogen explosion in reactor 1 blew the roof off. Another, even bigger hydrogen explosion occurred in reactor 3 on March 14 and a final explosion in reactor 4 occurred on March 15.

It was later determined that all three fuel cores in reactors 1-3 had at least partially melted. In reactor 1, the melted fuel actually penetrated the bottom of the PCV and buried 65 cm into the concrete pad below. Venting of high pressure from the PCV and then the loss of all containment due to the hydrogen explosions meant that significant quantities of radioactive isotopes were released into the atmosphere, although determining exactly how much was made much more difficult because 23 out of 24 radiation monitoring stations around the plant were destroyed by the tsunami. Estimates are that the total I^{131} equivalents of radiation were about 15% of the Chernobyl incident.

There were no reported fatalities due to short term radiation exposure, although there are widely varying estimates of long term effects on the general population. Some workers at the plant received significant exposure, especially in the first few days, when workers were undertaking heroic efforts to bring the situation under control. Six workers were reported to have whole body levels of more than 250 mSv, with one control room worker recording 678 mSv. 500 mSv is the international standard for a short term dose for "emergency workers taking life saving actions." The allowable standard during clean-up has now dropped to 50 mSv per year and since April 2013, none of the more than 13,000 workers on site have exceeded this. Natural background radiation is typically about 2.1 mSv per year.

The Japanese government ordered a mandatory evacuation during the incident for 20 km around the plant. 160,000 people were displaced because of radiation and almost 100,000 remain so today. Clean-up efforts including removing contaminated debris and soils and building containment structures over damaged reactors have lowered radiation levels significantly, but estimates are that it will take at least 40 more years and cost \$20 billion. No one has ever tried to remove nuclear fuel from such a highly contaminated environment as the destroyed reactors so this part of the process is truly unknown.

Meanwhile water must be continuously pumped into the reactor vessels to keep them stabilized and close to 1 million tons of contaminated water is stored on site. Water treatment plants that can remove radioactive nuclides, but not tritium, are being utilized, but legal questions about the safety of treated water prevented discharge back to the ocean until 2015.

The lessons from Fukushima are still being learned and public opinion about the efficacy of nuclear power is strongly divided. While it is true that the results from the nuclear meltdown and release of radiation could have been much worse, it remains clear that some risks were seriously miscalculated. We will never be able to eliminate all risk, but we have to be able to learn from our mistakes.

SUSTAINABILITY AND SUSTAINABLE DEVELOPMENT



Nicholas R. Hild, PhD.

TESTING 64,000 TSCA CHEMICALS ...*REALLY*?

A small blurb on the AP wire has some “heads up” information for EH&S professionals that you might have missed unless you are plugged in to an American Chemical Council internet feed. So, here’s what you need to know (courtesy of AP reporters, J. Scott Applewhite and Coral Davenport, May 24, 2016 NY Times): New Mexico Senator Tom Udall (D) headed a bipartisan committee that wrote the House bill for a Toxic Substances Control Act update because, in his words, *“he wanted to be sure, when it got to the Senate, it would be favorably passed.”* In the bipartisan bill, Senator Udall worked with House members and solicited the help of the American Chemical Council to ensure the support of the chemicals industry in requiring a toxicity evaluation and regulation of over 64,000 chemicals that were not required to be tested under the original Toxic Substances Control Act in 1976 (TSCA).

Efforts to tighten the law have stalled for years, in part because of opposition from the chemical industry. According to a statement issued by the Council and House and Senate representatives who participated in writing the bill, *“this breakthrough represents a pragmatic, politically viable compromise between better environmental standards and the demands of industry.”* But, let’s see what that *really* means; read on.

In particular, Senator Udall’s bipartisan committee worked closely with the American Chemistry Council to come up with language that would have the support of industry while allowing it to pass through the regulation-averse Republican Congress. Even so, there is no guarantee that the bill will get approval from the Senate, but Udall is confident he had support from the right Senators and Representatives ‘across the aisle’ in drafting language that, *‘has the best chance’* of becoming law since TSCA’s 1976 promulgation.

So, as the saying goes, that is the good news for those of us who genuinely care about the health and welfare of people using chemicals in their homes and work places.

The potential bad news, (besides the possibility that the Senate holds the bill for the next elected President as they have done with his Supreme Court nomination), the bill would require the EPA to begin conducting tests on those 64,000 chemicals at a ridiculously slow pace: It would require the agency to conduct tests on only 20 chemicals at a time, and with a deadline of seven years per chemical to complete each test. It would also allow the agency’s regulations to pre-empt stronger state-level rules. And, you know that won’t sit well with the States, so where is the ‘breakthrough’ this legislation promises?

Anyone familiar with TSCA knows that this “slow pace” for testing was the biggest negative feature of TSCA in its original promulgation. To date, now 40 years of “testing” has yielded a complete toxicity data base on fewer than 2,000 chemicals. So, how will this legislation ever hope to provide toxicity data on even a paltry percentage of those 64,000 new chemicals at a pace of ‘seven years per chemical, 20 chemicals at a time...?’

According to the press release, while the chemical lobby has lauded the bill, environmental groups are lukewarm about it at best. Andy Igrejas, the campaign director for Safer Chemicals, Healthy Families, which lobbied on the bill on behalf of about 450 environmental and public health groups was quoted as saying that, *“...we’re not in support of the bill. But we’re not formally opposing it.”*

So it appears that any action on TSCA chemicals testing, (after 40 years of no action), will be viewed as a step in the right direction by the environmental community. Unfortunately, while the politicians might think they’ve moved the needle a little further toward protecting human health, the actual results of spelling out the pace at which chemical testing will proceed in the bill itself, may just allow the chemical industry to stall and procrastinate having to tell chemicals-using workers, just what toxic substances they are being exposed to, for a long, long time.

But at least one pundit who represents an environmental consulting firm in Washington, D.C., noted (paraphrasing)... *‘when you get the chemicals industry lobby arm and politicians on both sides of the aisle in both houses to agree on an environmental bill’s language...and you add in the fact that the environmental lobby will neither support or oppose the bill, there has to be something wrong with it somewhere.’*

It is unclear what the language of the bill actually says so we won’t know what it really means to *“test 20 chemicals at a time with a deadline of 7 years per chemical for 64,000 chemicals...”* At least not until or if, it gets the President’s blessing, but any way you do the math---and here is your ‘heads up’ noted earlier---the actual testing of the targeted 64,000 chemicals on the list are unlikely to be completed until well beyond the lifetimes of our children’s, children’s, children’s, children’s....etc., etc.

NEWS BRIEFS

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20 years ago. Therefore, timely removal of old or unused tanks is critical. In Arizona, the average age of USTs throughout the state is 22 years, and more than 1,000 tanks are 30 years old or more.

Removing old tanks before they leak and finding tanks that have leaked as early as possible is critically important to reduce the likelihood of gasoline or diesel contaminating Arizona's scarce surface and groundwater resources and lowers cleanup costs. Both potential public health impacts and cleanup costs increase significantly when a leak spreads to groundwater.

ADEQ completed the first tank removal under the new program at a property owned by C.T. Price Contracting, Inc. Company President, Clark Price, said, "The UST removal was so appreciated and does really make a difference for a small business owner."

To participate in this program, a person either must own the property on which the UST is located or owned or operated the UST at some point in the past. ADEQ prioritizes applications based on risk to the environment and financial resources available to the applicant. For more information about this program, please visit: <http://www.azdeq.gov/environment/waste/ust/statelead.html>.

ADEQ ANNOUNCES REDUCED VEHICLE EMISSIONS TEST FEES FOR GREATER PHOENIX METROPOLITAN AREA MOTORISTS

❖ Arizona Department of Environmental Quality officials announced recently motorists whose vehicles are registered in the Phoenix Metropolitan Area, including Maricopa County and portions of Pinal and Yavapai Counties, known as "Area A," will save \$3.00 per vehicle for emissions testing fees, effective July 1, 2016.

ADEQ estimates that these fee reductions, representing approximately 1.2 million tests, will save vehicle owners about \$3.7 million annually. All "Area A" vehicle emissions inspection fees will be reduced by \$3.00.

"ADEQ continuously looks for ways to improve its vehicle emissions testing program," said ADEQ Air Quality Division Director Timothy Franquist. "The State legislature's passage of House Bill 2702 will reduce fees and more equitably cover ADEQ program costs."

Beginning in 2014, ADEQ voluntarily lowered vehicle emissions

inspection fees by more than 25 percent for more than one million tests in the Phoenix metropolitan area, which resulted in a savings to vehicle owners of about \$8.2 million.

ADEQ supports a stepwise approach to reducing vehicle emissions testing fees as a prudent approach to balancing fees with service costs. The approach ensures program resource

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NEWS BRIEFS

CONTINUED FROM PAGE 13

needs are met and minimizes reversing fee reductions at a later date.

ADEQ also instituted a Gas Cap Distribution Program in Maricopa and Pima counties, which provides vehicle owners with a new gas cap, free of charge, if their gas cap fails emissions inspection. This eliminates the need for the owner to leave, buy a new gas cap and return to retest, and immediately eliminates the release of gasoline vapors into the environment. If the testing station doesn't have the gas cap size needed, motorists are offered a \$5 prepaid card to help cover the cost of a new cap. Since its inception in 2014, ADEQ and its contractor have provided more than 91,000 gas caps and prepaid cards to Arizona motorists.

ADEQ said it is committed to better, faster, cheaper services by providing more service for less cost to customers applying Lean principles of continuous improvement and elimination of waste.

U.S. EPA AND NISH AWARD \$5.1 MILLION FOR A NEW ENVIRONMENTAL RESEARCH CENTER AT THE UNIVERSITY OF ARIZONA

✦ The U.S. Environmental Protection Agency and the National Institutes of Health (NIH), announced recently \$5.1 million in funding to create a new research center at the University of Arizona (UA) in Tucson, Ariz. UA is among five universities selected nationwide to work with local communities to better understand ways to improve environmental conditions for vulnerable populations.

The University of Arizona will set up the "Center for Indigenous Environmental Health Research," to work with American Indian/Alaska Native communities to examine chemical contamination of traditional foods, water, air, and household environments, while increasing environmental health literacy.

"Exposures to harmful contaminants in low-income communities is an ongoing problem in our country," said Michael Slimak, director of EPA's Sustainable and Healthy Communities Research Program. "With the support of these centers of excellence, EPA is working to address this issue and protect human health."

Environmental health problems are more likely to occur in communities that have ongoing exposure to multiple sources of pollution. These communities are usually economically disadvantaged with limited access to quality healthcare.

Each university will establish a center of excellence on environmental health disparities research, which will conduct multidisciplinary research to mitigate and prevent health disparities driven by environmental causes. This research will focus on understanding the relationships between biological, chemical, environmental, genetic and epigenetic, and social factors.

The new centers, funded by five-year grants, are an expansion of a successful pilot program originally started by EPA and the National Institute of Minority Health and Health Disparities. EPA's contribution to this research partnership will be \$7.5 million, with \$18 million from three institutes at the NIH (NIMHD, NIEHS, and NICHD).

In addition to UA, the following universities received funding:

University of Southern California, Los Angeles, Calif., "Maternal and Developmental Risks from Environmental Social Stressors," for studying how environmental factors may contribute to childhood obesity and excessive weight gain during pregnancy in Hispanic and Latino communities.

Harvard T.H. Chan School of Public Health and Boston University School of Public Health, Boston, Mass., "Disparities in Exposure and Health Effects of Multiple Environmental Stressors across the Life Course," for studying how housing may affect birth weight, childhood growth trajectories, and risk of death from cardiovascular disease, and whether improved urban housing may benefit health.

Johns Hopkins University, Baltimore, Md., "Comparing Urban and Rural Effects of Poverty on COPD," for comparing urban and rural effects of poverty on chronic obstructive pulmonary disease (COPD), and the impact of improved dietary intake on preventing or mitigating disease progression.

University of New Mexico Health Sciences Center, Albuquerque, N.M., "Center for Native American Health Equity Research," for examining



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how contact with metal mixtures from abandoned mines affects rural Native American populations through exposures related to inadequate drinking water infrastructure, reliance on local foods, and other uses of local resources to maintain their traditional lifestyle and culture.

ARIZONA WINS EPA'S AIR QUALITY FLAG PROGRAM CHALLENGE

❖ Arizona schools won the EPA's Spring Air Quality Flag Program Challenge to protect people's health. Schools state-wide are raising brightly colored flags to help students and members of the community be aware of daily air quality conditions. The colored flags correspond to the Air Quality Index to inform community members about air quality forecasts so they can take steps to protect their health. The Spring Challenge aimed to increase the number of participating schools and organizations and raise awareness about the Air Quality Index colors and associated health messages.

"We applaud Arizona for enrolling 63 new schools in the Flag Program and winning the nationwide challenge," said Alexis Strauss, EPA's Acting Regional Administrator for the Pacific Southwest. "These flags give community members information to make smart choices about their outdoor activity levels."

"As one of the first schools in Arizona to participate in the Air Quality Flag Program and now going on nearly a decade, our K-8 students have learned how air quality affects their daily activities and lives from the color of the flag and what they can do to protect themselves from poor air quality," said Annette Heasman, Registered Nurse, P.L. Julian School, Phoenix, Arizona.

"Having served as the model for EPA's nationwide Air Quality Flag Program, Arizona is proud to continue to be a leader in this effective voluntary public health program, which makes a difference in the lives of some of our most vulnerable children and adults," said ADEQ Air Quality Division Director Timothy Franquist.

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Each day a flag is hoisted above schools, or other community sites, that participate. In the school setting, recess and physical education are sometimes held indoors on days with particularly poor air quality, especially for sensitive populations, like children with severe asthma. The program also contains an environmental education component with teacher lesson plans about air pollution, and the science behind air monitoring technology."

As participation in Arizona's Flag Program continues to grow, we are hopeful that community awareness too will increase and positively impact both children's and public health," said ADEQ Children's Health Program Lead Julie Finke. "Our success in Arizona is due to our community's ongoing commitment and the tireless promotion work of our partners and local coordinators, whom we recognize and thank for their participation and efforts."

■ 2016 August 11



Luncheon Featuring: Speaker: Chuck Graf, ADEQ
Topic: "Advisory Panel on Emerging Contaminants".

Sponsor: EP Container

Location: SRP Pera Club, 1 E. Continental Drive, Tempe, AZ

■ 2016 September 8



Luncheon Featuring: Speakers: Rosanne Albright, City of Phoenix; Kenny W. Harris P.E., Harrison Properties; and Paris Masek, Green on Purpose Inc.
Topic: "Brownfields for Economic Growth and Healthy Communities".

Sponsor: TestAmerica

Location: SRP Pera Club, 1 E. Continental Drive, Tempe, AZ

■ 2016 October 13



Luncheon Featuring: Speaker: Disha Gadre, Trinity Consultants
Topic: "Environmental Life Cycle Assessments".

Sponsor: EP Container

Location: SRP Pera Club, 1 E. Continental Drive, Tempe, AZ

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