

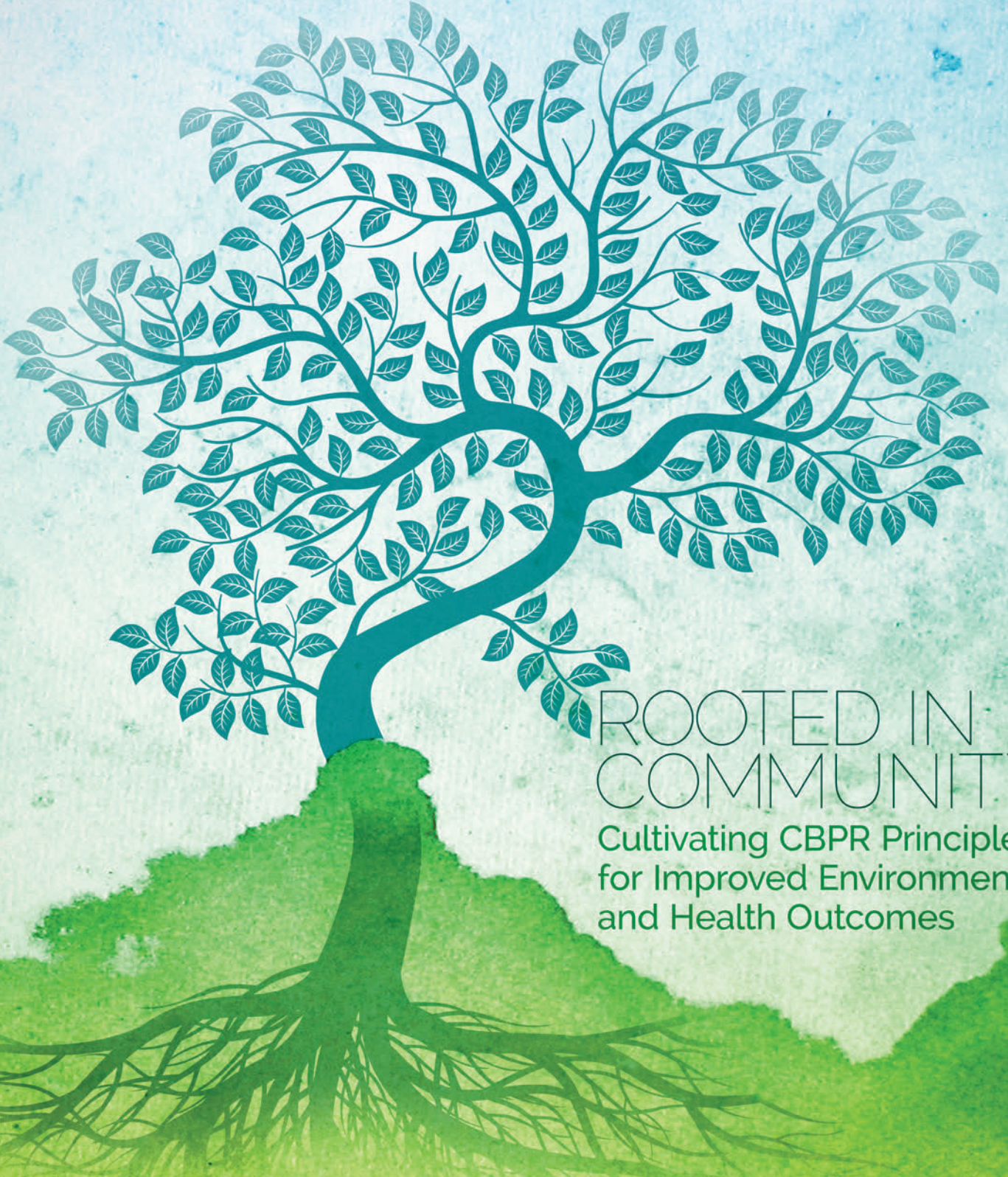
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Volume 76, No. 10 June 2014



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# Environmental Health

Dedicated to the advancement of the environmental health professional

Volume 76, No. 10 June 2014

## ABOUT THE COVER



Our cover this month emphasizes an important point that the authors of our feature, "Incorporating Community-Based Participatory Research Principles [CBPR] Into Environmental Health

Research: Challenges and Lessons Learned From a Housing Pilot Study," make about CBPR: it is rooted in the communities that are active participants as well as subjects of environmental health research. The authors' goal was to collaborate with residents of both green-built and conventional low-income housing to determine differences in chemical exposure and biological agents. The authors also aimed to explain to residents how to reduce their exposure and therefore improve health outcomes.

See page 8.

Cover illustration © iStockphoto/John Woodcock

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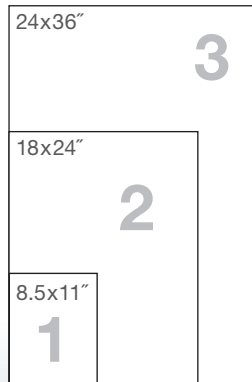
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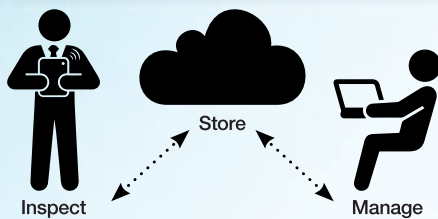
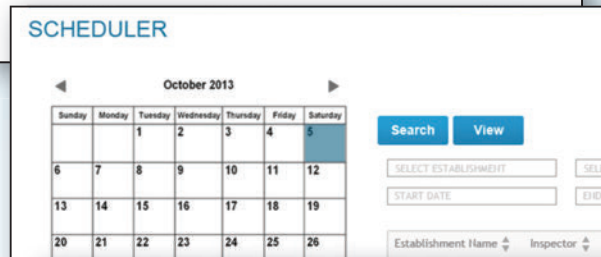
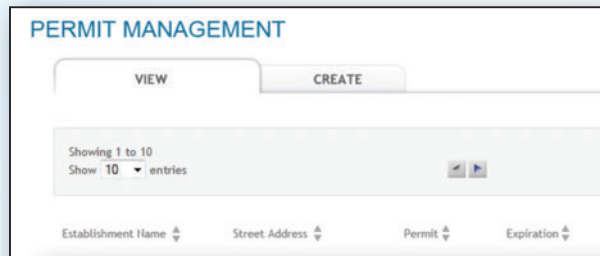




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## ► PRESIDENT'S MESSAGE



Alicia Enriquez Collins,  
REHS

## Where Everybody Knows Your Name

*Making your way in the world today takes everything you've got.*

*Taking a break from all your worries sure would help a lot.*

*Wouldn't you like to get away?*

*Be glad, there's one place in the world.*

*Where everybody knows your name and they're always glad you came.*

*You want to go where people know, people are all the same.*

*You want to go where everybody knows your name.*

Excerpt from the theme song of "Cheers," a popular sitcom that aired during 1982–1993  
Written by Gary Portnoy and Judy Hart

As my term as your president comes to a close, it has provided an opportunity for reflection on the friendships, partnerships, and bonds that have been developed or strengthened because of our organization. Thinking about the lyrics to this song brings to mind the gathering of friends in a familiar and welcoming venue. The setting was a neighborhood pub in Boston called "Cheers." In my view, NEHA is a lot like Cheers: a gathering of friends in a familiar and welcoming venue where our common ground provides the basis for improving ourselves and collectively seeking ways to enhance and protect the communities where we live, work, and recreate.

Before I say "cheers" to you, I would like to share a few thoughts and updates to let you know what we are doing to better serve our members.

*NEHA is the  
home base,  
the go-to place,  
and the welcoming  
venue for  
environmental  
health professionals.*

### Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) Credential

NEHA's REHS/RS credential is our premier credential and it represents technical competency for environmental health practitioners. It includes an array of program disciplines, such as food protection, air quality, drinking water quality, recreational health, disaster preparedness/emergency response, and land use, to name a few. This July, NEHA will begin offering a newly revised REHS/RS exam. And it will be offered at our upcoming Annual Educational Conference & Exhibition in Las Vegas! Congratulations and many thanks to the NEHA staff and a team of subject-matter experts for updating the exam.

Approximately 23 states require an REHS credential and approximately 18 states have reciprocity with NEHA's REHS/RS credential. As agencies seek ways to increase their can-

didate pools, simplify their recruiting efforts, and keep salary expenses down, this combination can translate to the whittling away at the demand for our credential. As this occurs, either our members or environmental health agencies will approach NEHA to lend support in the fight to uphold the REHS/RS credential. At our annual spring board of directors' meeting, I appointed an ad hoc committee to draft a position paper that will officially proclaim support for the REHS/RS credential. This affirmation document can then be used by the membership and jurisdictions when working to preserve our premier credential for environmental health practitioners.

For additional information regarding NEHA's REHS/RS credentialing program, official positions, and strategic directions, visit our Web site at [www.neha.org](http://www.neha.org).

### Sustainability in Environmental Health

In 2010, the board approved a white paper entitled, "The Role of Sustainability in Environmental Health." This team effort was led by Technical Advisor Tom Gonzales of Colorado. The team worked for two years to develop our annual Sustainability Award and our white paper. Education and advocacy in the area of food protection are in line with NEHA's strategic directions; therefore, I have asked the team to reconvene to closely examine the food section of the document. As we have witnessed a movement to promote locally grown and manufactured foods, it is important for NEHA to consider food protection and security within these initiatives (e.g., farmers' markets, urban farming/urban



farm stands, food co-ops, cottage foods, food composting, and organic foods).

### Best Practices Review

In 2013, the board of directors decided to search for a consultant to complete a best practices review for our association. NEHA is encountering many of the same challenges public and private-sector organizations are facing—generational change, fewer grant funding opportunities, and decreased travel budgets for our members. The board thought it was a good time to reexamine the way NEHA does business to ensure that it continues to be the leadership organization for our members and for the environmental health profession. We continually seek innovative methods for delivering our services. Our e-Learning opportunities, virtual conference options, and traveling educational workshops are perfect examples of NEHA's efforts to deliver quality education to environmental health practitioners. A best practices review is intended to identify additional innovative methods for delivering our products and services.

### 78th Annual Educational Conference & Exhibition

On July 7–10, 2014, NEHA will join with the International Federation of Environmental Health (IFEH) to cohost our premier educational event in Las Vegas, Nevada. We are honored to have the opportunity to partner with IFEH colleagues from around the world. The program agenda and the ceremonies are ready to launch in just a few short weeks. We have an educational program that will feature guest presenters from around the world, poster sessions, award and scholarship presentations, a student mentorship program, and a virtual conference option. I look forward to seeing you there as we welcome IFEH members.

### Cheers!

Cheers to the many volunteers and staff who work countless hours to make our organization run successfully. I offer my sincere gratitude to my husband Rick for his support and for being by my side throughout the year. To the board of directors, technical advisors, each one of our volunteers, and all of the staff

(see pages 54 and 55), I thank you for your creativity, commitment, and perseverance. When members attend a conference, participate in a workshop, take an e-Learning course, receive the *JEH* or E-News, or visit NEHA's social media sites, they are experiencing the result of your magical hands and bright and creative minds. I truly appreciate that your motivation is focused on giving back to NEHA to represent our members and support the advancement of the environmental health professional.

Cheers and bravo to this magnificent cast for championing our great cause! NEHA is the home base, the go-to place, and the welcoming venue for environmental health professionals.

It has truly been an honor and a pleasure to serve you as president this year. Thank you for your friendship and for your support throughout the year. 🍷



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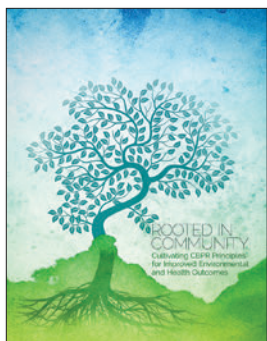
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# Incorporating Community-Based Participatory Research Principles Into Environmental Health Research: Challenges and Lessons Learned From a Housing Pilot Study

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**Abstract** In environmental health research, a community-based participatory research (CBPR) approach can effectively involve community members, researchers, and representatives from nonprofit, academic, and governmental agencies as equal partners throughout the research process. The authors sought to use CBPR principles in a pilot study; its purpose was to investigate how green construction practices might affect indoor exposures to chemicals and biological agents. Information from this pilot informed the development of a methodology for a nationwide study of low-income urban multifamily housing. The authors describe here 1) the incorporation of CBPR principles into a pilot study comparing green vs. conventionally built urban housing, 2) the resulting implementation and reporting challenges, and 3) lessons learned and implications for increased community participation in environmental health research.

## Introduction

Community participation and its emphasis on the partnership between researchers and affected communities is an important part of urban and environmental health research (Israel et al., 2005; Minkler, 2005). The scientific literature uses various terms to describe “community-based/involved/centered/engaged research” that features a collaborative partnership approach to working with communities (Ahmed & Palermo, 2010; Israel et al., 2005; Israel, Schulz, Parker, & Becker, 1998). However it is described, the partnership approach is an essential aspect

of community-based participatory research (CBPR). CBPR involves community members, organizational representatives, and researchers equally in all aspects of the research process—all partners contribute their expertise in an environment of shared responsibility and decision making (Israel et al., 1998; Israel et al., 2005; Israel et al., 2008). Unlike traditional investigator-driven research, CBPR is rooted in the community (Flicker, 2008; Sclove, 1997).

According to Israel and co-authors (1998, 2008) CBPR has nine key principles or characteristics (Table 1). While researchers should strive to meet these principles, the extent to

which a specific collaboration includes each principle can vary (Cornwall, 1996; Green et al., 1995; Israel et al., 2008). CBPR is the overarching concept that incorporates “participatory research” and “action research.” These terms describe how research participants “actively” participate in the research process (Bailey, 1992; Cornwall, 1996; Heron & Reason, 2001; Lewin, 1946). Green and co-authors (1995) define participatory research as a “systematic inquiry with those affected by the issue being studied, for purposes of educating and taking action or effecting social change” and they provide a framework for appraising various levels of participatory research.

Not all research conducted in a community uses a participatory action research method (Hatch, Moss, Saran, Presley-Cantrell, & Mallory, 1993; Schulz, Israel, Selig, & Bayer, 1998). Hatch and co-authors (1993) describe four models of “community-based” research. In two of these, research is conducted in a community setting, but the community’s role is passive and not involved with setting the research agenda. The other two models are more “participatory” in that researchers partner with community members 1) as key recruiters to identify others to participate and 2) as active members of the research team in establishing the direction of the research. “Community engagement” has been defined as supporting mutual respect of values, strategies, and actions for authentic partnership of people affiliated with or self-identified

by geography or specific interests affecting the community (Ahmed & Palermo, 2010; Clinical and Translational Science Awards Consortium & Community Engagement Key Function Committee Task Force, 2011). In this article, “community participation” signifies how community members are included in the research process.

This article describes 1) the incorporation of CBPR principles into a pilot study comparing green vs. conventionally built urban housing for low-income senior citizens, 2) the resulting implementation and reporting challenges, and 3) lessons learned and implications for increased community participation in housing-based environmental health research. Although—unlike model CBPR practice—the community was not involved in establishing the research questions, throughout the research process community members (i.e., residents) were planned-in for participation. Intended community benefits included 1) measurement of the level of environmental hazards in residents’ homes and 2) explanation of actions participants could take to reduce exposures.

## Background

In 2008, a pilot study investigated how green construction practices affected indoor air in low-income housing. Green-built environments are believed to promote occupant health because they can minimize pest infestations, exposures to many chemical compounds, and moisture (given appropriate ventilation in the home). The objectives of the pilot study were to quantify levels of allergens, fungi, pesticides, and volatile organic compounds (VOCs) to test for a possible difference between the levels in green-built housing versus conventionally built housing and to translate or communicate the results in plain language to study participants. The pilot study also laid the foundation for a nationwide prospective cohort study to ascertain health outcomes in low-income, inner-city populations before and after moving into green housing. While the results of the pilot study are not presented here, they can be found elsewhere (Chew et al., 2009).

## Methods

### Partner Selection

The pilot study used a CBPR approach by establishing a collaborative research team made up of partners representing government,

academia, and community-based organizations. Staff from the Centers for Disease Control and Prevention (CDC) collaborated with staff of the Atlanta Regional Health Forum (ARHF), a nonprofit coalition dedicated to creating healthy communities by educating and empowering individuals to achieve their fullest health potential. Other team members included academic partners from Georgia State University School of Public Health (GSU) and community health workers (CHWs) from Zap Asthma. Zap Asthma is a public-private partnership dedicated to reducing asthma in children and the CHWs administered questionnaires and collected environmental samples inside the home and in nearby outdoor locations. Studies on asthma and other chronic diseases have consistently shown positive outcomes associated with CHW-delivered interventions (Condon, Hynes, Brooks, Rivard, & McCarthy, 2007; Krieger, Takaro, Song, & Weaver, 2005; Postma, Karr, & Kieckhefer, 2009). The CHWs were essential partners who had experience working with similar low-income populations, several of which were older (>50 years of age) and of the same racial/ethnic population as the pilot study participants.

The research team met regularly over two years from 2006 to 2008 before data collection began in 2008. The team discussed the project, defined roles and responsibilities, and established an implementation process. The pilot study was approved by the GSU institutional review board (IRB). GSU also assisted with CHW training, sampling, database construction, analysis, results verification, and reporting. The CHWs participated in many aspects of the project, including feasibility issues, implementation, and translation of results back to the community to ensure cultural relevance and sensitivity. CDC technical advisors provided oversight on collaboration with community leaders, protocol, survey design, CHW training, and analysis. The research team agreed to share publication authorship.

### Site Selection and Study Population

The pilot study sampling frame was a non-probability convenience sample drawn from two urban senior citizen independent living housing complexes in Atlanta, Georgia. The complexes were selected because of the willingness of the property managers to participate and because of the complexes’ central

locations. The pilot study was designed to compare the concentration of allergens and chemicals in green versus conventional housing. Team members met with management of each complex to explain the study’s objectives. The green housing consisted of an 84-unit complex completed in 2003. The green components included low VOC-emitting carpets and paints, Energy Star appliances, insulation, energy efficient windows, and recycled building materials. Other features included fresh air intakes, integrated pest management, and moisture protection measures. The control complex was a conventionally built 195-unit, 14-story apartment tower completed in 1978. Each conventional apartment had inside access from a hallway.

The populations of interest were residents living in senior citizen housing complexes. The Department of Housing and Urban Development (HUD) categorized the study properties as multi-unit residences for low-income senior citizens. In the green complex, the majority of participants were African-American aged 64 to 90 years; in the control complex, both African-Americans and whites participated with ages ranging from 55 to 97 years.

Resident recruitment was conducted through town hall meetings at the respective housing complexes. The meetings were advertised with flyers designed to be culturally sensitive by reflecting the participants’ age and ethnicity. Incentives to encourage attendance included light refreshments, game prizes, and a raffle drawing and were provided solely to make the information dissemination sessions fun and informal. The principal investigator introduced the CHWs and research team, provided an overview of the pilot study, described its benefits, and answered questions. Residents were told they would receive an IRB-approved \$10 gift card at the completion of environmental sampling. A total of 74 participants were recruited: 34 (46%) from the study complex and 40 (54%) from the control. The town hall meetings began recruitment in March 2008 and sampling began in April. Environmental sampling was conducted over three months from April to July 2008.

### Environmental Sampling by CHWs

Two training workshops were held for the CHWs before sampling began. The first training included sessions on the study objectives, participant and property manager question-



naires, participant interview techniques, consent process, protocol for collecting and logging temperature and humidity, air sampling devices for formaldehyde and other VOCs, and wet-wipe sampling for pesticides. The CHWs practiced opening, resealing, and labeling the air sampling devices. The second training was held in a team member's home to allow hands-on practice with equipment and dust sampling in a home environment. CHWs reviewed protocols on laboratory supplies, shipping, and storage of collected samples. For further details, see Chew and co-authors (2009).

Data collection from each housing unit took place over two consecutive CHW visits. On the first day, the CHWs met with the participants in a public meeting room, explained the study, and obtained signatures on consent forms according to GSU's IRB-approved protocol. Residents were considered eligible to participate if they were able to answer questions on the study's purpose, activities, and voluntary nature. After obtaining consent, the CHWs performed a visual assessment of the participants' apartments to document fire damage; visible mold; musty odors; open windows; working heating, ventilation, and air conditioning and air cleaners; and paint stored in the home. Temperature and humidity were recorded indoors and out, and passive air sampling badges were placed in the home overnight. On the second data collection day, CHWs retrieved the air sampling badges and conducted dust sampling from the bed, bedroom floor, and kitchen floor. The CHWs also recorded household cleaning products found in each unit. Separately, the property managers completed maintenance records on each unit describing painting history, water damage and repair, carpet replacement, and overall pest management practices of the complex.

At the completion of all sample collection, a debriefing meeting was held with the CHWs to discuss the sampling process and obtain feedback on how it could be improved for the nationwide study. Certificates of appreciation were presented to the CHWs for their data collection efforts.

## Results and Discussion

### Results Reporting to Participants

A primary goal of the pilot study was to develop and test mechanisms for presenting results of environmental agents without

nationally accepted thresholds for safety (i.e., VOCs and pesticides). Assessing health risks was beyond the scope of the pilot and blood or other clinical samples were not collected, nor was information on a resident's ingestion or contact with chemicals in the housing unit. Therefore, special consideration was given to communicate results without raising fear. Quantifying risk was further complicated because the sampling methods provided only indirect estimates of exposure levels and because the ability to assess exposures varied by contaminant.

Another reporting concern was allaying residents' concerns that detection of some agents in the home reflected poorly on their housekeeping practices. For example, mouse allergen was detected in some units (23% green vs. 6% conventional) and one unit in the green housing had detectable rat allergen. Pest management by the residents and building maintenance influence rodent allergens; but we did not investigate past and current practices. While we could not say that these exposures were health hazards to the residents in either complex, we were able to suggest several methods of decreasing exposures in their homes.

The final aim of the results reporting was to inform residents of differences in allergen, fungi, pesticide, and VOC levels between the green and conventionally built housing. To this end, we selected the John Hopkins Center for Childhood Asthma in the Urban Environment form to serve as a model to adapt for our needs (Figures 1 and 2). Not only did this format give individual results, but it described the environmental agents and listed actions to take to decrease exposures. For those whose homes had results above the "levels of concern," information was presented on how to reduce levels of allergens, VOCs, and pesticides. The exposure levels that were used for determining "levels of concern/caution levels" were based upon the California Chronic Reference Exposure Levels (chRELS) (2007). The chRELS are designed to address continuous exposures for up to a lifetime and the exposure metric used was the annual average exposure. Results of VOC sampling included the numeric value for the level detected and a comment on units of measurement. In addition, a thermometer giving a visual graphic of caution levels for each VOC was printed adjacent to the list of individual results.

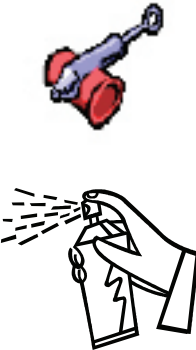
Results on pesticide measurement were recorded as either detected or not detected. Input on the reporting form from the CHWs resulted in modifications, including removing illustrations of mice and cockroaches and revising text to a lower literacy level. The CHWs thought that the elderly population in our study would be offended by the pictures of cockroaches and mice because they take pride in the cleanliness of their home; the pictures of cats and dust mites were deemed not offensive. Although the John Hopkins forms were used in a childhood asthma study without any problem with the illustrations, we incorporated the CHWs' suggested revisions (Principle 7). The final result-reporting forms had a reading grade level of 5.4, 7.4, and 7.6 for the allergen, pesticide, and VOCs reports, respectively, based on the Microsoft Word Flesch-Kincaid grade level index. Although it was challenging to translate results without national standards, the development of the results-reporting form allowed the research team to communicate individual environmental exposure findings in plain language.

### Results Dissemination via Town Halls

The result-reporting forms were distributed at closing town hall meetings held in December 2008 (green housing) and January 2009 (conventional housing). Approximately half of the pilot study participants attended the final town hall meetings. For those not in attendance, a copy of the slides and individual results were mailed. The closing town hall agenda included an overall pilot study result's presentation, VOC demonstration, a question and answer session, individual results distribution, refreshments, and raffle drawings. The presentation began with a reminder that this was not a health effects study and an explanation about individual susceptibility factors (e.g., allergies). To minimize residents' fears of eviction because of detection of high levels of rodent or cockroach allergens, care was taken to explain that pests and pest allergens in a unit can originate from several sources, and that cross-sectional measurements of environmental agents are not always reliable risk indicators. The VOC levels were reported in parts per million—a sometimes challenging concept; therefore, we demonstrated measurement of VOCs with a colorimetric detector tube and a commonly used window-cleaning agent containing isopropanol. This allowed

FIGURE 1

**Results Report Form—Pesticides and Allergens**

| Dust Sample:   | What You Need to Know:  | Pesticides in Your Home:  | To Improve Your Home, You Should:  |
|--|---|---|--|
| <p><b>Pesticides</b></p>  | <ul style="list-style-type: none"> <li>▪ Possible sources of indoor pesticides include contaminated soil or dust that floats or is tracked in from outside.</li> <li>▪ Risk cannot be determined with the information we collected for this study.</li> <li>▪ 75% of U.S. households used at least one pesticide product indoors during the past year.</li> <li>▪ Pesticides can last on surfaces for a long time and you should be careful around eating areas.</li> <li>▪ In 2001, the federal government phased out use of chlorpyrifos in homes.</li> </ul>   | <p><b>Cypermethrin</b> was</p> <p><input type="checkbox"/> Detected<br/><input type="checkbox"/> Not detected</p> <p><b>Chlorpyrifos</b> was</p> <p><input type="checkbox"/> Detected<br/><input type="checkbox"/> Not detected</p>   | <ul style="list-style-type: none"> <li>▪ Contact the property manager if you feel you have a problem with pests.</li> <li>▪ Use nonchemical methods of pest control when possible, such as roach traps.</li> <li>▪ Increase ventilation when using chemical pesticides indoors.</li> <li>▪ Do not store unneeded pesticides inside your home.</li> <li>▪ To decrease use of pesticides:               <ul style="list-style-type: none"> <li>- keep food in sealed containers;</li> <li>- don't leave pet food out overnight; and</li> <li>- seal cracks and crevices to keep the pests out.</li> </ul> </li> <li>▪ If possible, take plants and pets outside when applying pesticides/flea and tick treatments.</li> <li>▪ Always store pesticide products out of the reach of children.</li> </ul> |
| <p><b>House Dust Mite Allergen</b></p>   | <ul style="list-style-type: none"> <li>▪ House dust mites are tiny bugs. They live in fabric and can be found in mattresses, pillows, cloth-covered furniture, and carpeting.</li> <li>▪ Dust mites live off dead skin flakes and need humidity to grow.</li> <li>▪ The allergen is very small. When breathed in, it can trigger allergy and asthma problems in some people.</li> <li>▪ The allergen in the mattress and pillow is very close to the face while sleeping.</li> <li>▪ Some people are allergic to dust mites and may have a reaction (sneezing, watery eyes, etc.) and some are not allergic.</li> </ul> | <p><b>Dust mite allergen</b> was</p> <p><input type="checkbox"/> Detected (____ µg/g)<br/><input type="checkbox"/> Not detected</p> <p><b>Note:</b> If you are allergic to dust mites and your value is above <b>10 µg/g</b>, you should try to reduce your contact with this allergen.</p> | <ul style="list-style-type: none"> <li>▪ Put allergen-proof mattress and pillow covers on your bed.</li> <li>▪ Wash all bedding in hot water.</li> </ul>   |

*continued on page 12*

residents to see that an ordinary substance sprayed into the air could be several orders of magnitude higher than the VOC levels found in their homes. Time was provided to answer all questions. Lastly, individual result forms were handed out to each participant.

**Results of CBPR Principles Incorporated**

The implementation of the CBPR principles in the pilot study is described in Table 1. CBPR principles occur on a continuum, and incorporation of all nine principles is an aspi-

rational goal to achieve (Cornwall, 1996; Green et al., 1995; Israel et al., 2008). Our pilot study used CBPR principles, but due to the context of the pilot study (i.e., aim to quantify levels of common environmental contaminants and pilot a methodology) and



FIGURE 1 continued from page 11

**Results Report Form—Pesticides and Allergens**

| Dust Sample:              | What You Need to Know:  | Dust Levels in Your Home:  | To Improve Your Home, You Should:  |
|---------------------------|---|--|--|
| <b>Cockroach Allergen</b> | <ul style="list-style-type: none"> <li>▪ Roaches live in small cracks and near sources of food and water.</li> <li>▪ Allergens are found in both dead and living roaches.</li> <li>▪ It is hard to get rid of roaches because each female roach can have another 300 babies.</li> <li>▪ Some people are allergic to roaches and may have a reaction (sneezing, watery eyes, etc.) and some are not allergic.</li> </ul>   | <p><b>Cockroach allergen</b> was</p> <p><input type="checkbox"/> Detected (____ µg/g)</p> <p><input type="checkbox"/> Not detected</p> <p>Note: If you are allergic to cockroaches and your value is above <b>0.32 µg/g</b>, you should try to reduce your contact with this allergen.</p> | <ul style="list-style-type: none"> <li>▪ Use baits and traps. Never use roach sprays because they can contain harmful chemicals.</li> <li>▪ Take trash out every day.</li> <li>▪ Keep floor, countertops, and appliances clean by sweeping and mopping often.</li> <li>▪ Put exposed food, such as sugar, snacks, pasta boxes, breads, and cereals in tightly sealed containers.</li> <li>▪ Clean grease from the stove and walls after cooking.</li> </ul>    |
| <b>Mouse Allergen</b>     | <ul style="list-style-type: none"> <li>▪ Mice enter homes through holes in walls and doors and live in nests in dark places. They come inside when it gets cold outside.</li> <li>▪ Mice travel inside the home through holes in the walls or up and down gas and water pipes.</li> <li>▪ Mice live near food and water sources. They can live inside the oven, behind walls, and in the ceiling.</li> <li>▪ Some people are allergic to mice and may have a reaction (sneezing, watery eyes, etc.) and some are not allergic.</li> </ul> | <p><b>Mouse allergen</b> was</p> <p><input type="checkbox"/> Detected (____ µg/g)</p> <p><input type="checkbox"/> Not detected</p> <p>Note: If you are allergic to mice and your value is above <b>0.5 µg/g</b>, you should try to reduce your contact with this allergen.</p>             | <ul style="list-style-type: none"> <li>▪ Exterminate mice by using a mousetrap.</li> <li>▪ Clean up floors, countertops, and stoves after meals.</li> <li>▪ Put exposed food, such as sugar, snacks, pasta boxes, breads, and cereals in tightly sealed containers.</li> <li>▪ Take trash out every day.</li> <li>▪ Fill holes and around pipes with copper mesh to keep mice out.</li> <li>▪ Remove clutter and keep clothes and papers picked up.</li> </ul> |

the influence of various partners (see challenges below), we could not employ all principles. The purpose of the pilot study was not to address health disparities or community concerns, which are the most common reasons for a CBPR approach. Rather, the study was to gather pilot data for the future nationwide study. Nonetheless, many CBPR principles were applied and the value of the CBPR approach was realized. For example, the CHWs were instrumental in the recruitment, consent process, data collection, and in sharing promising practices to communicate results to the participants. The strategic use of the town hall meetings as a vehicle for transparent communication and information sharing helped to build trust between

participants and the research team and facilitate recruitment. In addition, the continuous communication among the CHWs, participants, and their families or caregivers further helped explain the project’s goals and increase receptivity of specific findings and recommendations. Nevertheless, more co-learning could have been done (Principle 4). The principles not fully incorporated into the pilot study are described below (i.e., challenges and lessons learned).

**Challenges**

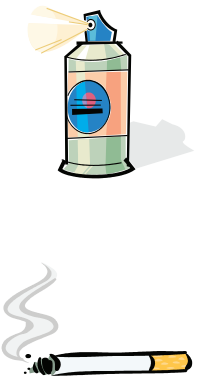

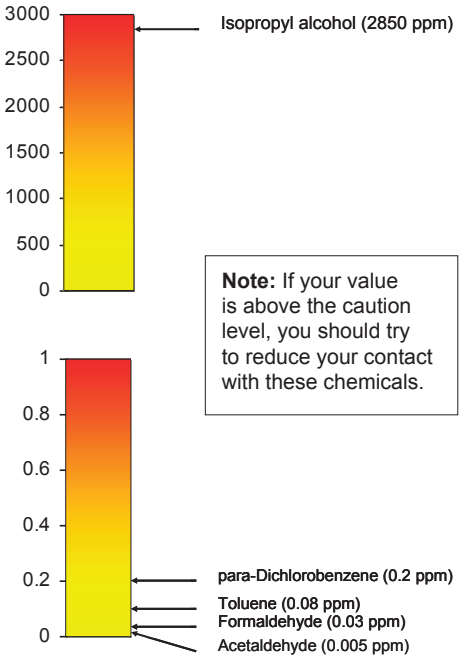
The research team encountered challenges to fully incorporating a CBPR approach during study implementation. We underestimated the importance of the property managers as

gatekeepers in controlling access to residents. Because Georgia’s “Right to Rent” law allows property managers to refuse admission to housing complexes, obtaining the property managers’ support and cooperation was essential. Property managers were concerned about the time commitment, disrupting the community, and repercussions from results that might reflect negatively on the property. To build trust and support, the property managers were involved in approving communication materials (post-CHW input) before any materials were shared with residents (Principle 4).

Furthermore, identifying the conventionally built complex proved to be a challenge. Potential properties were first identified from lists of low-income housing that received

FIGURE 2

**Results Report Form—Volatile Organic Compounds**

| Air Sample:   | What You Need to Know:   | To Improve Your Home, You Should:  |
|---|--|--|
| <p><b>Volatile Organic Compounds (VOCs)</b></p>  | <p><b>VOCs come from many sources:</b></p> <ul style="list-style-type: none"> <li>▪ Formaldehyde—particle board, cigarette smoke, insulation, and carpet</li> <li>▪ Acetaldehyde—fireplaces, vehicle exhaust, cigarette smoke</li> <li>▪ Isopropyl alcohol (rubbing alcohol)—cleaning agents and perfumes</li> <li>▪ Toluene—solvents, glue</li> <li>▪ para-Dichlorobenzene—toilet bowl deodorants and air fresheners</li> <li>▪ It's hard to know if some levels of VOCs are safe because people can react differently to exposures (for example, if you have asthma)</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Do not smoke inside.</li> <li>▪ Increase ventilation (opening windows or using exhaust fans) when using chemical indoors or getting new furniture or carpet.</li> <li>▪ Try to reduce use of chemicals in your home.</li> </ul> |
|    | <p><b>Air Levels in Your Home:</b></p> <p><b>Formaldehyde</b> was<br/> <input type="checkbox"/> Detected (____ ppm)<br/> <input type="checkbox"/> Not detected</p> <p><b>Acetaldehyde</b> was<br/> <input type="checkbox"/> Detected (____ ppm)<br/> <input type="checkbox"/> Not detected</p> <p><b>Isopropyl alcohol</b> was<br/> <input type="checkbox"/> Detected (____ ppm)<br/> <input type="checkbox"/> Not detected</p> <p><b>Toluene</b> was<br/> <input type="checkbox"/> Detected (____ ppm)<br/> <input type="checkbox"/> Not detected</p> <p><b>para-Dichlorobenzene</b> was<br/> <input type="checkbox"/> Detected (____ ppm)<br/> <input type="checkbox"/> Not detected</p> | <p><b>Range of Caution Levels:</b></p>  <p><b>Note:</b> If your value is above the caution level, you should try to reduce your contact with these chemicals.</p>                    |

ppm = parts per million.

HUD subsidies. We visited at least 10 properties to request participation and inform the property managers about the pilot study. Concerns arose regarding possible punitive consequences from the government if residents were found to be living in substandard

conditions. Ultimately, the decision to participate was predicated upon a manager's perception of the pilot study's benefit.

Once the green and conventionally built control complexes were identified (Principle 1), both managers originally agreed to the

participation of resident leaders as key informants in the planning and decision-making process. One manager later vetoed this idea, however, because she feared identifying certain residents as "leaders" might encourage complaints against management. Property



TABLE 1

**Community-Based Participatory Research (CBPR) Principles Incorporated in the Pilot Study**

| CBPR Principles*  | Applied to Pilot Study (Yes/No) | Explanation   |
|---|---------------------------------|---|
| 1. Recognizes community as a unit of identity   | Yes                             | Two community partners were identified. <ul style="list-style-type: none"> <li>• Residents based on geographical location and housing type.</li> <li>• Community health workers (CHWs) represented interests of senior citizens.</li> </ul>   |
| 2. Builds on strengths and resources within the community   | Yes                             | <ul style="list-style-type: none"> <li>• Community-based organizations (ARHF<sup>a</sup> and Zap Asthma) had experience with similar communities.</li> </ul>  |
| 3. Facilitates collaborative, equitable partnership in all research phases and involves an empowering and power-sharing process that attends to social inequalities   | No                              | Inequitable decision-making opportunities because <ul style="list-style-type: none"> <li>• Partners were engaged at different stages.</li> <li>• Residents and CHWs were not involved in study design.</li> <li>• CHWs did contribute, however, to communication materials and results dissemination.</li> </ul>  |
| 4. Promotes colearning and capacity building among all partners   | Yes                             | Many colearning opportunities were provided, per below, yet more were possible (see lessons learned). <ul style="list-style-type: none"> <li>• Frequent knowledge exchange among researchers, CHWs, and property managers.</li> <li>• Town hall meetings and Q&amp;A sessions for residents.</li> <li>• Received input from CHWs on sampling and results-reporting forms.</li> <li>• CHWs interacted with participants and their families/caregivers, which increased receptivity of pilot study recommendations.</li> </ul>                      |
| 5. Integrates and achieves a balance between research and action for the mutual benefit of all partners   | No                              | <ul style="list-style-type: none"> <li>• Power sharing was not balanced among all partners.</li> <li>• No “action” was identified as a study outcome.</li> <li>• Input from other partners (in planning stages) may have influenced study outcomes.</li> </ul>  |
| 6. Emphasizes public health problems of local relevance and also ecological perspectives that recognize and attend to the multiple determinants of health and disease | No                              | <ul style="list-style-type: none"> <li>• The pilot study did not attempt to address determinants of health given assessing health risks were beyond the pilot study’s scope.</li> </ul>   |
| 7. Involves systems development through a cyclical and iterative process  | Yes                             | <ul style="list-style-type: none"> <li>• The pilot study process allowed for cyclical feedback through phases of data collection, data analysis, and results reporting.</li> <li>• Participants had access to CHWs and research team from initial consent to final results reporting as needed.</li> </ul>  |
| 8. Disseminates findings and knowledge gained to all partners and involves all partners in the dissemination process  | Yes                             | Many information sharing opportunities were provided, per below, yet more were possible (see lessons learned). <ul style="list-style-type: none"> <li>• Strategic information dissemination to residents via the informed consent process and town hall meetings.</li> <li>• CHWs ensured information was presented in an easily understood, nonalarming format.</li> <li>• Town hall meetings were discrete episodes of information sharing, while CBPR encourages a long-term commitment to support sustainability in the community.</li> </ul> |
| 9. Requires a long-term process and commitment to sustainability  | No                              | <ul style="list-style-type: none"> <li>• Communications dwindled after the closing town hall meetings.</li> <li>• Our team could have made more effort to foster long-term relationships (see lessons learned).</li> </ul>  |

\*Source: Israel et al., 2008.  
<sup>a</sup>ARHF = Atlanta Regional Health Forum.

management also labeled residents who were overly exuberant about participating as “troublemakers,” and dissuaded them from participating. This notion of silencing “troublemakers” in the research process is contrary to CBPR. Principles 3, 4, and 5 encourage inclusion of those who traditionally have

been socially oppressed to ensure equity and shared influence and control, thereby changing the paradigm by which research is conceived and conducted (Chavez, Duran, Baker, Avila, & Wallerstein, 2008).

Ensuring consistent sampling methods among the CHWs was also challenging.

Several CHWs reverted to a previous study’s protocol for dust sampling and altered the length of time and locations for sampling. Placement of air sampling devices also varied among CHWs. The CHWs also modified the labeling system, which hampered the process of sample tracking with laboratories.

## Lessons Learned for Increased Community Participation

The need to identify the pilot study sites before engaging the residents limited the community's involvement. Defining the community is one of the first steps in initiating CBPR (Green et al., 1995; Israel et al., 2008) particularly with susceptible, vulnerable subpopulations like older adults (Shendell et al., 2011). We recognize the pilot study could have been more participatory by having the residents involved in decision making, which would have increased colearning opportunities and power sharing (Principles 3 and 4). If residents had been allowed to participate from the pilot's inception, their knowledge of the social environment and property management's temperament would have been extremely helpful and might have improved relations with the property managers. Furthermore, the residents could have been instrumental in identifying policy changes and other benefits to improve their community's health and social welfare, thereby fostering "action research" that identifies social change efforts (Principle 5). Active participation of residents could have increased reciprocal transfer of knowledge, skills, and capacity building (Principle 4). The residents could have learned scientific practices, enhanced leadership skills, and gained a sense of ownership while the researchers learned the community's social norms and more effective ways to communicate and translate results. Also having the residents and property managers provide their perspectives during the post-study presentations would have increased their role in the information sharing and dissemination process and help foster a longer relationship (Principles 8 and 9).

The pilot study identified two types of community partners: the residents and the CHWs working with the community organization ARHF to build upon community strengths (Principles 1 and 2). Partnering with a community-based organization comprising members more reflective of the community would have added another opportunity to enhance community participation and incorporate concerns of the residents into the pilot study (Principle 5). Although ARHF's leadership did not include residents of the pilot study community or low-income seniors, the role of Zap Asthma's CHWs—who serve the community and are of similar age and demographic of

the study participants—became more critical. Once the partnerships are established, it is important the group develops a set of bylaws (i.e., operating norms) to guide the partnership's work (Israel et al., 1998; Metzler et al., 2003). Our research team had informal understandings of operations but did not establish explicit working guidelines and could have benefited from having a consensual decision-making process. For example, more communication between the CHWs and researchers including joint field visits and additional trainings might have improved adherence to the sampling protocol (Principles 3 and 4).

The influence of funding allocation rules limited community involvement in the planning process due to the pilot study's funding mechanism (i.e., government contract). Research suggests the relationships that most favor the community are those that place funding and decision-making power with the community's lead agency (Principle 2); that agency can then subcontract with public health practitioners (Duran & Duran, 1999). A conscious effort was made to increase community participation and decision-making authority by providing primary funding to the community-based organization, who then subcontracted with the university and CHWs for data collection. Because the idea for the pilot study was initiated by CDC who contracted with ARHF to identify study sites and partners, however, the community members only became involved once the sites were chosen (i.e., the property manager agreed to participate), but henceforward were an integral part of the pilot study.

## Conclusion and Recommendations

This article discussed challenges to implementing CBPR and provided lessons learned to improve community participation in environmental health research. The experience demonstrates that incorporating CBPR principles in environmental health research involves trial/error, adjustment, and compromise and can take several years to develop effective partnerships. Our study piloted the environmental methodology and laid the foundation for a current nationwide study of the health and economic benefits of green renovations in low-income urban housing. The importance of the pilot study is that it allowed us to work with CHWs to develop a plain-lan-

guage, results-reporting form to communicate multiple environmental housing exposures without raising unnecessary concern for those environmental agents that have no national thresholds for safety. Because studies increasingly generate difficult-to-interpret data, the scientific literature has begun to focus more on the ethical considerations related to reporting these results (Altman et al., 2008; Morello-Frosch et al., 2009; Resnik & Zeldin, 2008). As we undertake the nationwide study, we will continue to reach out to community members from each site to consider how best to relay the results not only to the study participants but also to the community in general. In summary, our pilot study could have been more "participatory." Lessons learned to increase community participation include the following:

- adequately defining the community by including at the planning table the gatekeepers, community representatives, and others who are affected by the study;
- determining methods and explicit guidelines to ensure equitable decision making and power sharing among all partners;
- acknowledging the effect of funding dynamics on a CBPR approach;
- collaboratively disseminating results among all partners; and
- building long-lasting relationships that mutually benefit everyone involved.

If all CBPR principles are applied consciously, a CBPR approach can be a powerful tool to improve outcomes of environmental and urban health research, address community concerns, and promote social change. 🐼

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## Did You Know?

The U.S. Environmental Protection Agency released an enhanced version of “How’s My Waterway,” an app and Web site to help people find information on the condition of thousands of lakes, rivers, and streams across the U.S. from their smart phone, tablet, or desktop computer. Visit [www.epa.gov/mywaterway](http://www.epa.gov/mywaterway) to determine the quality of your local bodies of water.

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# A Strategic Cleaning Assessment Program: Menu Cleanliness at Restaurants

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**Abstract** The importance of clean food contact surfaces has been recognized; however, the importance of cleanliness on nonfood contact surfaces such as menus may be underestimated. The aim of the study described in this article was to determine the cleanliness of restaurant menus, evaluate typical cleaning methods used in a restaurant, and provide recommendations for improving menu cleanliness. The authors' study used an adenosine triphosphate meter to assess the cleanliness of the menus. A pretest identified the most commonly touched areas of the menu by consumers. Based on the results of the pretest, menus were collected from casual-family dining restaurants and analyzed for cleanliness. Results suggested that menus should be cleaned after each shift and that menus distributed by the staff when guests are seated are cleaner than those kept on the table.

## Introduction

Cleanliness of the environment in which food is being prepared, served, and consumed is critical in reducing the potential for foodborne illness. Foodborne illness outbreaks can certainly damage a restaurant's reputation and lead to a loss of revenue. Previous research found that 70% of consumers would no longer buy food from a food service establishment where they had concerns about hygiene (Food Safety Agency, 2008). Knight and co-authors (2007) found that people who perceived that a restaurant was "not at all" committed to food safety were less likely to choose that restaurant when eating out. In fact, at least one study found that cleanliness was the most important determinant for consumers' perceptions of restaurant food safety (Henson et al., 2006).

Consumers are likely to judge the cleanliness of a restaurant on visual perceptions. Similarly, although health inspectors use an inspection manual and the food code to inspect restaurants, their judgments also rely heavily on visual assessment. Where visual observations are used, subjective assessments may also be needed to quantify cleanliness. Moore and Griffith (2002) state, "Cleanliness' is a relative concept—what is acceptable as being 'clean' in one situation may be unacceptable in another (p. 318)." This perceptual difference was found in a previous study in which health inspectors showed variations in their opinions of cleanliness (Lee, Almanza, Nelson, & Ghiselli, 2009). The typical assessment of what is clean, therefore, relies heavily on visual assessment, which may be subjective and is likely to differ from one individual to another.

As bacterial and viral contaminations are not detectable by visual assessment, the lack of microbiological analysis can be problematic. The results of studies using hygiene swabs and agar contact plates have shown that visual inspection is a poor indicator of cleaning (Griffith, Cooper, Gilmore, Davis, & Lewis, 2000; Moore & Griffith, 2002). Microbiological assessment of restaurants is generally not conducted, however, as part of the inspection process since traditional microbiological analyses require 48–72 hours after the sample is collected to obtain results. Equipment such as an adenosine triphosphate (ATP) meter provides a faster assessment of cleaning, but ATP meters assess organic soils (which include food soil and other organic residues in addition to microorganisms) and are expensive for routine inspections.

Furthermore, consistent cleaning of certain surfaces outside the kitchen may not be done in all restaurants. This may be particularly true for furniture, equipment, and other frequently used items such as menus. Contaminants on menus can be transferred to guests' hands and subsequently to food being consumed. Cleaning of menus is commonly done in many restaurants; however, the need for cleaning is based more on esthetic considerations and may simply be done by visual inspection or by touching the menu. Standards or protocols to clean menus or even to determine when the menu needs to be cleaned have not yet been established. This is potentially a concern as it has been demonstrated that microorganisms could be transferred from damp menus to fingertips for up to 24 hours for certain types of menus



(Sirsat, Choi, Almanza, & Neal, 2013). The purpose of our study was therefore to assess the cleanliness of menus in a restaurant and the impact of different factors (such as type of cleaning method and how menus are stored or distributed) on menu contamination.

### **Determination of the Cleanliness of a Surface Using ATP Meters**

The cleaning of food service equipment or furniture in a restaurant depends on the protocols of that facility. Capable restaurant managers institute their own cleaning and sanitizing schedules for the restaurant to facilitate cleaning and sanitizing procedures. Factors influencing the choice of hygiene practice methods include cost, time, staff, ease of use, management needs, and nature of the food contact surfaces (Griffith, Blucher, Fleri, & Fielding, 1994).

More recently, ATP meters have been suggested as a less time-intensive and acceptable method for determining the cleanliness of a surface (Griffith et al., 2000). They measure the bioluminescence from ATP (an energy-containing substance present in living cells) from microorganisms, food residues (or other organic materials), and humans (Worsfold & Griffith, 1996). Because of the potential for contamination on menus and the possible transfer of contamination onto customers' hands, it is important to consider menu cleaning practices and their effectiveness. More specifically, the purpose of our study was to assess the contamination on restaurant menus to determine if typical cleaning methods are effective and the impact of different factors (such as type of cleaning method and how menus are stored or distributed) on menu contamination.

ATP values of 500 relative light units (RLU) for a clean surface are considered a realistic upper critical limit (Griffith et al., 2000). The use of ATP meters in research studies is thought to be advantageous in that it is a rapid test that provides results within minutes and is a more cost-effective means to monitor surface cleanliness than traditional microbiology (Griffith et al., 1994). The use of the ATP technique has also been suggested for the restaurant and food service industry to indicate the level of potential cross contamination of food (Leon & Albrecht, 2007). A comparison of ATP bioluminescence and traditional swabbing methods for the deter-

mination of surface cleanliness at a hospital kitchen showed both techniques were highly correlated (Aycicek, Oguz, & Karci, 2006). Hence, because of the advantages of ATP testing and its correlation to traditional swabbing methods, our study used ATP meters to assess the cleanliness of food contact surfaces.

### **Materials and Methods**

#### **Pretest**

In order to validate the most appropriate areas of the menu to test for the impact of cleanliness, a pretest was conducted to identify the high-touch areas of the menu by consumers. Because restaurants use a variety of different menu styles, this pretest included four styles of menus. Two sizes were tested (letter size and legal size) for two different menu formats (single page and multipage). The menus were made with a high-quality color copy glossy 32 lb. weight paper similar to that used by many restaurants. To standardize consumers' visual and tactile use of the menus, both single-page menus had a restaurant's name on one side and the menu printed on the other. The two single-page menus listed the same menu items using the same font and type size (Times New Roman, 12 point); the only difference was the spacing between the menu items for the letter vs. legal sizes. To standardize consumers' visual and tactile use of the menus for the multipage formats, the same food items using the same font and type size were again used for the letter vs. legal sizes. The multipage menus were created by folding the paper on the long side resulting in a four-page menu that measured either 8 1/2" x 5 1/2" for the letter size paper or 8 1/2" x 7" for the legal size paper. For both multipage menus, the name of the restaurant was printed on the front and the menu was printed on the two inside pages.

The research investigator and three field workers visited with a group of 36 students enrolled in a hospitality and tourism management program to explain the purpose of the study and ask if students were willing to participate in the pretest. Seventeen students agreed. Participants were asked to rub their hands with a fluorescing liquid that would leave traces on menus when they were touched and then be visible under ultraviolet light. Menus were presented one at a time to each study participant. Each participant eval-

uated all four menus following the protocol described above. To ensure participants used the menu as they would in a restaurant, they were handed the menu after being seated and asked to select their choice of entrée, beverage, and dessert as if they were eating in that restaurant. After collecting the first menu from the participants, the second menu was presented to the participants. Similarly, after completing the second menu, the third menu and finally the fourth menu were presented. A coupon for a gourmet cookie was then given to the participants in appreciation for their participation. Menus were stacked on clean sheets of paper so that the liquid could dry thoroughly without smearing or contacting other menus.

Menus were then analyzed visually using a 5-watt ultraviolet disclosing lamp black light. To quantify the areas of highest touch and identify the areas for testing in the later study, the menu was divided into smaller units. A transparent grid marked with 2.8" squares was laid over the menu to ascertain if any touch contact occurred in these smaller units. This grid was then used to create a map of consumer contact on the menus. Contact patterns were determined by recording a positive result each time an area had been touched as indicated by the ultraviolet visible fingerprints left on the menu.

Results of the pretest were then used to determine which areas of the menus to evaluate for the main study. Results showed that the lower and outer sides of the menus were most likely to be touched for both sizes of the two page menus (Figure 1). One difference for the 8.5" x 11" menu was that the lower half of the menu was most likely to be touched, whereas for the 8.5" x 14" menu, it was not the bottom half but an area representing a similar distance from the top as the shorter menu that was most likely to be touched. The lowest section of the 8.5" x 14" menu was in fact less likely to be touched, particularly for the one page menus. Multiple page menus were unique in that the cover of the menu was less likely to be touched on the left side of the menu. The one-page letter-size menu did not show distinct patterns and was therefore excluded from the analyses.

#### **Main Study**

The owner of a casual-family dining restaurant chain agreed to allow our study to be

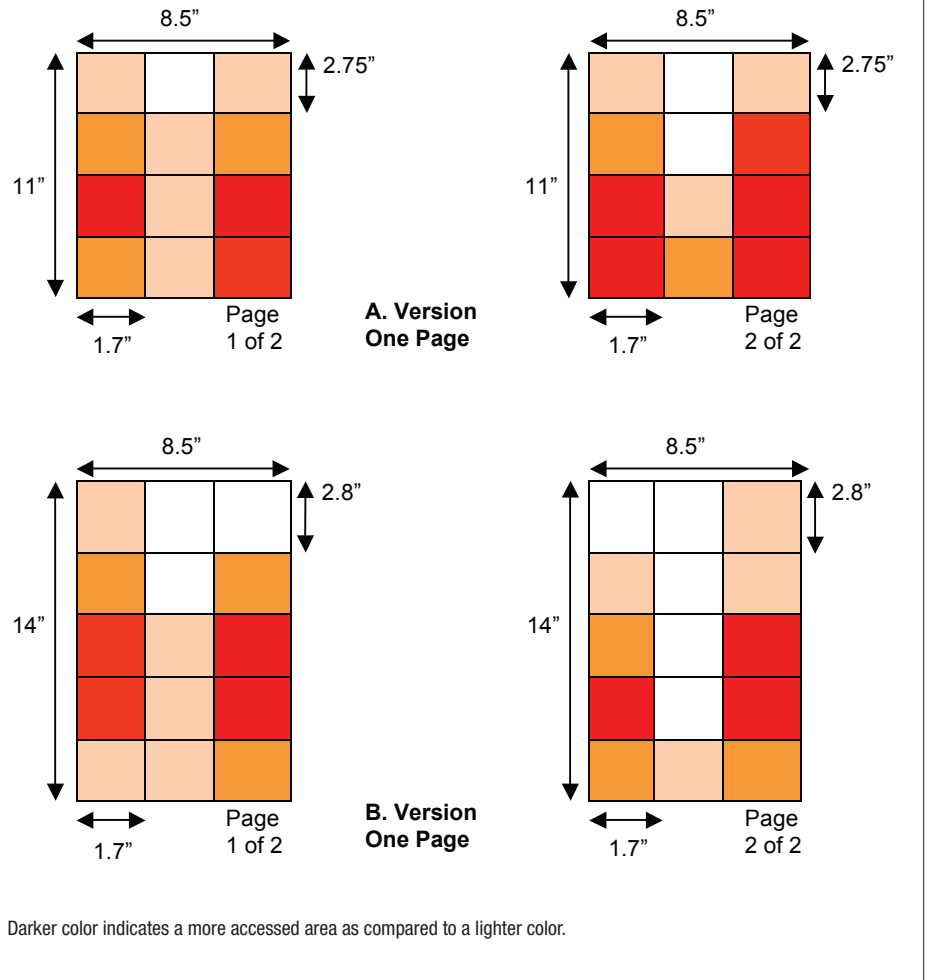
conducted in one of his restaurants using his menus. The restaurant represented a small chain that offered sandwiches, salads, pizza, and desserts. Information was collected regarding menu storage, menu distribution and collection procedures, and menu cleaning procedures. After discussing possible research questions in this real-world setting, permission was received from the owner to evaluate the impact of three factors on menu cleanliness. The first question was to find out the impact of typical cleaning methods on menu cleanliness (before being cleaned vs. after being cleaned by the staff). The second question was to find out how the type of cleaning method (spray vs. wet cloth) impacted cleanliness. Finally, the third question was to determine the impact of menu storage and distribution method (servers handing them out vs. leaving menus in a holder on the table).

Prior to the start of data collection all menus were collected and thoroughly cleaned using 91% isopropyl alcohol. This standardized the beginning level cleanliness among the restaurant menus. The menus were circulated in the restaurant for two weeks and the staff cleaned menus according to their routine cleaning policies. Routine cleaning practices included the use of a commercial grade chlorine-based solution as a sanitizer. The standard cleaning practice in the restaurant was to spray the menus with this sanitizer and then wipe it from the menus using a washable cotton cloth. All menus were normally cleaned at the end of each shift. A fresh cleaning cloth was used for each shift.

Two rooms were used in the restaurant to determine the impact of handing out menus vs. leaving them on the table in a storage rack. This was already a standard practice in the restaurant (one room normally had servers hand out menus that were stored at the host station, the other room had wire racks on each table that stored the menus and were readily available for customers to use without the need to have one handed to them by a server). Identical menus were used in each of these two rooms. The staff were asked not to exchange menus between these two rooms during this time period. All menus were cleaned with isopropyl alcohol prior to start of our study to standardize cleanliness levels between the two distribution treatments.

FIGURE 1

Mapping of the Most Accessed Areas by Participants



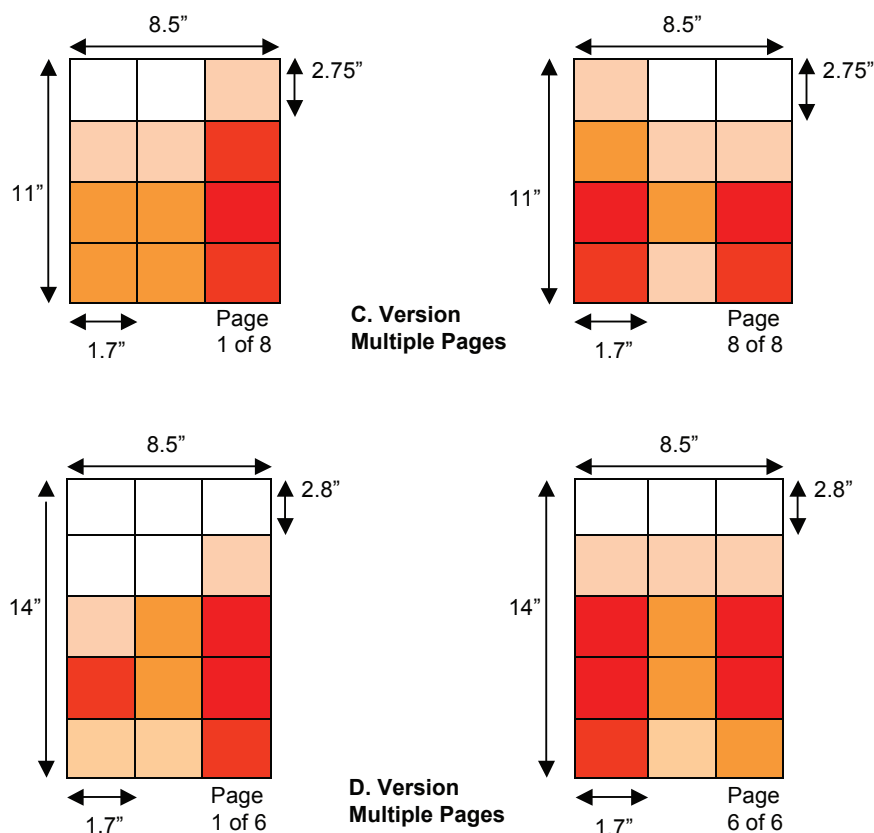
The first part of our study determined the effectiveness of current cleaning procedures in the restaurant. Menus were collected for sampling at two time periods (1:30 p.m. and 4:30 p.m.). Those times were specifically chosen to determine how dirty the menus became after the lunch rush (the 1:30 collection time) and how well the menus were cleaned by the staff during their routine cleaning (prior to the 4:30 collection time) and before the evening meal service period. Menus were collected without the staff being alerted as to the reason why they were being collected. A sample of menus was collected for three days in each of two weeks (six data collections) for this portion of our study. For the first week, 50 menus were sampled (15

menus on the first day, 15 menus the second day, and 20 menus the third day) and 55 menus were sampled the second week (20 menus for the first day, 15 menus the second day, and 20 menus the third day) for a total of 105 menus.

To determine the impact of the spray vs. wet cloth cleaning method, a total of 120 menus were selected for sampling (30 menus in each of the two weeks for each of the two cleaning methods). The second variable tested the effect of cleaning method (wiping vs. spraying) and sought 60 menus for sampling (15 menus for each of the two weeks for each cleaning method). For the third variable, the effect of handing out vs. storing menus on the table, a total of 40 menus were selected

FIGURE 1 *continued*

**Mapping of the Most Accessed Areas by Participants**



Darker color indicates a more accessed area as compared to a lighter color.

for sampling. These included 10 menus from each of the two rooms (one room had servers hand out the menus and the other room kept menus on the table) in each of the two weeks.

ATP sampling on menus was conducted in the following manner. Menus were partitioned into squares measuring 10 cm x 10 cm (100 cm<sup>2</sup>) as recommend by Moore and Griffith (2002). The areas used for sampling were those determined in the pretest for multipage menus. Based on the results of the pretest, a 100-cm<sup>2</sup> area in the lower right hand side of the front of the menu was swabbed for testing. After swabbing, menus were cleaned with 91% isopropyl alcohol before they were handed back to the restaurant for customer use.

The second part of our study examined the effect of two cleaning methods. The first cleaning method involved spraying the menu with a Lysol brand product then wiping with a clean towel. Each menu was sprayed once per cleaning. To evaluate the amount of spray used, the volume of Lysol was measured. Volumes used for the two weeks were fairly similar with a total of 25 mL of Lysol used to clean the 15 menus in the first week and a total of 22 mL used for the menus in the second week. After spraying, the menus were wiped with a towel with antimicrobial protection. Each towel was used to clean a maximum of four menus before it was then discarded to minimize the effect of any carryover from one menu to another.

The other cleaning method involved wiping the menus with a damp towel. The towels were impregnated with 200 parts per million U.S. Environmental Protection Agency–approved sanitizing solution of quaternary ammonium. To release the sanitizer from the towel (as given in the manufacturer’s directions) they were immersed in one gallon of water at approximately 75°F (24°C) then squeezed 10 times. One towel was used to clean all 10 menus in that week. To minimize the effect of carryover of contamination from one menu to another, the towel was placed back into the bucket after four menus were wiped down and then squeezed to remove excess liquid. After the cleaning process, menus were air dried for 20–30 minutes and then swabbed with the ATP meter. All menus were cleaned with 91% isopropyl alcohol before they were given back to the restaurant for use by customers.

Lastly, the effect of menu storage and handling was assessed. This part of our study hypothesized that menus handed out by the staff would be cleaner than menus displayed on tables since customers could easily touch the menus on the tables while they were eating and food debris could contaminate the menus. One room in the restaurant had servers hand out menus that were stored at the host station. The second room left the menus in a holder at the table. This portion of our study differed slightly in its collection method in that the menus were sampled prior to staff cleaning to assess the differences in contamination associated with these two storage and handling methods. Of the 45 menus typically used in each room, 10 menus were randomly collected for sampling from each room at approximately 4:00 p.m. (prior to cleaning) for each of the two weeks. The menus were swabbed with ATP meters using the method described above and cleaned with 91% isopropyl alcohol before they were given back to the restaurant.

**Results and Discussion**

Because of changes in menu availability and handling in the restaurant and one dropped sample during testing, the actual number of menus sampled changed slightly for the first test, but were still considered adequate for analysis. For the first test (before and after restaurant cleaning), 53 menus were sampled prior to cleaning and 58 menus after clean-



TABLE 1

**The Effect on Adenosine Triphosphate Values (Relative Light Units) for Test 1 (Menu Cleanliness)\***

| Before Cleaning | After Cleaning |
|-----------------|----------------|
| 163             | 546            |
| 174             | 151            |
| Dropped         | 283            |
| 217             | 431            |
| 367             | 403            |
| 218             | 440            |
| 295             | 329            |
| 208             | 220            |
| 121             | 306            |
| 208             | 85             |
| 157             | 203            |
| 752             | 109            |
| 1152            | 147            |
| 508             | 342            |
| 188             | 246            |
| 267             | 142            |
| 310             | 120            |
| 84              | 148            |
| 108             | 115            |
| 249             | 163            |
| 346             | 43             |
| 39              | 48             |
| 249             | 35             |
| 16              | 95             |
| 657             | 29             |
| 67              | 39             |

\*Relative light unit values greater than 500 indicate an unacceptable cleanliness level.

ing (Table 1). The number of samples used for the second test (60 menus) and third test (40 menus) were the intended numbers described in the methodology.

A *t*-test was used to compare the ATP values of the menus after lunch (and before they were cleaned) at 1:30 p.m. to those after they were cleaned (and before the supper period) at 4:30 p.m. by the staff. As expected, menus had higher ATP values prior to being cleaned ( $M = 306.20$ ,  $SD = 687.42$ ) as compared to menus that had been cleaned ( $M = 125.36$ ,  $SD = 125.90$ ). This difference was statistically significant:  $t(103) = 1.92$ ,  $p < .05$ . The average of RLU values (306.20) for the uncleaned menus did not reach the critical upper limit of 500 RLU; however, approximately 11% or 6 out of the 53 usable individual menu

| Before Cleaning | After Cleaning |
|-----------------|----------------|
| 9               | 66             |
| 103             | 14             |
| 82              | 48             |
| 83              | 41             |
| 58              | 39             |
| 255             | 36             |
| 59              | 27             |
| 87              | 16             |
| 118             | 39             |
| 76              | 21             |
| 282             | 32             |
| 700             | 24             |
| 75              | 26             |
| 95              | 30             |
| 59              | 60             |
| 107             | 69             |
| 4838            | 50             |
| 152             | 82             |
| 169             | 24             |
| 121             | 72             |
| 222             | 91             |
| 66              | 67             |
| 57              | 26             |
| 150             | 74             |
| 81              | 113            |

results were at values greater than 500 RLU (657; 700; 4,838; 752; 1,152; and 508). Interestingly, one cleaned menu even showed a critical ATP value > 500 RLU (546).

The assessment of cleaning methods using a *t*-test showed a statistically significant difference in cleanliness between the two methods:  $t(58) = 2.303$ ,  $p = .025$ . Menus cleaned with the spray cleaning method ( $M = 81.23$ ,  $SD = 46.97$ ) gave significantly higher ATP values than menus cleaned by the wiping method ( $M = 52.97$ ,  $SD = 48.12$ ) and were therefore considered less clean. None of the menus had values higher than 500 RLU and all of the menus were in an acceptable range of 0 to 249 RLU (Table 2). These results suggest that the use of a wet wipe to clean menus may be more effective, but that the spray method using a

TABLE 2

**The Effect on Adenosine Triphosphate Values (Relative Light Units) for Test 2 (Type of Cleaning Method)\***

| Type of Cleaning Method |            |
|-------------------------|------------|
| Spray Cleaning          | Damp Towel |
| 26                      | 60         |
| 117                     | 69         |
| 69                      | 50         |
| 125                     | 82         |
| 83                      | 24         |
| 77                      | 72         |
| 70                      | 91         |
| 120                     | 67         |
| 115                     | 26         |
| 151                     | 74         |
| 63                      | 113        |
| 32                      | 249        |
| 117                     | 66         |
| 77                      | 106        |
| 119                     | 69         |
| 7                       | 16         |
| 26                      | 12         |
| 41                      | 61         |
| 36                      | 64         |
| 76                      | 16         |
| 82                      | 21         |
| 207                     | 23         |
| 28                      | 32         |
| 93                      | 0          |
| 77                      | 10         |
| 69                      | 4          |
| 12                      | 32         |
| 116                     | 32         |
| 47                      | 32         |
| 159                     | 16         |

\*Relative light unit values greater than 500 indicate an unacceptable cleanliness level.

dry cloth was also able to adequately clean the menus according the ATP test.

Results of the third study showed that menus stored on the table ( $M = 370.35$ ,  $SD = 243.70$ ) gave statistically significant higher RLU values than menus that had been handed out ( $M = 96.80$ ,  $SD = 47.07$ ;  $t[38] = 4.93$ ,  $p < .001$ ), indicating that menus stored on the table were dirtier than menus handed out. None of the individual menus that were

TABLE 3

**The Effect on Adenosine Triphosphate Values (Relative Light Units) for Test 3 (Menu Distribution)\***

| Menu Distribution |               |
|-------------------|---------------|
| Hand Out          | Left on Table |
| 47                | 130           |
| 27                | 47            |
| 121               | 176           |
| 16                | 576           |
| 82                | 102           |
| 67                | 1035          |
| 58                | 298           |
| 118               | 434           |
| 89                | 533           |
| 134               | 252           |
| 74                | 185           |
| 155               | 746           |
| 133               | 326           |
| 185               | 471           |
| 102               | 529           |
| 173               | 359           |
| 62                | 224           |
| 56                | 209           |
| 103               | 212           |
| 134               | 563           |

\*Relative light unit values greater than 500 indicate an unacceptable cleanliness level.

handed out exceeded 500 RLU; however, 30% or 6 out of the 20 menus left on the table had levels greater than 500 RLU (576; 1,035; 533; 746; 529; and 563; Table 3). As predicted, menus stored on the tables may have had more chances for contamination by customers as food was being eaten.

### Conclusion

Our study showed that menus should be cleaned after each shift or approximately every four hours. Skipping even one cleaning might result in a high level of contamination increasing the potential risk of cross contamination. If the menus are not clean, contamination could easily be transferred from the menus to the customers' hands or to the staff's hands when they serve food to the customers. Therefore, restaurant staff need to pay close attention to cleaning the menus with the appropriate cleaning methods after each shift.

Better cleaning was associated with the wet wiping cloths, although both methods achieved adequate cleaning scores according to the ATP results. In addition, our study found that menus stored on the table had greater levels of contamination than menus that had been handed out. Restaurant managers should consider handing out menus rather than leaving menus on the table. Menus stored on the table appear to have more chances for contamination from food or the hands of customers. If a restaurant's policy is to put menus on the table, the staff may need to clean the menus more frequently.

Previous studies have assessed consumers' perceptions of risk when purchasing food (Mitchell, 1998; Mitchell & Harris, 2005) and when selecting a restaurant (Henson et al., 2006; Knight et al., 2007). Future studies may wish to consider the perception of consumers about clean or unclean menus and whether an unclean menu affects their revisit intention. Although our study did not measure consumers' perception of the importance of clean menus, it is possible that clean menus may be an indicator of restaurant cleanliness to consumers in the same way that odors (Fatimah, Boo, Sambasivan, & Salleh, 2011) and workers' behavior and appearance (Fatimah et al., 2011; Henson et

al., 2006) have been found to be important cues to the cleanliness of the restaurant.

Our study measured contamination on the surfaces of a multipage restaurant menu. One limitation of our study is that only one type of menu was assessed. Future studies may wish to evaluate the differences with other types of menus and other variables. For example, laminated menus, disposable menus (including children's menus), and menus that fit in leather-type holders may offer different results. In addition, the length of time that menus are used prior to disposal may make a difference. Finally, the types of foods offered on the menu may make a difference. Foods that are eaten with fingers or hands (particularly when menus are kept at the tables) may offer different results when menus are handled by customers.

It would appear that cleaning can reduce contamination if it is done correctly. Better cleaning and lower levels of contamination may be possible with certain cleaning methods such as the sanitizer towel tested in our study. Differences in the level of contamination were also found with different service methods (leaving the menu on the table vs. the server handing it to the customers). One of the most significant findings of our study is that critical levels of contamination (as assessed by ATP values) may occur if regular cleaning is not done. High levels were found after one service period. Cleaning may not have been a priority in the past for restaurants, but should be considered in the future based on the results of our study. Regular menu cleaning can make a difference in the cleanliness of menus. 🍴

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# Voluntary Approaches to Solid Waste Management in Small Towns: A Case Study of Community Involvement in Household Hazardous Waste Recycling

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**Abstract** An enormous amount of household hazardous waste (HHW) is generated as part of municipal solid waste. This scenario presents problems during disposal, including endangering human health and the environment if improperly disposed. This article examines current HHW recycling efforts in Hammond, Louisiana, with the following objectives: (a) analyze factors and attitudes that motivate residents to participate in the program; (b) quantify various types of HHW; and (c) analyze the e-waste stream in the HHW.

Residents and city officials who were surveyed and interviewed cited that commitment shown by local authorities and passion to protect the environment and human health were part of their active participation in the program. An awareness program has played a key role in the success of the program. A legislation specific to e-waste is encouraged. While knowledge and information on laws and permit application processes and the promotion of greener products are encouraged, provision of storage or collection facilities and communal transportation will further motivate more residents to participate in the recycling program.

## Introduction

Household waste management is a growing problem in the U.S. and many other parts of the world. The U.S. generates at least 4.5 pounds of household solid wastes per day per person (Government Accountability Office [GAO], 2007; U.S. Environmental Protection Agency [U.S. EPA], 2008a). In a small town with a population of slightly higher than 20,000, household wastes can easily translate into about 100,000 lb. per day. About 1% of municipal solid waste (MSW) generated in the U.S. is household hazardous waste (HHW), a fraction that corresponds closely with what is being produced in other devel-

oped countries (Pendle & Poll, 1993; Stasiak, Gaiziuniene, & Zidoniene, 2011; U.S. EPA, 2011).

In 2006, U.S. residents, businesses, and commercial institutions generated more than 251 million tons of MSW per year and about 8 billion tons of industrial solid wastes (U.S. EPA, 2009a, 2009b). This enormous amount of waste is both hazardous and nonhazardous. While hazardous waste is regulated by subpart C of the Resource Conservation and Recovery Act (RCRA) or 42 U.S.C. § 6901, nonhazardous waste falls under the management guidelines of RCRA, subpart D (U.S. EPA, 2009a).

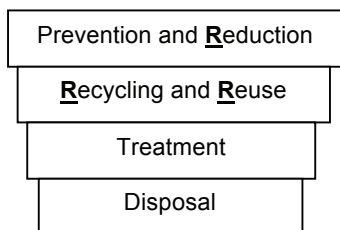
HHW is distinguished by four characteristics: ignitability, corrosivity, reactivity, and toxicity (Hall, Davis, Schwartz, Bryson, & McCrum, 1996). Since these features contribute to the extent to which HHW can damage property and cause physical illness and fatalities, concerns for the growing fraction of MSW being HHW will continue to present real waste management challenges to municipalities of all sizes for the foreseeable future. The main objectives of our study were to assess factors that motivate residents to participate in the city of Hammond, Louisiana's, HHW recycling program; to quantify various fractions of HHW generated in a semiurban environment; and to address the issue of e-waste in the city of Hammond and its surrounding communities.

## Background

Household waste management practices present major environmental and public health concerns. High disposal costs and lack of disposal facilities along with the increasing stringency of laws and regulations and declining or limited natural resources have been cited as some of the problems associated with the management of HHW (Forfás, 2006; Reinhart, 1993; U.S. EPA, 1993). An ever-increasing cost of waste disposal is clearly an incentive to promote good HHW management practices such as pollution prevention strategies that embrace on-site recycling and reduction, reuse, or remanufacture, commonly known as the 3 Rs of the pollution prevention hierarchy of HHW management practices (Figure 1). Pollution prevention approaches can sustain MSW management practices, particularly in small cities and towns where resources are limited.

FIGURE 1

**Pollution Prevention Hierarchy and the 3 Rs for Reducing, Recycling, and Reusing**



Lack of landfill sites for waste disposal is an obvious challenge in the management of HHW. Key infrastructures to support safe and sustainable waste disposal management operations are also lacking in many semiurban areas (Forfás, 2006). Since most cities and towns continue to face population growth, this continually puts pressure on local government, including communities' resistance to locate landfill facilities in their neighborhoods. Population growth and awareness on the impacts of HHW include what is now commonly known as the "not in my backyard" syndrome among people. This condition makes it extremely difficult for cities and towns to implement safe and sustainable management of HHW (Forfás, 2006; U.S. EPA, 1993).

Another significant problem of HHW management is myriad regulations regarding waste collection, storage, transportation, disposal, and long-term monitoring requirements for landfills and human health impacts of HHW. Although regulations have evolved over the years at different levels of the government to solve solid waste management issues, recycling efforts that are being encouraged by nonregulatory voluntary programs are receiving positive responses from communities across the country. As an example (Figure 1), the Pollution Prevention Act of 1990 encourages nonregulatory voluntary waste management initiatives through the 3 Rs of recycling, reducing, and remanufacturing or reusing resources embedded in the HHW that would otherwise be discarded (National Pollution Prevention Center for Higher Education, 1995; World Class Communications Technologies, 2011).

FIGURE 2

**Study Location**



Since the early 1980s, the U.S. Environmental Protection Agency (U.S. EPA) has encouraged voluntary community approaches to managing HHW (Illinois Environmental Protection Agency [EPA], 2003; U.S. EPA, 2008a). Municipalities across the country have successfully used these approaches as tools to minimize impacts of HHW, mainly by voluntary recycling efforts and encouraging proper disposal of wastes through training and awareness raising (Illinois EPA, 2003). As a result of these initiatives, which include sharing of successful case studies, voluntary community programs have increased by a factor of 400 within a period of 10 years, from two programs in 1980 to more than 800 programs countrywide (Illinois EPA, 2003; U.S. EPA, 1993). The city of Hammond, in Tangipahoa Parish, Louisiana (Figure 2), is one of the cities in the country that have embraced pollution prevention and voluntary participatory approaches to address HHW management practices at the local level.

**Materials and Methods**

A semistructured study questionnaire was designed during March and April 2011 with an objective of assessing perceptions of residents and finding out key factors for their voluntary participation. Recycling of HHW in Hammond is a half-day, twice-per-year event. It brings together citizens from the city and the neighboring towns to recycle and dispose HHW.

The questionnaire was circulated for review among members of three separate entities. These included faculty members from Southeastern Louisiana University's kinesiology and health studies department, Hammond city officials, and committee members representing the household solid waste advisory committee. The latter oversees Hammond's recycling activities and has played a key role in the city since the recycling program began almost a decade ago (City of Hammond Storm Water Advisory Committee [SWAC], 2012; Subsurface Drainage, 2012). A review by that commit-



tee was sought out in order to ensure the validity of the questionnaire and to clarify and identify relevant issues related to HHW management at the local level.

Three undergraduate students were asked to answer the questions as if they were responding to the questionnaire. This process helped to determine the approximate amount of time required to fill out the questionnaire and also provided an opportunity for editorial feedback and accuracy. In addition, exemption for review was submitted to Southeastern Louisiana University's institutional review board (IRB) together with the questionnaire. An exempt research includes activities where human subjects are not subjected to any form of discomfort such as laboratory tests or clinical trial and experiments to determine drug efficacies. Following the approval of the exemption form, an IRB consent form was prepared to communicate important information to participants of their rights and privacy in the study. This consent form accompanied the questionnaire.

On the day of the HHW recycling event, questionnaire and consent forms were administered to each resident who drove through the park where the recycling event took place. Respondents received a briefing on the objective of the survey and were informed that the survey was voluntary and it would take at most 15 minutes to complete. In addition, participants were informed that the number of questions to be answered was completely under their own discretion and that they could remain anonymous if they so desired. Identifying information such as participant's social security numbers or dates of birth was not needed for this survey.

Participants who were willing to fill out the questionnaire could choose to complete the survey at the site or to take it home and mail it back once completed. Each participant was given the questionnaire at the entrance to the park. The questionnaires were collected at the park's exit.

Participants willing to participate in a short interview were asked four questions: (a) What motivates you to participate in the recycling events? (b) Describe difficult types of HHW not accepted at the recycling event. (c) What do you consider to be the most significant strengths and weaknesses of the HHW recycling events? and (d) What would you like to be done five years from now?

TABLE 1

**Exposures to Heavy Metals and Potential Human Health Impacts**

| Heavy Metals   | Potential Sources of Emission or Exposures  | Minimum Risk Levels        | Chronic Toxicity Effects  |
|--|---|----------------------------|---|
| Lead (Levy & Bro, 1994)                                  | Paints (in U.S. before 1978), burning of plastics and papers, plumbing, electronic products, circuit boards | Blood lead levels <10 µg/L | Neurological impacts and lowering of IQ   |
| Mercury (European Council, 1991)                         | Electronic products, plastic wastes, pesticides, pharmaceuticals, fluorescent tubes, dental wastes          | Blood levels <10 µg/L      | Gastrointestinal (GI) disorders, respiratory tract irritation, renal failure, neurotoxicity |
| Cadmium (Friberg, Elinder, Kjellstrom, & Nordberg, 1986) | Electronic products, plastic wastes   | Blood lead levels <1 µg/L  | Irritation of the lungs and GI infections, damage to kidneys                                |

Other sources: Schübeler et al., 1996; United Nations Environment Program, 2006.

**Results and Discussion**

**Participants**

At least 360 residents participated in the HHW recycling program in spring 2011. Out of the total participants at the event, 187 (51.9%) residents agreed to fill out the survey. One respondent submitted responses via regular mail. On-the-spot survey methods are usually rare, but often the response rates are very similar to what is expected (Health Communication Unit, 2006).

About 32% of the participants attended this event for the first time. A similar number of participants (31%) attended past events more than three times, and 16% attended either once or twice. About 1% of the residents attended more than five program events, and 3% do not remember the exact number of events they have attended. Based on the zip code, 48% of residents were from the city of Hammond, and 16% lived in the nearby city of Ponchatoula. At least 6% and 4% of the residents were from the cities of Tickfaw and Springfield, respectively. Only 1% of the respondents came from as far as 100 miles away from Hammond.

Analysis based on ethnicity, age, sex, and marital and income status indicated that more males (58%) than females (42%) attended the recycling event. Previous studies, however, have reported women to be more willing to participate in recycling activities than men (Saphores, Nixon, Ogunseitan, & Shapiro,

2006). About 5% of residents were in the age group of 60–70 and 7% were in the 20–39 age group. Married couples represented 75.9% as compared to those who were single (21.7%) or divorced (2.3%). Middle age has been reported, however, as a significant factor in residents who are willing to participate in community and curb recycling efforts (Gamba & Oskamp, 1994).

More whites (85%) than African-Americans (3%), Asians (1%), Native Americans (11%), and Hispanics (0%) attended the HHW recycling event. This can be attributed to many factors including lack of transportation to and from the recycling event or the lack of passion and perhaps knowledge about protecting the environment among some residents.

While residents with a \$25,000–\$40,000 annual income accounted for 62% of the participants, a small fraction (4%) reported an income in excess of \$150,000 per year. While 42% of residents were employed full time, 6.8% and 41% showed part time and retirement status, respectively. Previous studies demonstrate that income and employment status, both of which are dependent on education level, are good predictors of the willingness to participate in community recycling efforts (Saphores et al., 2006).

**How Residents Receive Information on HHW Events**

About 59% of residents participating at the HHW event received information from local

TABLE 2

**Household Hazardous Waste in Municipal Solid Waste in the U.S.**

| Category of Household Hazardous Waste  | Percentage by Weight (% w/w) |
|--|------------------------------|
| Household maintenance items (paint, thinners, glues)                           | 36.6                         |
| Household batteries (plus electronics)   | 18.6                         |
| Personal care products (nail polish and remover, hair spray)                   | 12.1                         |
| Janitorial cleaning products   | 11.5                         |
| Automotive maintenance products (grease, oil, windshield washer fluids, tires) | 10.5                         |
| Pesticides, pet supplies, and fertilizers                                      | 4.1                          |
| Hobbies/other (pool chemicals, lighter fluid)                                  | 3.4                          |
| Pharmaceuticals  | 3.2                          |

Sources: Pendle & Poll, 1993; U.S. Environmental Protection Agency, 2011.

newspapers. *The Daily Star* is a local newspaper circulated throughout Tangipahoa Parish. This media outlet in a rural community with fewer Internet services can be an effective way of communicating information. Other ways by which residents became aware of the program were through word of mouth (14%), fliers (7%), radio (4%), Internet (3%), and local television (4%).

**Characteristics of Recycled HHW**

Residents recycling HHW contributed by only one person accounted for 17%; but 55% and 28% of residents recycled HHW that was contributed by two and three other people in the household, respectively. At least 64% of the HHW originated from one household; and slightly over 19%, 9%, and 6% of HHW originated from two, three, and four other households, respectively. This is not surprising in a community with close-knit families.

Most HHW products contain toxic chemicals such as heavy metals, e.g., lead, mercury, and cadmium (Schübeler, Wehrle, & Christen, 1996). Table 1 shows the relationship between exposure to heavy metals and potential human health impacts. HHW also contains solvents such as propylene glycol ether, which can be found in ordinary inks, resins, adhesives, paints, and household cleaning products (Bolognesi et al., 2001; European Council, 1991; Friberg, Elinder, Kjellstrom, & Nordberg, 1986; Levy & Bro, 1994; Nestmann, Otson, Williams, & Kowbel, 1981; Staples & Davis, 2002; United Nations Environment Program, 2012). Exposure to solvents can

also cause significant environmental, public health, and safety concerns. Some HHW contains acids and alkalis, which are corrosive. Examples of corrosive HHW include automotive battery acid, which can have a pH of 2 or less, and domestic detergents with a pH of 12.5 or greater because of their high sodium hydroxide content (Levy & Bro, 1994).

About 49% and 20% of residents surveyed produce 10–50 lb. or 50–100 lb. of HHW per year, respectively. Data in the city of Hammond and interviews indicate that a considerable and consistent increase of HHW generation has occurred since the inception of the program (City of Hammond SWAC, 2012). Although current levels of about 100 tons per year of HHW recycled at the events are high, it is far less than the national average of about 4–5 pounds per person per day. At the national level, composition of HHW in most MSW is broken down as shown in Table 2.

The effort taken by local governments to promote good HHW practices is beneficial for the environmental and public health because poor management of MSW can be a leading cause of ground water contamination and environmental degradation (Kumar, 2012). There are constraints, however, such as budgetary constraints which make it difficult for small cities and towns across America to produce reference manuals that can help small-quantity generators of hazardous wastes to comply with existing regulations pertaining to proper HHW management (Missouri Department of Natural Resources, 2008). Literature

show that most local government authorities in developing countries spend between 20% and 50% of their total budgets for solid waste management (Schübeler et al., 1996). Local authorities in developed countries are recognizing that environmental laws and regulations, including HHW management guidelines, are more stringent now than in the past and will continue to be so in the future. Therefore, given the nature of contemporary financial constraints, these authorities are becoming more innovative in designing safer and sustainable HHW management practices, including recycling program.

Of the 68% of residents who left one type of HHW or another at home, some raised concerns that either that HHW was not being accepted at the recycling event or they lacked the ability to transport that fraction of HHW to the recycling event. While 32% of residents left no unacceptable HHW in their households, 68% could not recycle some HHW, such as pesticides. The recycling event did not accept pesticides because a permit that is needed from the Louisiana Department of Environmental Quality (LDEQ) for this fraction of HHW was not secured.

An issue of unaccepted HHW can be addressed by implementing a fee-to-recycle system. A nominal fee paid upfront during purchase of household products can support end-of-life product management, such as incineration or other proper methods of recycling of pesticides and other HHW not accepted at the recycling event. For example, the state of California has successfully reduced in a significant way the waste generated by electronic products by implementing such systems (California State Board of Equalization, 2010).

**Interviews and Comments From Residents and City Officials**

Residents and city officials who were interviewed showed that turnout at the HHW events continues to increase each year, resulting in over 100 tons of waste being recycled to date (City of Hammond SWAC, 2012). Residents cited the passion to protect the environment and human health, top management commitment, and the ability of the city officials to connect with residents. These factors correlate well with the concerns of other communities who have practiced recycling (Domina & Koch, 2002; Meneses & Palacio, 2005).

Another motivating factor cited was commitment of city officials to recycling efforts through the resources they provided. The city pays fees to truck owners for recycling HHW and provides fliers, safety briefings to residents, student volunteers, and emergency trucks and personnel. The fliers outline the types of waste that are and are not accepted at the recycling events.

Residents and city officials cited the short duration (about four hours on Saturday for this recycling event), the number of events (only twice per year), lack of storage, and lack of collection and communal transportation facilities for HHW as being the main weaknesses of the recycling program. Design of permanent and temporary collection facilities have proved to provide convenience in other communities to residents who wish to recycle HHW but are unable to do so because of lack of transport, time, or other resources (California State Board of Equalization, 2010; Domina & Koch, 2002; Hornik, Cherian, Madansky, & Narayana, 1995; Saphores et al., 2006).

**E-Waste**

At the event, cell phones, stereos, computers, television sets, and other e-waste were recycled. In comparison to other types of HHW, the amount of e-waste was significantly higher (45%) than paint, tires, and “other” HHW that constituted 15.6%, 5.2%, and 1.6% of the total HHW, respectively. In comparison to the nation, e-waste is a growing concern in the city of Hammond. Generation of e-waste occurs in homes, government agencies, and at commercial facilities in the form of television sets, laptops, desktops, cell phones, and stereos. E-waste accounts for about 2% of all the waste transported to landfills and is nearly 70% of all hazardous waste generated in the U.S. (Ahmed & Tanveer, 2008; Integrated Waste Management Board, 2012).

In 2003, at least three million tons of e-waste were generated, but in 2008, more than 36 million units of television sets, 24 million personal computers, and 140 million pieces of portable cell phones, pagers, or phones were being sold, leading to the generation of more than 13 million tons of e-waste (Consumer Electronic Association, 2008; U.S. EPA, 2008a). In 2007, data showed a significant increase in e-waste (Table 3). This apparent increase in e-waste is attributed to the fast expiration of the useful life of elec-

**TABLE 3**  
**Amount of E-Waste Discarded or Recycled in 2007**

| Product Type      | Total Disposed or Trashed (Million Units) | Recycled (Million Units) | Recycling Rate (% w/w) |
|-------------------|---|--------------------------|------------------------|
| Television sets   | 47.5                                      | 6.3                      | 9%                     |
| Computer products | 362.8                                     | 48.2                     | 9%                     |
| Cell phones       | 266.6                                     | 14                       | 5%                     |

Source: U.S. Environmental Protection Agency, 2008b.

tronic products and their recycling rate that has remained relatively low.

Appropriate e-waste handling practices serve two major purposes: first, to prevent or minimize significant health, safety, and ecological impacts from the toxic materials embedded in the products; and second, to support recovery of valuable materials for reuse.

*Legislative Frameworks to Manage E-Waste at the Local Level*

Currently, 50% of states have enacted legislation to address sustainable management of e-waste (Figure 3). Some initiatives are in the form of take-back plans, and others focus on the producer responsibility laws (Electronic Take Back Coalition, 2011). E-waste constitutes a significant amount of recycled HHW. The use of electronic devices will continue to increase and this situation may present challenges to e-waste end-of-life management to state and local authorities.

*Resources to Support E-Waste Recycling Management*

Many useful resources are available for community use to design and implement successful management strategies for e-wastes. The Basel Action Network (BAN) in Seattle and the Silicon Valley Coalition in California and numerous nonprofit organizations have accumulated a lot of information about e-waste problems (BAN, 2002; Canadian Broadcasting Corporation, 2008). Large amounts of useful resources are discarded with e-waste across the globe. A personal computer may contain 26% silica or glass; 20% ferrous and nonferrous metals; 23% plastic materials; 14% aluminum; and 17% precious heavy metals such as lead, copper, zinc, mercury, and cadmium (E-Waste Collections, 2011). Discarding one

million cell phones is equivalent to disposing of 35,000 lb. of copper, 800 lb. of silver, 75 lb. of gold, and 33 lb. of palladium.

Appropriate legislation includes regulatory and nonregulatory frameworks at local, state, and federal levels. Existing federal regulatory requirements such as the Pollution Prevention Act of 1990 can provide a sustainable framework since most state governments can use these legislative and regulatory resources as their benchmarks (Kubasek & Silverman, 2008). For example, LDEQ has guidelines covering hazardous materials handlers, including conditionally exempt small-quantity generators (Louisiana Department of Environmental Quality, 2012).

Nonprofit organizations and communities can also support these initiatives by providing resources for sustainable management of e-wastes. For example, the federal government passed the Resource Conservation and Recovery Act (RCRA) in 1976, which offers a good framework to manage both hazardous and nonhazardous wastes, including the e-waste fraction of HHW. Another federal government initiative is the Hazardous Waste Electronic Manifest Establishment Act of June 2011, which requires generators of hazardous wastes to use electronic version of e-waste manifests to track hazardous wastes through a “cradle-to-grave” approach (Government Printing Office, 2011). The waste electrical and electronic equipment directive number 2002/96/EC of the European Union can influence the e-waste recycling at the community level (European Parliament and Council, 2002).

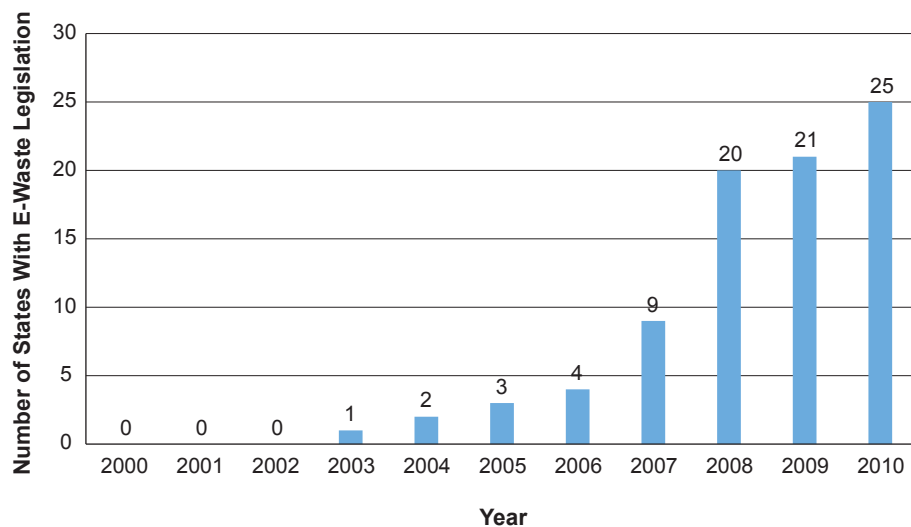
**Conclusion and Recommendations**

There is every reason to believe that—like in other parts of the country—HHW is a growing problem in the city of Hammond and



FIGURE 3

**Number of States With E-Waste Legislation**



Sources: Electronic Take Back Coalition, 2011; E-Waste Collection, 2011.

surrounding areas. Although the amount of HHW generated is not comparable to the national average data, the current recycling programs should be improved in frequency and time allocated in order to tackle any potential future growth of HHW as a result of potential population growth.

The city of Hammond's HHW program is successful as it incorporates a component of raising awareness and education through the use of fliers. This approach brings together residents, local institutions, govern-

ment authorities, and community members through a participatory approach. This case study can be replicated elsewhere to support initiatives that are designed to reduce HHW.

E-waste is a growing problem in the city of Hammond and surrounding communities. An urgent need exists to establish e-waste management programs to address this waste. Continuous involvement and engagement of residents is also as important as raising awareness including that of the 3 Rs of pollution prevention in managing HHW. Media, especially local

newspapers, can contribute to this awareness raising. A plan for community transportation for residents who cannot afford to transport wastes to the events is recommended.

Equally important is raising awareness on applicable regulations and ordinances about HHW through training and to provide residents with fundamental knowledge of procedures and permit application processes for HHW currently not permitted at the recycling events. These needs will promote proper management of HHW waste such as pesticides and polychlorinated biphenyl-containing products.

Some legislation to encourage take back of e-waste would minimize the generation of e-wastes in Tangipahoa Parish and in the state of Louisiana. Finally, green products are less toxic, and for common household products, promotion of these products can make a big difference in efforts to minimize the generation of HHW. 🐜

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## ▶ DIRECT FROM ATSDR



Michelle Watters, MPH, MD, PhD



Jamie Rayman, MPH

## Agency for Toxic Substances and Disease Registry's Don't Mess With Mercury Initiative

**Editor's Note:** As part of our continuing effort to highlight innovative approaches to improving the health and environment of communities, the *Journal* is pleased to publish a bimonthly column from the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). The ATSDR, based in Atlanta, Georgia, is a federal public health agency of the U.S. Department of Health and Human Services and shares a common office of the Director with the National Center for Environmental Health at the Centers for Disease Control and Prevention (CDC). ATSDR serves the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances.

The purpose of this column is to inform readers of ATSDR's activities and initiatives to better understand the relationship between exposure to hazardous substances in the environment and their impact on human health and how to protect public health. We believe that the column will provide a valuable resource to our readership by helping to make known the considerable resources and expertise that ATSDR has available to assist communities, states, and others to assure good environmental health practice for all is served.

The findings and conclusions in this article are those of the author(s) and do not necessarily represent the views of CDC/ATSDR.

Michelle Watters is a medical officer for ATSDR's Division of Community Health Investigations. Dr. Watters provides medical expertise in public health issues related to exposure to biological, chemical, and radiological agents for the regional offices, state and local public health and environmental agencies, and community members. Jamie Rayman is a health educator for ATSDR's Division of Community Health Investigations in the Region 9 office (San Francisco). Ms. Rayman develops health education and communication materials for community members affected by hazardous waste.

Mercury has long been recognized by the public health community as an environmental and occupational health hazard. In October 2013, the U.S. signed and ratified the international Minamata Convention on Mercury. Once fully ratified, this global treaty will require countries to reduce emissions and releases of mercury from products, processes, and industries to protect human health and the environment (United Nations Environment Programme, 2014). While many public health policy efforts focus on methylmercury exposure from fish or airborne elemental mercury emissions from coal-powered plants, a recent Agency for Toxic Substances and Disease Registry (ATSDR) initiative, Don't Mess With Mercury (DMWM) (Figures 1 and 2), is aimed at preventing exposure from elemental mercury spills.

Elemental mercury is a dense, silvery metal that is liquid at room temperature. When spilled, its high surface tension causes tiny droplets to form. These unique physical characteristics appeal to children and adolescents who have been observed playing with mercury, sharing it with friends, decorating their hair with it, taking it on school buses and into school buildings, and smoking mercury-dipped cigarettes. Mercury can be found in a variety of household items including thermometers, fluorescent light bulbs, and electronic switches. People have kept jars and containers of mercury for refining metals, folk medicine, and some ritualistic practices (Agency for Toxic Substances and Disease Registry [ATSDR], 1999).

Elemental mercury volatilizes at room temperature; the vapors are colorless, odorless, and heavier than air and accumulate in lower areas of a room. Heating mercury or

FIGURE 1

**Agency for Toxic Substances and Disease Registry's Don't Mess With Mercury Initiative**



FIGURE 2

**Agency for Toxic Substances and Disease Registry's Don't Mess With Mercury Initiative**

dispersing mercury droplets by vacuuming or sweeping will increase concentrations of airborne mercury. The droplets can settle deep into cracks and crevices making the spill difficult to remediate and providing an ongoing exposure. Inhalation of mercury vapor is the major route of exposure and toxicity; minimal dermal or gastrointestinal absorption occurs. Once inhaled, mercury enters the bloodstream and distributes to all tissues but accumulates primarily in the kidneys and brain. Elemental mercury crosses the blood-brain and placental barriers (ATSDR, 1999).

The human body has no known physiologic requirement for mercury. The nervous system and renal system are sensitive targets for both acute and chronic exposures to mercury vapors. Exposures may result in tremor, personality changes, irritability, memory loss, insomnia, mood swings, weakness, and sensory-motor peripheral neuropathy. Kidney effects range from transient proteinuria to acute tubular necrosis. High concentrations of vapor received acutely can cause cough, dyspnea, and pneumonitis. Dermal manifestations of mercury vapor exposure may include an erythematous, pruritic rash or acrodynia (a rare, nonallergic hypersensitivity reaction seen in some children). In general, children are more sensitive to health effects from mercury than adults (ATSDR, 1999).

Unfortunately many people, especially children, are not aware of the dangers of mercury exposure, and mercury spills are common throughout the country. In 2008, Congress directed ATSDR to characterize elemental mercury exposures to children across the U.S. The report, "Children's Exposure to Elemental Mercury," summarized numerous mercury spill exposures and other sources of children's exposure to mercury (ATSDR, 2009). While no comprehensive surveillance system exists for elemental mercury spills, numerous sources were used to document hundreds of spills ranging in size from broken thermometers reported to poison control centers (1,825 calls in 2012) to mercury spills of one pound or more (two tablespoons by volume) that must be reported to the U.S. Coast Guard's National Response Center (at least 50 school-related spills documented in a six-year period) (ATSDR, 2009; Mowry, Spyker, Cantilena, Bailey, & Ford, 2013).

Consequences of mercury spills range from minor inconveniences to major, potentially harmful exposures that are expensive to remediate. Cleanup of even relatively small spills that had initially been improperly managed have cost thousands of dollars and resulted in days to months of unplanned school closures. In 2003, a large spill at a Washington, DC, area high school resulted in school closure for 35 days and a remediation cost of about \$1.5 million (U.S. Environmental Protection Agency, 2013). In this incident, a student took mercury from a science laboratory and distributed it to other students. In 2013, two children required chelation therapy when they developed symptoms consistent with mercury exposure and elevated blood mercury levels. They had obtained mercury from a neighbor's shed and spilled it at home and on the school bus. Four other family members also had blood mercury levels exceeding the human health risk threshold of 50 µg/L (ATSDR, 1999; Centers for Disease Control and Prevention, 2014).

ATSDR started the DMWM initiative after a U.S. Environmental Protection Agency (U.S. EPA) Region 9 request in 2008 for health education outreach. The region's emergency response workers had responded to multiple mercury spills caused by young teens and preteens handling mercury found in homes, garages, schools, or abandoned buildings. ATSDR created a 30-second DMWM public service announcement in English and Spanish to increase awareness of mercury and encourage behavioral change among middle school children. The public service announcement was posted on a joint U.S. EPA-ATSDR Web site. ATSDR recognized, however, that schools needed additional educational material, as well as outreach to administrators, teachers,

and staff, to further reduce the number of spills and exposures and improve the management of spills that do occur.

ATSDR launched an expanded DMWM Web site ([www.atsdr.cdc.gov/dontmesswithmercury](http://www.atsdr.cdc.gov/dontmesswithmercury)) in late 2013. The site's goals are to prevent mercury spills from happening and to minimize harm if spills do occur. For the primary prevention goal, the site provides instructional material on eliminating mercury in schools, finding alternative products for use in school science classes and facilities, and creating a school mercury policy. Interactive educational materials for students include a web-based video game and an interactive graphic of the effects of mercury on the human body. The DMWM Web site also provides step-by-step instructions on proper spill cleanup and disposal, including how to create a spill kit for small spills. Supporting materials include speaking points for communicating with parents and the media about exposure concerns and fact sheets for health providers for counseling patients. While the materials are targeted to the education system, much of the information is applicable for other venues such as homes, clinics, and offices.

ATSDR is not alone in the effort to eliminate mercury spills. Many state health departments, U.S. EPA, and other nonprofit organizations have created educational materials on preventing mercury spills. These initiatives will empower schools with knowledge of spill response plans and educational and emergency contacts. Ultimately, the reduction in the number and the extent of mercury spill incidents in schools will reflect a successful public health outreach. With education, this health hazard can be relegated to a historical footnote.

If you see mercury, don't mess with it. Mercury is anything but cool. ☹️

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# Impact of Budget Cuts to Environmental Health Services at Local Health Departments: Key Findings

**Editor's Note:** NEHA strives to provide up-to-date and relevant information on environmental health and to build partnerships in the profession. In pursuit of these goals, we feature a column from the Environmental Health Services Branch (EHSB) of the Centers for Disease Control and Prevention (CDC) in every issue of the *Journal*.

In this column, EHSB and guest authors from across CDC will highlight a variety of concerns, opportunities, challenges, and successes that we all share in environmental public health. EHSB's objective is to strengthen the role of state, local, tribal, and national environmental health programs and professionals to anticipate, identify, and respond to adverse environmental exposures and the consequences of these exposures for human health.

The conclusions in this article are those of the author(s) and do not necessarily represent the views of the CDC.

Jennifer Li is the director of Environmental Health and Health and Disability at the National Association of County and City Health Officials. Andrew Elligers is a senior program analyst for Environmental Health at the National Association of County and City Health Officials.

*According to one respondent, personnel reductions due to budget cuts had “put an enormous strain on providing customary environmental health services.”*

sons. In addition, respondents indicated that some environmental health services that were not reduced or eliminated were still negatively impacted by budgetary constraints.

Key findings from the survey are summarized in the following categories.

### Changes in Environmental Health Revenue

- Of the 75% of LHDs that were able to separate environmental health revenue from overall LHD revenue, 34.5% realized lower environmental health revenue than in the previous fiscal year.
- Eighteen and a half percent of LHDs realized higher environmental health revenue in their most recently completed fiscal year than in the previous fiscal year.

### Impact on Environmental Health Workforce

- Nearly three out of 10 (29.1%) LHDs experienced a reduction of their environmental

The recent economic recession and its aftermath negatively impacted many local health departments (LHDs) across the U.S. Seven surveys conducted by the National Association of County and City Health Officials (NACCHO) between August 2009 and February 2012 produced informative data (NACCHO, 2012). Each wave of the study showed that in comparing the current and prior fiscal years about 40% of LHDs nationwide had lower budgets, about 50% cut at least one program, and about 45% experienced staff reduction. Since 2008, LHDs lost almost 40,000 employees.

To learn specifically about changes to environmental health funding and the impacts of these changes on the environmental health workforce and services at LHDs, NACCHO surveyed a nationally representative sample of LHDs in March and April 2012. The study assessed changes between each respondent's most recently completed fiscal year and prior fiscal year. The study data indicated that environmental health revenue decreased for a substantial percentage of LHDs and that significant cuts to the environmental health workforce and to valuable environmental health services were made for budgetary rea-

TABLE 1

**Percentages of Local Health Departments That Reduced or Eliminated Environmental Health Services for Budgetary Reasons (N = 280–291)**

| Environmental Health Service | Reduced or Eliminated (%) |
|------------------------------|---------------------------|
| At least one service         | 33.7                      |
| Food safety                  | 12.8                      |
| Vector control               | 12.7                      |
| Ground water                 | 10.7                      |
| Surface water                | 8.5                       |
| Drinking water               | 10.0                      |
| Recreational water           | 8.3                       |
| Indoor air                   | 7.8                       |
| Outdoor air                  | 3.2                       |
| Pollution prevention         | 5.3                       |
| Land use                     | 5.6                       |
| Hazardous material           | 2.6                       |
| Air pollution                | 1.6                       |
| Hazardous waste              | 5.3                       |
| Animal control               | 6.8                       |
| Climate change               | 1.5                       |

TABLE 2

**Percentages of Local Health Departments for Which Budgetary Constraints Negatively Impacted Environmental Health Service Outcomes (N = 289–307)**

| Environmental Health Service | Negative Impact (%) |
|------------------------------|---------------------|
| Any service                  | 39.6                |
| Food safety                  | 20.7                |
| Vector control               | 16.8                |
| Ground water                 | 14.9                |
| Surface water                | 13.5                |
| Drinking water               | 15.6                |
| Recreational water           | 13.6                |
| Indoor air                   | 8.9                 |
| Outdoor air                  | 3.2                 |
| Pollution prevention         | 6.9                 |
| Land use                     | 7.1                 |
| Hazardous material           | 3.5                 |
| Air pollution                | 1.8                 |
| Hazardous waste              | 5.9                 |
| Animal control               | 8.8                 |
| Climate change               | 1.1                 |

health staff for budgetary reasons in the form of layoffs or employee attrition where employees were not replaced because of hiring freezes or budget cuts.

- The number of job losses for the environmental health workforce at LHDs nationwide was estimated to be 1,350 (550 were laid off and 800 were lost to attrition and

not replaced because of hiring freezes or budget cuts).

- LHDs reported that job losses negatively affected their abilities to provide environmental health services, increased stress on the remaining workforce, and resulted in low employee morale. According to one respondent, personnel reductions due to budget cuts had “put an enormous strain on providing customary environmental health services.”

### Reduction and Elimination of Environmental Health Services

- Many LHDs reduced or eliminated environmental health services for budgetary reasons (Table 1). Over one-third (33.7%) of LHDs reduced or eliminated at least one environmental health service.
- Environmental health services that were reduced or eliminated by the largest percentages of LHDs included food safety (12.8%) and vector control (12.7%).
- Environmental health services related to water (ground, drinking, surface, and recreational) were reduced or eliminated by the next largest percentages of LHDs.
- Multiple respondents noted reduced inspections of food establishments due to budgetary constraints. For example, one LHD “reduced food inspections from four times per year to three.”
- Several respondents indicated reduced vector control services and described impacts to mosquito control. Some examples included eliminating mosquito surveillance trapping, not spraying for mosquitoes as frequently, and not providing any mosquito control services.

### Environmental Health Service Outcomes

- More than one-third (39.6%) of LHDs reported that budgetary constraints negatively impacted environmental health service outcomes (Table 2).
- Food safety, vector control, and services related to water were the top three areas for which LHDs reported that budgetary constraints negatively impacted service outcomes.
- Some respondents described decreased quality of work in attempting to meet unchanged or increasing workloads. Respondents also indicated that budget constraints had led to “reduced education and training.”



## Moving Forward

With diminished resources, LHDs may be less able to provide customary services and respond to emergencies quickly and comprehensively. Recognizing the challenging conditions illustrated by the survey data, NACCHO supports staff at LHDs to advance the practice of environmental health by providing innovative resources to address existing and emerging issues and encourages LHDs to consider the following actions (see Sidebar):

- learn from peers through NACCHO's model practices program;
- use and share existing tools and resources developed by and for LHDs; and
- communicate, illustrate, and quantify the impact of budget cuts on environmental health service outcomes by telling their stories to the public and policy makers.

For the full survey report, more information about NACCHO's environmental health work, and links to additional resources, please visit [www.naccho.org/topics/environmental](http://www.naccho.org/topics/environmental).

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### Quick Links: National Association of County and City Health Officials (NACCHO) Resources to Support Environmental Health

**NACCHO environmental health program:** Environmental health-related tools, publications, policy statements, and other resources. <http://www.naccho.org/topics/environmental>

**Toolbox:** Free, online collection of local public health tools produced by members of the public health community. Current examples of tools include case examples, presentations, fact sheets, drills, evaluations, protocols, templates, reports, and training materials. Check out environmental health-related toolkits on climate change, environmental health in all policies, food safety, healthy community design, and Protocol for Assessing Community Excellence in Environmental Health (PACE EH). <http://www.naccho.org/toolbox>

**Model practices database:** Online, searchable collection of innovative, peer-reviewed best practices across public health areas that allows users to benefit from their colleagues' experiences to learn what works, get strategies on how to implement effective programs with good results, and save time and resources. <http://www.naccho.org/topics/modelpractices/>

**Stories from the field Web site:** Web site that enables local health departments to share their experiences and demonstrate the value of public health. Stories from the field can be used to support advocacy, peer learning, and collaboration with state and federal partners. <http://www.nacchostories.org/>

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NEHA is coordinating with the Centers for Disease Control and Prevention to offer four more Integrated Pest Management Workshops in the upcoming months. Learn more at [www.neha.org/research/irprogram.html](http://www.neha.org/research/irprogram.html).

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## ▶ GUEST COMMENTARY

# I Am an Environmental Health Pracademic (And So Can You!)

Ken Runkle, MA, DPA, REHS

**W**ith apologies to Stephen Colbert for the title above (Colbert, 2009), let me confess that I am an environmental public health pracademic. What's a pracademic? I'm glad you asked.

Popularized by Paul Posner in the field of public administration, a pracademic is a person who spans the boundaries between practitioners and academics in ways that “enrich both theory and practice (Posner, 2009).” Roles range from practitioners who supervise internships, to practitioners who teach, train, or serve on college advisory boards, to academics who practice and conduct environmental health research. These are all roles that I have played in my career as an environmental toxicologist and as the director of the Division of Environmental Health at the Illinois Department of Public Health (IDPH) and as an assistant professor at the University of Illinois Springfield (UIS) in the public health department.

At UIS, partnerships with pracademics produce benefits for masters of public health (MPH) students. As a department offering an MPH with an environmental health concentration fully accredited by the National Environmental Health Science and Protection Accreditation Council (EHAC), UIS has a regular need for practitioners to serve as internship supervisors. EHAC requires that graduate students have an environmental health internship experience of at least 180 contact hours (National Environmental Health Science and Protection Accreditation Council [EHAC], 2013). Many of the UIS students take internships with little or no pay that are purposed for the career growth, education, and hands-on experience of the student. Meanwhile, supervisors and agencies get the benefit of some low-cost or no-cost short-term professional help.

Additionally, EHAC requires that each accredited program have an advisory committee that typically has members who are practitioners from both public and private sectors of environmental health. Programs benefit from an active and knowledgeable advisory team of pracademics working in public health agencies and businesses because they can see the academic program from a practitioner's perspective and help ensure the curriculum is appropriate for preparation for careers in the environmental health field (EHAC, 2013).

Jessica Thoron, food program supervisor for the Sangamon County Health Department in Springfield, Illinois, is a local pracademic. She serves on the UIS advisory committee and has supervised several UIS student interns who have gained environmental health experience at the county level. “The interns not only get me out of the rut of my day-to-day activities,” Thoron explained, “they tend to remind me of why I entered this field in the first place. We've also found some good employees this way!”

Because of a growing online MPH program at UIS, students are looking for internship opportunities outside Springfield in their individual locales. Nationwide, 32 undergraduate and 8 graduate environmental health programs are accredited by EHAC, so internship opportunities are needed throughout the U.S. and even on other continents (EHAC, 2013). This pracademic role is one that can be very rewarding and can help professionals be reminded of the “why” behind the “what” of their daily practice.

Academic faculty need practical experiences in environmental health as well to stay fresh in the practice. Sometimes educators can get trapped inside the bubble of academia, so field opportunities with local practitioners are welcome. I have participated in food safety activities with our local health

department and pool safety visits with state inspectors. The photos and stories obtained from the field help make class lectures timely, practical, and more real to my students.

At UIS, pracademics serve as adjunct faculty teaching courses in the MPH curriculum as need arises. While working at IDPH, I had the opportunity to teach environmental and occupational health each spring semester for 17 years. An IDPH deputy director has taught public health policy, an IDPH epidemiologist has taught epidemiology, an IDPH health assessor has taught environmental risk assessment, a CDC public health advisor has taught online courses, and an environmental communication specialist with a local engineering firm has taught environmental risk communication.

Teaching a college-level course is not easy, but it will keep a professional fresh in the practice and refreshed on the science of the field. Students enjoy instructors who make the subject matter in textbooks come alive with stories of real-world environmental public health experiences. Environmental health pracademics also can teach introductory science classes at local community colleges, raising awareness of the field for a new generation of students.

Lastly, pracademics have the unique opportunity to conduct useful and pragmatic environmental public health research. Too often academics are reluctant to enter the world of practice and practitioners do not have the time or inclination to publish the results of data gathered, but the pracademic can bridge the gap between these territories to design and conduct research that can produce rational and useful results. In addition, research partnerships between academia and practice provide much-needed data for informed decisions with which to improve environmental public health in our communities.



So, consider becoming an environmental health pracademic. The field and future pracademics will benefit. You will too! 🐻

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## Did You Know?

Epi-Ready is a two-day, in-person workshop for environmental and public health professionals who are responsible for the investigation and response to foodborne illness outbreaks. Using a team approach, the workshop focuses on how to efficiently and effectively respond to an outbreak by understanding the roles and responsibilities of environmental health specialists, epidemiologists, and laboratory staff. The workshop is relevant to foodborne outbreak investigation partners such as public health nurses, health educators, industry, risk communicators, and public information officers, and the content is consistent with the Council to Improve Foodborne Outbreak Response Guidelines. Contact Ginny Coyle at [gcoyle@neha.org](mailto:gcoyle@neha.org) for more information.

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NEHA Booth #226

► DEMYSTIFYING THE FUTURE



Thomas Frey

## Passing the Fortune Cookie Test

**Editor's Note:** Significant and fast-paced change is occurring across society in general and our profession in particular. The clearer our sense for the future is, the more able we are to both understand and take advantage of trends working their way through virtually every aspect of our lives today. To help us see what these trends are and where they appear to be taking us, NEHA has made arrangements to publish the critical thinking of the highly regarded futurist, Thomas Frey.

The opinions expressed in this column are solely that of the author and do not in any way reflect the policies and positions of NEHA and the *Journal of Environmental Health*.

Thomas Frey is Google's top-rated futurist speaker and the executive director of the DaVinci Institute®. At the Institute, he has developed original research studies enabling him to speak on unusual topics, translating trends into unique opportunities. Frey is a powerful visionary who is revolutionizing our thinking about the future.

Recently my wife Deb and I had lunch at one of our favorite Chinese restaurants, and afterwards we were given the typical fortune cookies that come with the bill. Jokingly I broke open the first one and asked, "I wonder if it'd be possible to create a real fortune sometime in the future and put it into these cookies?"

Naturally Deb gave me the standard "not again" look that I often get when asking weird questions like this.

I quickly countered with, "If someone were to combine information from smartphones and a few Internet of Things devices and tied it into an anticipatory computing algorithm, it might be possible to spit out some meaningful predictions."

Just when she was about to change the subject because she saw that I was about to

enter brainstorming mode and she wanted no part of it, I added, "Maybe I should have gotten a fortune cookie that predicted I was about to invent the ultimate fortune cookie!"

It was at this point that she made the hand gesture that she wanted to strangle herself. That was her way of saying it may be a good idea but she had too much workload to entertain some random thoughts that would distract her from the all-important task of balancing our checkbooks once we got back to the office.

It occurred to me that she would have thought differently if she'd gotten a fortune cookie telling her that balancing the checkbook was far less important than helping me with my idea, but I decided there are times when silence is the better course of action.

And so it was that I became sucked into the world of fortune cookies as I attempted to move this ancient delicacy into the digital age.

First a disclaimer. This is not an attempt to reinvent the fortune cookie industry (yes, it is), or rid the world of badly written fortunes (all fortune cookie writers must have failed kindergarten), or even an excuse for me to eat more of them (I'm on my second bag now). Rather, my goal is to show how the coming digital age will permeate even century-old industries like fortune cookies (no, it won't) (yes, it will).

If only I had a cookie that could end all these arguments! Anyway, here are some thoughts on creating the ultimate fortune cookie.

### First a Little Background

The true origin of the fortune cookie has been disputed several times in the courts, but they first showed up in the late 1800s and came from Kyoto, Japan, not China.

Up until World War II, fortune cookies were known as "fortune tea cakes," reflecting their Japanese origins of being served in the tea gardens.

The industry changed dramatically with the invention of the automated fortune cookie machine. Some claim it started with the folding machine invented by Shuck Yee in Oakland in 1973, but others have traced its true origins to the 1964 invention of Edward Louie of San Francisco's Lotus Fortune Cookie Company. Louie invented a machine that automatically inserted the paper fortunes into the golden wafers as they came off the griddle.

Today there are roughly three billion fortune cookies made each year, with the vast majority of them served in the U.S. The largest manufacturer is Wonton Foods, head-

quartered in Brooklyn, New York. They produce over 4.5 million fortune cookies per day. Another large manufacturer is Peking Noodle based in the Los Angeles area.

## Anticipatory Computing

To better grasp my logic here, it's best to understand the fast-emerging field of anticipatory computing.

We are entering a world that is filled with connected devices. In this world, when we need information, we will no longer have to resort to typing a query or asking a question. Instead, we will allow our devices and apps to pay attention continuously to the things we read and write, the places we visit, and the things we say and hear.

By interpreting these contextual signals, our apps and devices will become much better at finding the information we need, in some cases, before we even know enough to ask.

An early example of anticipatory computing is an app called MindMeld that listens to group conversations and anticipates what will be talked about next by pulling up documents, photos, and videos to add to the conversation.

## The Fortune Cookie Test

Creating the ultimate fortune cookie is no small task, and there are virtually millions of ways to get it wrong. For this reason I've taken the liberty of creating a few of the parameters that will help guide people's thinking.

1. Has a less than 24-hour event horizon.
2. Correlates three or more seemingly unrelated data points in the life of the person receiving it.
3. Recommends a single course of action and predicts meaningful results.
4. Can be demonstrated to be at least 80% accurate.
5. Advises the recipient to do something he or she would not have previously considered.

## The Ultimate Fortune Cookie Scenario

So let's pull it all together with this scenario.

You enter the famous Tao Fusion restaurant with great anticipation. You are joined by a group of friends because tapping into your "friend network" often produces better fortunes.

The waiter hands you a smart menu that automatically changes the menu items to

only select items that you like and things that fall within your diet.

As you order your food and enjoy the meal, the anticipatory computing system is cross-referencing appointments, places you've been, projects you've been working on, relationships, e-mails, and telephone conversations. The end result is a meaningful fortune printed on a small piece of paper and sent to the cookie machine.

The cookie machine consists of a 3D food printer that instantly syncs up with your preferred flavors and dietary requirements and prints a perfect cookie around the all-important fortune.

During this process, no people are aware of any of the details throughout the process, nor have any of them seen your fortune. Your privacy is still perfectly intact.

At the end of your meal, the waiter brings out a finely decorated plate with the cookie as the centerpiece. Your name has been carefully printed along the edge in lightly colored confectionery cream so there is no mistaking whose cookie it is.

Once you open the cookie and read the fortune, it immediately causes a series of events to unfold, giving direction to your ideas, giving answers to your uncertainties, and giving motion to seemingly unmovable situations.

This one seemingly innocent fortune cookie has changed your life in profound ways.

## Eight Examples

While I'm surely missing many of the possibilities, I thought it would be helpful to give you a few examples of the kind of fortunes you might receive.

1. If you call Frank, the CFO at Acme computing, tomorrow, you will be able to solve the valuation dispute you're having with the Mango Tiberius Corporation. He'll be free for one hour starting at 11:00 a.m.
2. On your next date with Sharon, if you ask her about the product shipment failure under her previous boss, Charles, you'll be able to understand her reluctance to form an intimate relationship.
3. The Nissan Altima you're considering buying has brake problems that the seller hasn't told you about. Be wary of purchasing this vehicle.
4. Before you vote in tomorrow's election, please understand the attack ads against Joe Wilson are highly distorted, but his

claims of fiscal responsibility are also exaggerated. A vote for Betsy Green is more in line with your values.

5. Arthur is about to propose to you. But before you agree to marry him, you should ask him why he left his last four jobs after less than a year.
6. Your son Jonathan is having difficulty with his new job but doesn't want to tell you about it. A simple phone call from you would help him immensely.
7. Your washing machine will fail sometime within the next three months. Best to put aside money for a new one.
8. You will receive a call tomorrow from the Greenland Corporation offering you a different position than what you'd applied for, and also for less money. If you emphasize your marketing background you'll be able to get the job you want.

As you read through each of these examples, some will seem more plausible than others.

## Final Thoughts

*Whatever the mind can conceive and believe, it can achieve.*—Napoleon Hill, author of *Think and Grow Rich*.

In much the same way we can predict the weather less than 24 hours in the future with ever-increasing accuracy, anticipatory computing will be able to predict near-term personal events with far greater precision.

Any restaurant serving this kind of fortune cookie would instantly have people standing in line to get in.

The fortune cookie, however, is really just a tool that we can all relate to for giving us a tiny glimpse of the world ahead.

The combination of old-school products and digital-age thinking will unleash far more opportunities than ever before in history.

But I only know that because I paid attention to my fortune cookie yesterday—what it represented, not what was inside it. I suggest you do the same.

Interested in sharing your thoughts? Go to [www.FuturistSpeaker.com](http://www.FuturistSpeaker.com). 🗣️

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E-mail: [dr2tom@davinciinstitute.com](mailto:dr2tom@davinciinstitute.com).



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## UPCOMING NEHA CONFERENCE

July 7–10, 2014: NEHA's 78th Annual Educational Conference & Exhibition in Partnership with the International Federation of Environmental Health, The Cosmopolitan of Las Vegas, NV. For more information, visit [www.neha2014aec.org](http://www.neha2014aec.org).

## NEHA AFFILIATE AND REGIONAL LISTINGS

## Alaska

September 30–October 3, 2014: Annual Educational Conference, sponsored by the Alaska Environmental Health Association, BP Energy Center, Anchorage, AK. For more information, visit <https://sites.google.com/site/aeatest/>.

## Colorado

September 24–26, 2014: Annual Education Conference & Exhibition, sponsored by the Colorado Environmental Health Association, Steamboat Grand, Steamboat Springs, CO. For more information, visit [www.cehawebsite.com/aec.html](http://www.cehawebsite.com/aec.html).

## Florida

July 28–30, 2014: Annual Educational Meeting, sponsored by the Florida Environmental Health Association, Florida Mall Hotel and Conference Center, Orlando, FL. For more information, visit [www.feha.org](http://www.feha.org).

## Georgia

July 16–18, 2014: 68th Annual Environmental Health Seminar, hosted by the Georgia Environmental Health Association, Hyatt Regency, Savannah, GA. For more information, visit [www.geha-online.org/Pages/Conference/htm](http://www.geha-online.org/Pages/Conference/htm).

## Iowa

October 14–15, 2014: Fall Conference, sponsored by the Iowa Environmental Health Association, Best Western, Marshalltown, IA. For more information, visit [www.ieha.net](http://www.ieha.net).

## New Hampshire

September 3–4, 2014: 52nd Annual Yankee Conference on Environmental Health—Moving Forward by Building Partnerships, Radisson Manchester, NH. For more information, visit [www.nhhealthofficers.org](http://www.nhhealthofficers.org).

## North Dakota

October 21–23, 2014: Fall Education Conference, sponsored by the North Dakota Environmental Health Association, Bismarck, ND. For more information, visit <http://ndeha.org/wp/conferences>.

## Texas

October 7–10, 2014: 59th Annual Education Conference, sponsored by the Texas Environmental Health Association, Double Tree Hotel, Austin, TX. For more information, visit [www.myteha.org](http://www.myteha.org).

## Wyoming

September 9–11, 2014: Annual Education Conference, sponsored by the Wyoming Environmental Health Association and the Wyoming Food Safety Coalition, The Peaks Conference Center, Lander, WY. For more information, visit [www.wehaonline.net](http://www.wehaonline.net).

## NEHA CREDENTIALS



## New REHS/RS Exam Offered in July

NEHA recently updated the exam for the Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) in order to ensure that the credential exam tests on the most up-to-date and relevant information. Candidates who are preparing for or are eligible to take the REHS/RS exam must apply by May 30, 2014, to take the exam at the NEHA 2014 AEC in Las Vegas.

Visit NEHA's Web site to find details on:

- Updated Candidate Information Brochure
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- Revised Reference/Study Materials

For more information: [neha.org/credential/rehs2014.html](http://neha.org/credential/rehs2014.html)



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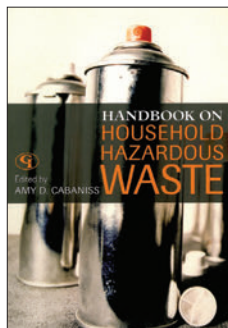
# RESOURCE CORNER

Resource Corner highlights different resources that NEHA has available to meet your education and training needs. These timely resources provide you with information and knowledge to advance your professional development. Visit NEHA's online Bookstore for additional information about these, and many other, pertinent resources!



## Handbook on Household Hazardous Waste

Edited by Amy D. Cabaniss (2008)



According to the U.S. Environmental Protection Agency, Americans generate 1.6 million tons of household hazardous waste (HHW) every year. This book provides solid waste management professionals, municipal officials, chemical waste handlers, environmental students, and others with a comprehensive look at the state of HHW management. Readers will learn answers to questions such as what is hazardous household waste and

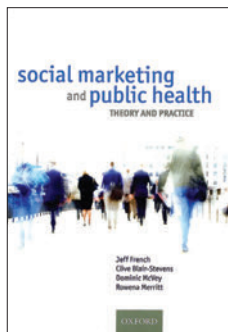
why do we collect it; what are the main concerns; how are HHW collections held and the material managed; what are some best management practices; how can I motivate behavior change; and how can a product-stewardship approach increase collections, cover costs, and promote better products?

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## Social Marketing and Public Health: Theory and Practice

Jeff French, Clive Blair-Stevens, Dominic McVey, and Rowena Merritt (2010)



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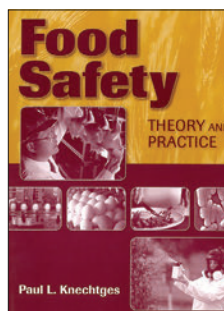
tional learning and thinking. It covers both theory and practical step-by-step planning, enhanced by case examples that illustrate the benefits and challenges involved in applying social marketing. It will appeal to a broad policy, academic, and practitioner readership, from public sector and business backgrounds, including those working in policy, public and environmental health, health promotion, public sector management, nursing, medicine, allied health, communications, and marketing.

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## Food Safety: Theory and Practice

Paul L. Knechtges (2012)



Authored by a NEHA member! Written from a "farm-to-fork" perspective, this book provides a comprehensive overview of food safety and discusses the biological, chemical, and physical agents of foodborne diseases. Topics covered include risk and hazard analysis of goods; the prevention of foodborne illnesses and diseases; safety management of the food supply; food safety laws, regulations, enforcement, and responsibilities; and the pivotal role of food sanitation/safety inspectors.

Early chapters introduce readers to the history and fundamental principles of food safety. Later chapters provide an overview of the risk and hazard analysis of different foods and the important advances in technology that have become indispensable in controlling hazards in the modern food industry.

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## Food Alert! The Ultimate Sourcebook for Food Safety (Second Edition)

Morton Satin (2008)



It is estimated that more than 100 million food-related illnesses occur in the U.S. every year, several thousand of which prove fatal. This book explains the history and science of food contamination; the causes, dangers, and types of foodborne diseases; and everything you need to know to understand the risk of foodborne illness and how to protect yourself and others from it. It also covers primary food contaminants; how to recognize a foodborne illness; and

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### CDP, Inc.

www.cdpehs.com

### Chemstar Corporation

www.chemstarcorp.com

### City of Bloomington

www.ci.bloomington.mn.us

### City of Fall River Health & Human Services

(508) 324-2410

### City of Houston

#### Environmental Health

www.houstontx.gov/health/Environmental

### City of Milwaukee Health Department, Consumer Environmental Health

http://city.milwaukee.gov/Health

### Coconino County Public Health

www.coconino.az.gov

### Colorado Department of Public Health and Environment, Division of Environmental Health, Delegated Programs Unit

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### Columbia County Health Department

www.columbiacountyny.com/depts/health2

### Decade Software Company LLC

Darryl Booth  
www.decadesoftware.com

### DEH Child Care

www.denvergov.org/DEH

### DeltaTrak, Inc.

Vallierie Cureton  
www.deltatrak.com

### Department on Disability Services, District of Columbia

http://dds.dc.gov

### Digital Health Department, Inc.

www.dhdinspections.com

### Diversey, Inc.

Steve Hails  
www.diversey.com

### DuPage County Health Department

www.dupagehealth.org

### Ecolab

robert.casey@ecolab.com  
www.ecolab.com

### EcoSure

charlesa.arnold@ecolab.com

### Elite Food Safety Training

www.elitefoodsafety.com

### English Sewage Disposal, Inc.

(756) 358-4771

### Erie County Department of Health

www.erie.gov/health

### Food Marketing Institute

www.fmi.org

### Gass Weber Mullins LLC

www.gasswebermullins.com

### Gila River Indian Community, Environmental Health Services

www.gilariver.org

### GLO GERM/Food Safety First

Joe D. Kingsley  
www.glogerm.com

### HealthSpace USA Inc.

Joseph Willmott  
www.healthspace.com

### Industrial Test Systems, Inc.

www.sensafe.com

### Inspect2Go

www.inspect2go.com

### InspekPro LLC

www.inspekpro.com

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www.jeffcohealth.org

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www.lamotte.com

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### Mars Air Doors

www.marsair.com

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### Mesothelioma Lawyer Center

www.mesotheliomalawyercenter.org

### Mid-Iowa Community Action

www.micaonline.org

### Mid-Ohio Valley Health Department

tim.l.miller@wv.gov  
www.movhd.com

### Mitchell Humphrey

www.mitchellhumphrey.com

### Mycometer

www.mycometer.com

### National Environmental Health Science and Protection Accreditation Council

www.ehacoffice.org

### National Registry of Food Safety Professionals

Lawrence Lynch  
www.nrfsp.com

### National Restaurant Association

www.restaurant.org

### National Swimming Pool Foundation

Michelle Kavanaugh  
www.nspf.org

### New Jersey State Health Department, Consumer and Environmental Health Services

Joe Eldridge  
www.njeha.org

### New York City Department of Health & Mental Hygiene

www.nyc.gov/health

### North Bay Parry Sound District Health Unit

www.healthunit.biz

### Nova Scotia Department of Agriculture

www.gov.ns.ca

### NSF International

Stan Hazan  
www.nsf.org

### Omaha Healthy Kids Alliance

www.omahahealthykids.org

### Oneida Indian Tribe of Wisconsin

www.oneidanation.org

### Orkin

Zia Siddiqi  
www.orkincommercial.com

### Ozark River Hygienic Hand-Wash Station

www.ozarkriver.com

### PerkinElmer, Inc.

www.perkinelmer.com

### Pinnacle Health Childhood Lead Poisoning Prevention Program

www.pinnaclehealth.org/Conditions--  
Treatments/Services/Children-s-Health/  
Services/Childhood-Lead-Poisoning-  
Prevention-Program.aspx

### Prometric

www.prometric.com

### Racine City Department of Health

www.cityofracine.org/Health.aspx

### San Jamar

www.sanjamar.com

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Anita Yost  
www.shat-r-shield.com

### SneezeGuard Solutions Inc.

Bill Pfeifer  
www.sneeze-guard-solutions.com

### Sonoma County Permit and Resource Management Department, Wells and Septic Section

www.sonoma-county.org/prmd

### St. Johns Housing Partnership

www.sjhp.org

### Stater Brothers Market

www.staterbros.com

### StateFoodSafety.com

www.StateFoodSafety.com

### Sweeps Software, Inc.

Kevin Thrasher  
www.sweepssoftware.com

### Texas Roadhouse

www.texasroadhouse.com

### The Steritech Group, Inc.

www.steritech.com

### Tri-County Health Department

www.tchd.org

### Underwriters Laboratories, Inc.

Gus Schaeffer  
www.ul.com

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### West Virginia Office of Economic Opportunity

www.oewv.gov

### Winn-Dixie Stores, Inc.

www.winn-dixie.com

### YUM! Brands, Inc.

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www.StudyatAPU.com/NEHA

### Colorado State University, Department of Environmental/Radiological Health

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www.uwosh.edu/llece

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www.uwstout.edu 

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## NEHA NEWS

**NEHA General Election 2014—Results**

Elections are a critical part of the democratic process and are one way to provide members a voice in the running of their organization. National officers of NEHA's board of directors serve a one-year term in each officer position—progressing from second vice president to board president and then immediate past president—for a total of five years. Regional vice presidents serve a three-year term. NEHA voting members have an opportunity to vote for candidates of a contested board of director's office.

For more information about NEHA elections and the critical deadlines for nomination forms, eligibility dates to become a NEHA voting member, and ballot dates, please visit the election page on the NEHA Web site at [www.neha.org/about/elections.html](http://www.neha.org/about/elections.html).

For the 2014 NEHA general election, the results are as follows.

**Regional Vice Presidents**

The terms of three regional vice presidents (RVP) expired in 2014:

- Region 1—Vacant
- Region 5—RVP Sandra Long
- Region 7—RVP John Steward

There was a single candidate for the Region 1 vacancy. There were no opposing candidates to RVP Long. RVP Steward vacated his Region 7 vice president position to seek the second vice president position and there was a single candidate for that position. Board policy does not require an election if candidates are unopposed. The vice presidents for the three regions are as follows:

- Region 1—Ned C. Therien (term expires 2017)
- Region 5—Sandra Long (term expires 2017)
- Region 7—Tim Hatch (term expires 2017)

**Second Vice President**

There were four qualified candidates for the second vice president position:

- Stan Hazan
- Adam London
- Gary P. Noonan
- John Steward

In addition to the candidate profiles that appeared in the March *JEH* issue and NEHA Web site ([www.neha.org/about/election\\_candidates.html](http://www.neha.org/about/election_candidates.html)), all candidates had the same or different profiles posted on the online ballot. Eligible voters were encouraged to vote during the month of March. The deadline to vote was March 31, 2014, at 11:59 p.m. (MDT).

Voters elected Adam London as the second vice president. London will become the second vice president at the closing of NEHA's 2014 Annual Educational Conference & Exhibition in Las Vegas. London's ascension to this position leaves a vice president vacancy in Region 6. This position will be filled in accordance to NEHA board policy. If interested in being considered for this position, please contact Terry Osner at [tosner@neha.org](mailto:tosner@neha.org). 🐼

## IN MEMORIAM

**William Keene**

NEHA was saddened to learn of the passing of William Keene in December 2013. Keene was Oregon's senior state epidemiologist for the past two decades. He was a nationally known and respected figure in food safety and foodborne disease outbreak investigations. In a profile published in *The Oregonian* in 2010, colleagues called Keene everything from "one of the food safety heroes in the U.S." to "zealous, energetic, dedicated, and diligent."

Keene, 56, graduated from Yale University in 1977 with a bachelor's degree in anthropology. He spent two years in India and Pakistan studying rhesus monkeys. Returning to the states, he became interested in parasites while working as a lab technician at the University of California at San Francisco. His interest in parasites led Keene back to graduate school, first at Johns Hopkins University in Baltimore and then at the University of

California at Berkeley, where he graduated in 1989 with a master's degree in public health and a doctorate in microbiology. He had worked as Oregon's top food detective ever since.

NEHA wishes to express its deepest sympathies to Keene's family, colleagues, and friends. He was an exemplary figure in food safety and will be missed tremendously.

Source: Food Safety News, *A Food Safety Hero: Oregon's William Keene Dead at 56*, December 2, 2013.

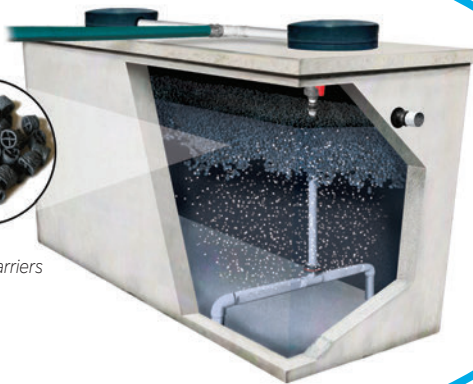
Editor's Note: The *Journal* will publish the In Memoriam section twice a year in the June and December issues. If you would like to share information on the passing of a noteworthy environmental health professional, please contact Kristen Ruby at [kruby@neha.org](mailto:kruby@neha.org).

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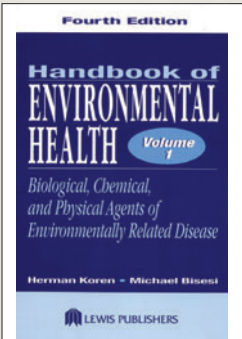
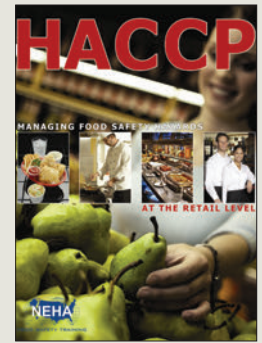
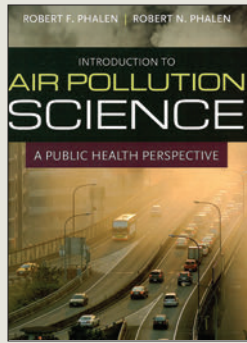
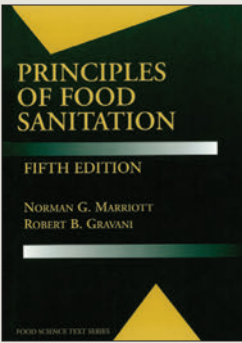
The PuraMax moving bed biological reactor (MBBR) is an attached growth process designed to achieve a high quality effluent within a small overall footprint. It employs thousands of recycled plastic biocarriers to ensure stable and robust treatment. This proven system—the result of extensive research and development—is engineered especially for community and commercial applications, including food service establishments.


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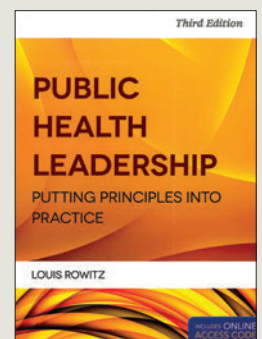
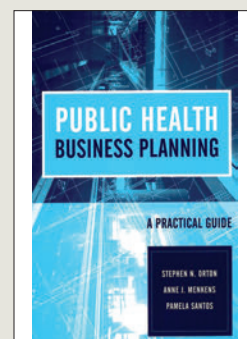
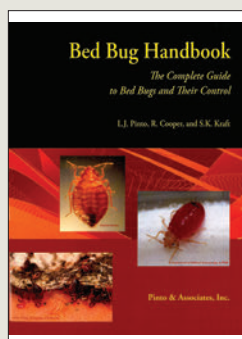
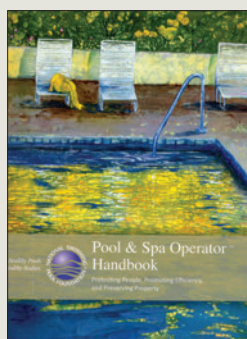
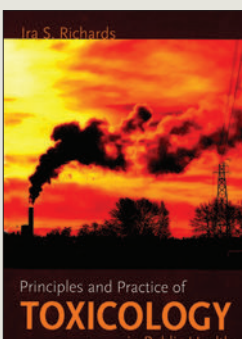
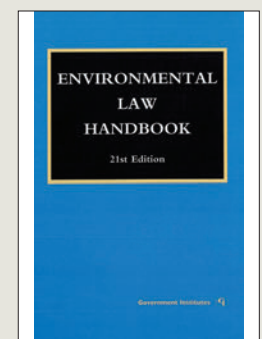
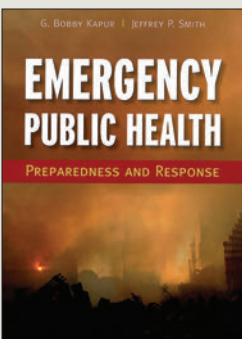
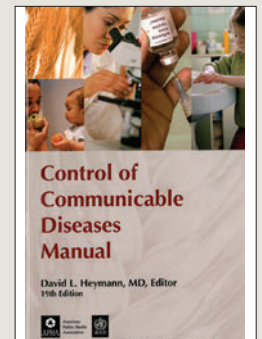
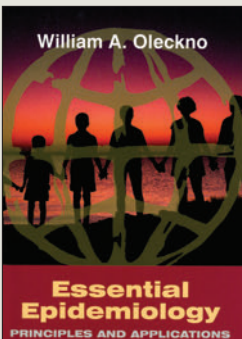
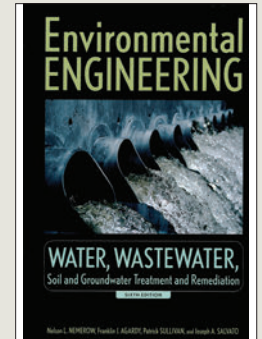
Choose from the most complete library of environmental health resources available—more than 150 texts, as well as recent *Journal of Environmental Health (JEH)* articles and E-Journal issues. NEHA's Bookstore allows you to search for resources by topic and gives you the opportunity to peruse resource descriptions and table of contents.

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| <ul style="list-style-type: none"> <li>AEC &amp; Exhibition</li> <li>Air Quality</li> <li>All-Hazards Preparedness</li> <li>Clearance Books</li> <li>Credential Study References</li> <li>Epidemiology</li> <li>Food Safety and Protection</li> <li>Food Safety Training Resources</li> <li>General Environmental Health</li> <li>Hazardous Materials</li> </ul> | <ul style="list-style-type: none"> <li><i>JEH</i> Articles and E-Journal Issues</li> <li>NEHA Merchandise</li> <li>Occupational Health</li> <li>Sustainability</li> <li>Swimming Pools/Spas</li> <li>Toxicology</li> <li>Vector Control</li> <li>Water Quality</li> <li>Workforce Development</li> </ul> |
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*Check out this video from the 2013 AEC to  
see why you should attend the 2014 AEC!*

[neha2014aec.org](http://neha2014aec.org)

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*Don't miss this unique experience: The NEHA 2014 AEC is being held in collaboration with the International Federation of Environmental Health! This is an unprecedented and exciting opportunity to explore innovative ideas, approaches, and methods with environmental health professionals from all over the world.*

**Visit [neha2014aec.org](http://neha2014aec.org) for more information and a justification/ROI letter for your employer.**

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### **CONTINUING EDUCATION (CE) CREDITS**

Earn up to 24 hours of CE contact hours (enough to meet your full two-year NEHA professional credential requirement) by attending and participating in the NEHA AEC. CEs can be fulfilled by attending:

- First Time Attendee Workshop
- Training and Educational Sessions
- The Keynote Session
- Pre-Conference Workshops
- Credential Review Courses
- Educational sessions via the Virtual AEC while they are being shown live during the AEC or as an archive after the AEC is over

### **CONTINUING EDUCATION CREDITS FOR OTHER ORGANIZATIONS**

Professionals who attend the 2014 AEC may apply for continuing education (CE) hours from other organizations. NEHA has been recognized as a provider of CE hours for:

- American Council for Accredited Certification (ACAC)
- Board of Certified Safety Professionals (BCSP)
- California Registered Environmental Health Specialists (CA REHS)

**See [neha2014aec.org/why-you-should-attend](http://neha2014aec.org/why-you-should-attend) for additional details.**

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# AEC SPONSORS & PARTNERS

*The National Environmental Health Association would like to recognize the following sponsors for their generous support of the Annual Educational Conference & Exhibition:*



*In addition, we thank the following partners for their continued efforts to enrich the environmental health profession:*

**Association of Pool & Spa Professionals**

**Centers for Disease Control and Prevention**

**State Onsite Regulators Alliance and Captains of Industry**

**Uniformed Services Environmental Health Association**

**U.S. Department of Agriculture Food and Nutrition Service**

**U.S. Environmental Protection Agency**

**U.S. Food and Drug Administration**

# PRE-CONFERENCE WORKSHOPS

*Schedule is subject to change.*



## **Industry-Foodborne Illness Investigation Training and Recall Response (I-FITT-RR) Workshop**

**Monday, July 7, 8:00am – 5:00pm**

Do you and your staff know what to do if a foodborne illness or food recall occurs? If not, you need to attend this workshop to get the critical training needed to respond to these issues.

This NEHA/FDA supported workshop is designed to bridge the gap between the retail food industry and local and state regulatory officials in an effort to create stronger working relationships prior to a potential foodborne incident or recall occurring. It will help you

- understand the steps for responding to a potential illness outbreak,
- know what to do when you get customer or product complaints,
- learn what's involved in food recalls and what you need to do, and
- be more familiar with the different agencies that work together to help you get through a food-related crisis.

*This workshop is designed for retail food stores and food service establishments (restaurants, grocery stores, casinos, etc.); single unit to large chains; mid-level managers and above; and quality assurance/quality control professionals.*

*Cost to attend is \$39 per person and space is limited to 30 people.*

## **Springboard to Prevention: The Model Aquatic Health Code, 1st Edition**

**Monday, July 7, 1:00 – 5:00pm**

Over the past six years a group of public health, academic, and industry experts have been working with CDC to develop the first comprehensive public health guidance for swimming pools and aquatic venues in the U.S. This workshop will present the first completed version of the Model Aquatic Health Code (MAHC). The MAHC will be a guidance document that can help local and state authorities update or implement swimming pool and spa codes or standards without having to “recreate the wheel.” The workshop will cover

- common health concerns at aquatic venues,
- key concepts influencing lifeguarding staffing plans,
- secondary disinfection, and
- a science-based operational and communication support toolkit for aquatic and pool programs.

*Cost is free with a full or one-day conference registration to the NEHA 2014 AEC.*

# CREDENTIAL AND CERTIFICATION COURSES AND EXAMS

*Schedule is subject to change.*

Advance your expertise and career potential by obtaining a NEHA credential or certification at the AEC. You may choose to take just a credential/certification course, just an exam, or both a course and an exam while at the NEHA AEC. (Note: Only qualified applicants will be able to sit for an exam.)

## Certified Professional of Food Safety (CP-FS)

Friday & Saturday, July 11 and 12, 8:00am – 5:00pm

This two-day refresher course is designed to enhance your preparation for the NEHA CP-FS credential exam. Participants are expected to have prior food safety knowledge and training equal to the eligibility requirements to sit for the CP-FS exam. The course will cover exam content areas as described in the job task analysis. The instructor will be available during and after the course for questions.

*Cost: \$325 for members and \$425 for non-members, which includes the CP-FS Study Package (newly revised and updated CP-FS manual, NEHA's Professional Food Manager book, and the 2009 and 2013 FDA Food Codes on CD), a \$145 value.*

**Exam: Sunday, July 13, 8:00 – 10:30am**

*Separate application and exam fee required. \$245 member/\$390 non-member. Deadline to apply to take the exam is May 30, 2014.*

## Certified in Comprehensive Food Safety (CCFS)

Wednesday & Thursday, July 9 and 10, 8:00am – 5:00pm

NEHA is pleased to offer the introductory course for the Certified in Comprehensive Food Safety (CCFS) credential at the 2014 AEC. The CCFS is a strong core credential for food safety professionals with a primary concern of overseeing the producing, processing, and manufacturing environments of the U.S. food supply. It has been designed to meet the increasing need for highly qualified food safety professionals from both industry and the regulatory community that provide oversight in preventing food safety breaches at U.S. production and manufacturing facilities and abroad. The credential course will cover exam content areas as described in the job task analysis. The course will utilize different learning modalities from critical thinking exercises to small group breakouts and videos.

*Cost: \$325 for members and \$425 for non-members, which includes NEHA's brand new CCFS Preparation Guide.*

**Exam: Friday, July 11, 8:00 – 10:30am**

*Separate application and exam fee required. \$245 member/\$390 non-member. Deadline to apply to take the exam is May 30, 2014.*

## Registered Environmental Health Specialist/ Registered Sanitarian (REHS/RS)

Friday & Saturday, July 11 and 12, 8:00am – 5:00pm

Sunday, July 13, 8:00am – 12:00pm

This two and a half day refresher course is designed to enhance your preparation for the **NEW 2014 NEHA REHS/RS credential exam**.

Participants are expected to have a solid foundation of environmental health knowledge and training equal to the eligibility requirements to sit for the REHS/RS credential exam. This course alone is not enough to pass the REHS/RS credential exam. The class will cover exam content areas as described in the job task analysis. The instructor will be available during and after the course for questions.

*Cost: \$499 for members and \$599 for non-members, which includes the newly revised and updated REHS/RS Study Guide, a \$179 value.*

**Exam: Sunday, July 13 1:00 – 6:00pm**

*Separate application and exam fee required. \$265 member/\$450 non-member. Deadline to apply to take the exam is May 30, 2014.*

*The July 13 REHS/RS exam is newly revised. Visit [neha.org/credential/rehs2014](http://neha.org/credential/rehs2014) for new course outline, updated study guide, and other details.*

## Certified Pool/Spa Operator® Certification Course (CPO®)

Friday & Saturday, July 11 and 12, 8:00 am – 5:00 pm

(includes exam)

This two-day course is designed to provide individuals with the basic knowledge, techniques, and skills of pool and spa operations. The CPO® certification program includes pool and spa chemistry, testing, treatment, filtration, maintenance, automatic feeding equipment, and government requirements. The CPO® certification program requires an open book written examination and certification is valid for five years.

*Cost: \$300 for members and non-members, which includes the NSPF Pool & Spa Operator Handbook and CPO® certification fee, a \$115 combined value.*

### Recently Added Courses!

HACCP for Retail Food Service

HACCP for Manufacturers/Processors

Visit [neha2014aec.org](http://neha2014aec.org) for details.



# INNOVATION & INTERNATIONAL SESSIONS

*Building a World of Innovative Ideas for Environmental Health*



This year's combined NEHA and IFEH event will offer sessions that help environmental health professionals adapt to and excel in the ever-changing economic, professional, and global landscape by learning the best tips, tricks, and tweaks needed to thrive in their positions.

## CHILDREN'S EH

### **Keeping Children Safe and Healthy Through Comprehensive Child Care Center Regulations**

Are your children protected against secondhand smoke, scalding hot water, and shigellosis outbreaks in the child care center where they spend a great deal of time? Are they assured of receiving healthy meals and regular outdoor exercise in a safe playground? Learn in this session how one county developed environmental health regulations to ensure protections against these and other environmental hazards and how you can do the same in your jurisdiction.

## EMERGENCY PREPAREDNESS & RESPONSE

### **Environmental Health and Disaster Management: An International Effort for Training and Awareness**

Globally, environmental health professionals have a critical role in mitigating public health risks before and after disasters. To build this capacity, IFEH, CDC, and NEHA have collaborated to develop the course "Environmental Health and Disaster Management," which was heavily guided by CDC's successful Environmental Health Training in Emergency Response course. Attend this session to see how this type of course promotes the profession and ensures that professionals are adequately equipped to prepare, respond, recover, and mitigate the adverse impacts of disasters internationally.

### **Incorporating Emergency Preparedness into Retail Food Facility Inspections**

What can you do to make food facilities strong and capable of moving forward after a disaster? This session will describe how to efficiently address emergency preparedness with operators during routine food facility inspections and will provide resources for your reference. This approach provides an opportunity for the regulator and operator to partner not only to increase chances of the facility's success after a disaster, but to reduce time spent on post-disaster assessment, and protect the public's health at the same time.

### **Protecting the Living Environment of Survivors in Congregate Shelters During Disasters: Is Public Health Ready?**

Shelters play an important role in providing safety and basic human needs for survival during disaster situations and are an important priority for public health agencies responding to any disaster. This session will describe the current knowledge and use of assessments as well as the importance and benefits of using them as a data collection tool for decision making and occupant protection. Attend this session to see how to implement assessment procedures and tools in your jurisdiction's disaster response.

### **Disaster Management Challenges From Non-Communicable Diseases: Lessons Learned and Questions Going Forward**

Due to population aging and an increase in longevity, there has been a disease transition to non-communicable diseases (NCDs), which are the challenge for the 21st century. This is a new concept for environmental health and disaster management to explore, as the focus has traditionally been on communicable diseases in the disaster setting. Today, damages to public health infrastructure such as food, water, and sanitation place the vulnerable population with NCDs at great



risk. Attend this group exercise to discuss and debate possible approaches to and roles environmental health professionals play in mitigating the risks of disaster.

## **ENVIRONMENTAL JUSTICE**

### **101 Ways to Improve Health Equity**

IFEH works to disseminate knowledge concerning environmental health and promote cooperation between countries where environmental health issues are transboundary. IFEH recently adopted Policy 10, based on the WHO report “Closing the Gap in a Generation,” which aims to improve health equity through action on the social determinants of health. The session will showcase how colleagues around the world are making a difference! What problem are they addressing? What actions have been taken? What outcomes are being delivered? And, how can YOU make a difference where YOU are?

## **FOOD PROTECTION AND DEFENSE**

### **Foods Without Frontiers**

“Farm to Fork” is a great slogan, but how do we really ensure food safety when the farm is in one country, processing in another, and consumers in a third, fourth, or more countries? Using the recent international food safety recall of Karicare Whey Protein Concentrate for a contaminated ingredient, you’ll see that simply knowing about an adverse event in your country is no longer enough. This session will identify gaps in international incident notification systems such that attendees will be equipped to act to fill those gaps and respond promptly and efficiently to the next incident that arrives at the shipping dock.

### **Focusing Disney Magic on Food Safety**

This Learning Lab will demonstrate how the latest Disney technologies and smart temperature probes are being used in food service food safety and impacting inspections. When you put your hands on these technologies in this session, you’ll have a FASTPASS for food safety. Bypass the complexity. Go straight to the critical control points. Take your process for a ride. And when it’s all over, you get a digital “picture” for your records. This session will give you the skills and confidence you need to conduct inspections or audits in facilities using these types of technologies.

### **How to Deliver Effective Food Safety Programs on a Tight Budget**

Due to the worldwide economic downturn and its effect on government spending, existing UK delivery models for food hygiene inspections are now in need of review. This session will quantifiably describe the economic and programmatic challenges agencies are facing using Wales as the example. The session will examine the traditional food hygiene inspection program model and then evaluate contemporary adaptive approaches that are more innovative, imaginative, and targeted. These techniques may help your agency provide a quality service while protecting public health.

### **Catch Me If You Can—Misbranding, Adulterating, and Counterfeiting Foods: A National/International Food Incident Workshop**

Recent food fraud incidents involving melamine, horse meat, and rat meat necessitate that local, national, and international government and industry stakeholders have knowledge of response when an incident occurs in their jurisdictions. The newest FDA Food Related Emergency Exercise Bundle (FREE-B) exercise explores such a food fraud scenario. When faced with this situation, what are the risks? Who gets involved? What are the handoffs to different national or international government agencies? This workshop includes live participation of international stakeholders via a web platform. In addition, related multi-lingual educational materials will provide attendees with immediately applicable resources for the stakeholders in their own jurisdictions.

## **HEALTHY HOMES AND COMMUNITIES**

### **Clever Software Tools That Advance Health in Homes**

Get an introduction to the Housing Health and Safety Rating System (HHSRS) and English housing enforcement work. Then try two useful software tools to help with using HHSRS. Hunt for hazards in a virtual home, a tool which can be taken away for free. Then try an online tool to justify budgets by calculating the cost savings from using the HHSRS. Bring your laptops and tablets!

### **Implementing a Community-Based Child Care Program Utilizing the Healthy Homes Rating System**

This session will review a case study of the expansion of the local healthy homes program to home-based and small child

care providers. A community organization created a new healthy child care assessment program based on the Healthy Homes Rating System. The program rates 29 environmental, health, and safety hazards for their potential to harm residents and enables those risks to be mitigated. The local fire department even accepts the assessment as equivalent to a fire inspection. Attend this session to learn how a program like this can benefit your community.

## **LAND USE PLANNING: SCIENCE TO POLICY**

### **Outside-the-Box Advocacy: Organizing Public Health’s Engagement in Built Environment Advocacy**

The buzz phrase “Health in All Policies” has almost become ubiquitous, especially in public health’s efforts to come to the land use planning and infrastructure design discussion. Tulsa Health Department will share their project’s success using community engagement and collaborative relationships. They’ll provide you with some innovative techniques to use when resources are limited to educate and advocate for health with decision makers, the public, and your own agency.

### **Annoyance and Perception of Noise in Rural and Urban Areas of France**

Traffic, urban, and occupational noises are now described as major environmental problems, which can greatly interfere with health. This session will discuss the results of a survey conducted to identify the perception of noise pollution in occupational and domestic environments. Attend this presentation to identify possible interventions and recommendations that may alleviate health risks from noise pollution.

*NEHA and SORA are again partnering to bring together onsite regulators and industry leaders for decentralized and onsite wastewater treatment. The sessions offered by the NEHA and SORA partnership will focus on topics such as sustainability, reuse, reciprocity, and other emerging issues.*

## **ONSITE WASTEWATER**

### **Sustainability Is the Name of the Game: EPA’s Decentralized Wastewater Program Efforts**

There are small and underserved rural communities across the U.S. in need of first-time and adequate access to water and

wastewater infrastructure. Through joint efforts with many government agencies, EPA has developed programs and tools such as workshops in a box to assist these communities in creating sustainable solutions that will meet their current and future needs. Attend this session to gain knowledge and resources to implement programs in your community even on a shrinking budget.

**Currumbin—A Community Designed Around Environmental Sustainability and Wastewater Reuse in Queensland, Australia (NEHA/SORA session)**

On the Gold Coast of Queensland, Australia, EcoVillage at Currumbin is a community focused on implementing and teaching sustainable development principles. Wastewater systems were chosen that created the lowest total impact to the environment in its manufacturing, construction, and operation. After treatment followed by UV and chlorine disinfection, the wastewater from 144 homes and numerous community facilities is recirculated to homes for reuse via toilet flushing, car washing, garden watering, and landscape irrigation. Attend this session to see how these award-winning techniques could make a difference in your community.

**PATHOGENS AND OUTBREAKS**

**Who's Missing From the Table? Building Partnerships With the Medical Community in Foodborne Illness Surveillance**

Detecting increases in self-reported foodborne illnesses and low report rates by medical providers, Kern County Environmental Health implemented an innovative approach to enhance collaboration between environmental health, public health, and the medical community. The execution of the Foodborne Illness Surveillance Guidance Training for Medical Professionals became a successful method in communicating with the medical community and improving foodborne illness surveillance. This presentation will provide an overview of the workshop design, challenges, results, and next steps that you may want to apply within your community.

**Restroom Infection Control: Chlorhexidine, the Final Frontier**

Pioneering, award-winning work at the Queen Elizabeth Hospital, UK, has demonstrated the remarkable residual antimicrobial activity of chlorhexidine on surfaces, thereby maintaining their continuous cleanliness over time. In this school-setting trial, the presenters will

demonstrate significant improvements in continuous cleanliness of restroom door handles. Attend this session and join in the discussion of the possible benefits of applying this simple, inexpensive technique beyond clinical and office environments.

**RECREATIONAL WATER**

**Rethinking Recreational Water Monitoring: Can Predictive Modeling Increase Public Health Outcomes?**

Canadian recreational water safety practices are put into an international context by comparing them with the EPA and WHO guidelines. A review of the use of a geometric mean will identify the limitations of using bacteriology in general, and the geometric mean of *E. coli* in particular, as the basis of recreational water safety decision-making, and determine the most appropriate, evidence-based values of the geometric mean for recreational water to be considered safe. Use these results in your organization to create a comprehensive risk assessment strategy, forecasting models, and risk management approaches to posting recreational water safety.

**Chlorine Resistant Pathogen Treatment Strategies for Recreational Water (NEHA/APSP session)**

Because chlorine resistant pathogens, such as Cryptosporidium, can survive for extended periods of time in even well-maintained swimming pools, multi-pronged approaches are useful in prevention of disease transmission from these pathogens. This session will cover the efficacy and practical application of various approaches including UV, ozone, filtration, enhanced filtration, and traditional sanitizers such as chlorine.

**VECTOR CONTROL & ZOO NOTIC DISEASES (SPONSORED BY ORKIN)**

**Get Results! Tools for Managing a Public Health Nuisance Program**

The housing crisis and diminished mental health services have resulted in more complaints and public health nuisance inspections at Franklin County Public Health. See how simple triage and scoring tools were used to categorize and prioritize complaints to get results and gain recognition in the community. In this session, you'll be able to evaluate this approach and test these tools as a way for your department to manage public health nuisances with limited funds and staff.

**Integrated Approach to Malaria Prevention in Uganda: Experiences From a Pilot Project**

This pilot project promoted an integrated approach to the prevention of malaria at the household level in two rural communities where malaria is the leading cause of morbidity and mortality. This project conducted a baseline survey on malaria prevention knowledge and practices, trained community health workers, increased awareness of the population of an integrated approach to malaria prevention, and established study demonstration sites. The integrated approach to malaria prevention was well received by the study communities and work continues to assess health benefits and community perceptions of this approach. Available data will be shared with attendees during the session.

**TECHNOLOGY AND EH (SPONSORED BY MITCHELL HUMPHREY)**

**Tools and Data for Identifying Areas With a High Potential for Private Well Contamination**

In many areas there are concerns about private well water quality, but little data on levels of contaminants such as nitrate, arsenic, and uranium. We have compiled extensive groundwater quality data from national, state, and local sources and generated maps spanning the U.S. showing where there is the greatest chance of elevated levels of these contaminants. In this session, you will be shown how to access and interpret these maps and data for application in your jurisdiction.

**Attend the Awards Ceremony on July 8 to find out who wins the NEHA Environmental Health Innovation Award.**

In its second year, this award is presented to an individual, team, or organization for an innovative contribution in the form of a new idea, practice, or product that has had a positive impact on improving environmental public health and the quality of life. Change that promotes or improves environmental health protection is the foundation of this award.



# MORE SESSIONS BY TRACK

Acquire comprehensive information from subject matter experts and industry leaders, and learn from your peers as you share.

## **CHILDREN'S EH**

- Lessons Learned About Environmental Health in the World of Child Care
- Beating the Odds: Eliminating Lead Exposure for Kids in the Nation's Capital
- Association Between Risk of Birth Defects and Arsenic Concentrations in Soils of China

## **EMERGENCY PREPAREDNESS & RESPONSE**

- Hurricane Sandy: A Complex Environmental Health Communications Challenge
- Enhancing Planning and Preparedness: Development of an E-Learning Tool for Chemical Incidents
- Public Health Preparedness: Examination of Legal Language Authorizing Responses to Radiological Incidents
- Destructive Wildfires and Devastating Floods: EH's Response and Role in Recovery
- To Tweet or Not To Tweet: Leveraging Social Media for Environmental Health

## **FOOD PROTECTION AND DEFENSE**

- Food Safety Focus Series I: A National Collaborative Effort to Support the FDA National Retail Food Regulatory Program Standards (*Sponsored by Prometric and Skillsoft*)
- Food Safety Focus Series II: Local Experiences With the FDA Retail Food Program Standards (*Sponsored by Prometric and Skillsoft*)
- Food Safety Apps Can Improve Food Safety Standards
- Applying a Behavior Change Model Proven to be Effective in Child Care Settings to Licensed Food Establishments
- Investigation of a Large Foodborne Illness Outbreak in Toronto, Canada

- Bet on a Sure Thing: THINK RISK
- FDA's Oral Culture Learner Project: Helping Food Employees Understand the Importance of Food Safety
- The Great Food Truck Race...for Food Safety
- Flip the Fear: Food Allergen Lawsuits, Training Requirements, and Tools
- Nanotechnology Implications for Food and Food Safety

## **HAZARDOUS MATERIALS AND TOXIC SUBSTANCES**

- Burning to Know: Neighborhood Mercury Exposure From Crematoriums
- Lead Poisoning Outbreak Resulting From Construction and Renovation at an Indoor Firing Range
- Smoke and Ash Deconstructed—Not Just Particles

## **HEALTHY HOMES AND COMMUNITIES**

- Clever Software Tools That Advance Health in Homes
- Multi-Agency Approach in the Closure of a Motel
- Fungal Bioburden in Foreclosed Homes Using ERMI<sup>sm</sup> as an Indicator
- The Public Health Challenge of Hoarding
- Pesticide Usage and Pesticide Dust Concentrations in Residences of Asthmatic Children Living in Subsidized Housing

## **LAND USE PLANNING: SCIENCE TO POLICY**

- Developing Policy to Address Near Roadway Pollution Health Hazards
- Annoyance and Perception of Noise in Rural and Urban Areas of France
- Outside-the-Box Advocacy: Organizing Public Health's Engagement in Built

## Environment Advocacy

- Levels of Heavy Metals in Traffic-Related Particulate Matter Along a Major Motorway in Nigeria
- Keys to Facilitating Healthy Cities Partnership in Indonesia: A Case Study
- Air Quality Assessments Using Satellite Derived High Resolution Aerosol Optical Depth Retrievals

## **LEADERSHIP/MANAGEMENT**

- Building Agency Capacity
- Leadership Development: Key Considerations for Mentoring Millennials
- Getting Through the Swamp: Communicating the Value of Environmental Health
- Lead, Follow, or Get Out of the Way—Leadership in Contemporary EH
- Building an Environmental Health Program of Excellence in a Time of Austerity
- Organizational Culture Change: Moving the Needle from Fair to Great
- Implications of the Affordable Care Act on Environmental Health

## **ONSITE WASTEWATER**

- Transfer of Property Requirements: Training, Certification, and Politics
- Greywater and Water Reuse in the Southwest
- Market Impacts of Product Testing, Product Acceptance, and Regulations (NEHA/SORA session)
- Onsite Wastewater Treatment and the Value of Independent Certification
- The Proliferation of Blue-Green Algae: Context, Challenges, and Innovative Solutions
- Realtors and Environmental Health, Partners in a Successful Mandatory Point-of-Sale Program

## Be a voice.

You Spoke, We Listened...



NEHA used your participation in our 2014 Abstracts Blog and your responses to our conference surveys as guidance in choosing sessions and developing the training and education program. THANK YOU for giving us feedback so we can advance the proficiency of the environmental health profession AND help create bottom line improvements for your organization!

### FROM THE BLOG

- The Great Food Truck Race...for Food Safety
- Restroom Infection Control: Chlorhexidine, the Final Frontier
- Arsenic in Iowa's Groundwater—The Unknown Threat: A Pilot Study in Cerro Gordo County
- Triggers for Change in the Safest Place on Earth
- Disaster Management Challenges From Non-Communicable Diseases: Lessons Learned and Questions Going Forward

### FROM CONFERENCE SURVEYS

- Inspection technology and use of apps in EH:
  - » Help! Everyone Wants My Data: A Look at Streamlining Data Collection for Environmental Health Programs
  - » Enhancing Planning and Preparedness: Development of an E-Learning Tool for Chemical Incidents
  - » Focusing Disney Magic on Food Safety
  - » Food Safety Apps Can Improve Food Safety Standards
  - » Using the Lean Program to Improve Efficiency in Environmental Health Services
- The Leadership/Management track will address your concerns related to:
  - » The future of the EH practice
  - » Demonstrating program effectiveness
  - » Value and return on investment for environmental health programs
  - » Building agency capacity under reduced budgets and staffing collaborations/programs
- Hoarding, bed bugs, and rats—we've got them covered in our Vector Control & Zoonotic Diseases and Healthy Homes and Communities tracks!
- Evaluation of the built environment and its link to public health—check out sessions in the Land Use Planning & Design track!

### PATHOGENS AND OUTBREAKS

- Don't Gamble With Norovirus: Prevention, Control, and Containment of a Norovirus Outbreak in a Casino
- Issues and Challenges: Investigation of a Foodborne Outbreak in Jamaica
- Investigation of a Foodborne Illness Outbreak in Toronto, Canada

### RECREATIONAL WATERS

- Chlorine Resistant Pathogen Treatment Strategies for Recreational Water (NEHA/APSP session)
- Gage-Bidwell Law of Purification: Old Errors Corrected and New Relevance Identified (NEHA/APSP session)
- Hot Tub and Spa Inspection Data: The Power to Prevent Illness and Injury
- Pool and Spa Safety Act Program: Implementation and Findings in Seattle and King County

### SCHOOLS/INSTITUTIONS

- Food-Safe Schools: Food Safety Beyond the Cafeteria
- School Indoor Air Quality Improvement: Lessons from Multnomah County, Oregon
- Correcting Corrections: Surviving Jail Inspections and High Risk Inmate Activities

### SUSTAINABILITY/CLIMATE CHANGE

- Climate Change and Sustainability: Navigation of Governance, Energy, and Built Environment Opportunities
- Triggers for Change in the Safest Place on Earth
- International Perspectives on Climate Change and the Role of Environmental Health
- Climate Change Impacts and Options: Case Studies in the Northwest Arctic Borough, Alaska

### TECHNOLOGY AND EH (SPONSORED BY MITCHELL HUMPHREY)

- Help! Everyone Wants My Data: A Look at Streamlining Data Collection for Environmental Health Programs
- Building Agency Capacity
- Environmental Public Health Tracking:

Developing Nationally-Consistent Community Environmental Health Profiles

- Public Health Mythbusters
- Using the Lean Program to Improve Efficiency in Environmental Health Services
- Implementation of GIS for Research on Neural Tube Defects in China
- Can Technology Improve Hand Washing Behaviors

### VECTOR CONTROL & ZOOONOTIC DISEASES (SPONSORED BY ORKIN)

- GIS Mapping to Get Rid of Rodents—Integrated Pest Management Program Success
- Integrated Approach to Malaria Prevention in Uganda: Experiences From a Pilot Project
- Hantavirus in Northern Arizona: Investigation and Response
- Stamping Out Bed Bugs: An Organization and Systems Approach in Action
- New Urban Rat Control Program Development in the Post Recessionary Environment
- Using Heat to Treat for Bed Bugs in a Homeless Shelter
- Get Results! Tools for Managing a Public Health Nuisance Program

### WATER QUALITY

- Innovative Methods to Control, Investigate, and Monitor for *Legionella*: A Panel Discussion
- Containing an Outbreak of Cryptosporidiosis in Galway: The Role of the Environmental Health Service
- Arsenic in Iowa's Groundwater—The Unknown Threat: A Pilot Study in Cerro Gordo County
- Broadening the National Dialogue on Public Health and Water Quality
- An Online Class for Private Well Owners to Protect Public Health

# NEHA 2014 AEC SCHEDULE AT-A-GLANCE

*Schedule is subject to change.*

|                     | SAT // July 5   | SUN // July 6  | MON // July 7  | TUE // July 8                                      | WED // July 9      | THU // July 10  | FRI // July 11   | SAT // July 12   | SUN // July 13  |
|---------------------|---|--|--|--|--------------------|---|--|--|---|
| EHAC Meeting        | EHAC Meeting  | NEHA Board of Directors Meeting  | Educational Sessions   | Exhibition Open Poster Session<br>• Silent Auction | Town Hall Assembly |   |  |  |   |
| FEH Council Meeting | International Environmental Health Faculty Forum Business Meeting     | Pre-Conference Workshops:<br>• Industry-Foodborne Illness Investigation Training and Recall Response Workshop<br>• Model Aquatic Health Code Workshop<br>• NEHASORA Onsite Wastewater Field Trip | International EH—IFEH Special Sessions   | Student Research Presentations                     | CCFS Course        | Educational Sessions  | <ul style="list-style-type: none"> <li>• Credentials &amp; Certifications</li> <li>• CCFS Exam</li> <li>• CP-FS Course</li> <li>• REHS/RS Course</li> <li>• CPO® Course</li> <li>• HACCP: Managing Risks for Foodservice and Retail Food Operations Course</li> <li>• HACCP Basics for Processors and Manufacturers</li> </ul> | <ul style="list-style-type: none"> <li>• Credentials &amp; Certifications</li> <li>• CP-FS Course</li> <li>• REHS/RS Course</li> <li>• CPO® Course &amp; Exam</li> <li>• HACCP: Managing Risks for Foodservice and Retail Food Operations Exam</li> <li>• HACCP Basics for Processors and Manufacturers</li> </ul> | <ul style="list-style-type: none"> <li>• Credentials &amp; Certifications</li> <li>• CP-FS Exam</li> <li>• REHS/RS Course &amp; Exam</li> </ul> |
|                     |   |  | “Thank You Luncheon” for guests staying at the AEC designated hotel for two or more nights | CCFS Course  |                    | Networking Luncheon (Sponsored by American Public University) |  |  |   |
|                     | International Environmental Health Faculty Forum & EHAC Joint Meeting | IFEH Regional Meetings<br>AEHAP Annual Meeting   | Awards Ceremony & Keynote Address  | International EH—IFEH Special Sessions             |                    |   |  |  |   |
|                     | IFEH AGM Meeting  | Community Volunteer Event  |  |  |                    |   |  |  |   |
|                     |   | First Time Attendee Workshop   | Exhibition<br>• Grand Opening & Party<br>• Poster Session                                  |  |                    |   |  |  |   |
|                     |   | Annual UL Event  |  |  |                    | President's Banquet   |  |  |   |

AEHAP = Association of Environmental Health Academic Programs

EHAC = National Environmental Health Science & Protection Accreditation Council

IFEH = International Federation of Environmental Health

SORA = State Onsite Regulators Alliance

*Stay at the designated AEC hotel—The Cosmopolitan of Las Vegas—for two or more nights and attend a free “Thank You Luncheon” on Tuesday, July 8. Certain terms and conditions apply. See Web site for details.*



# KEYNOTE SPEAKER

*The National Environmental Health Association is pleased to announce that Mark Keim, MD, with the Centers for Disease Control and Prevention, will address attendees of the 78th Annual Educational Conference (AEC) & Exhibition as the keynote speaker.*

With the expanded international audience at this year's AEC, you'll want to hear Dr. Keim's perspective on emerging and contemporary issues, including the far-reaching health effects of global climate change.

**Register today for the 2014 AEC so you don't miss this opportunity!**



*The keynote speaker is sponsored by NSF International.*

***Check out the sessions in the Sustainability/Climate Change Track for more on this topic and more of Dr. Keim!***

The National Environmental Health Association is pleased to announce that Mark Keim, MD, Associate Director for Science in the Office for Environmental Health Emergencies, National Center for Environmental Health/Agency for Toxic Substances and Disease Registry at the Centers for Disease Control and Prevention (CDC), will be the keynote speaker for this combined IFEH and NEHA environmental health event.

Dr. Keim will be speaking on emerging and contemporary issues, including the far-reaching health effects of global climate change.

In addition to his current role, Dr. Keim has spent many years working for the CDC in many capacities including Acting Associate Director in the Office of Terrorism Preparedness and Emergency Response, Medical Officer and Team Leader at the International Emergency and Refugee Health Branch, and Acting Associate Director for Science in the Division of Emergency and Environmental Health Services. He is also an adjunct faculty member at the Rollins School of Public Health at Emory University.

Dr. Keim has provided consultation for the management of dozens of disasters involving the health of literally millions of people throughout the world. Dr. Keim is the author of several hundred scientific presentations, 40 journal publications, and 13 book chapters.

Dr. Keim received numerous awards for his work in CDC's emergency operations during the World Trade Center, anthrax letter, and Hurricane Katrina emergencies, as well as for leading the U.S. health sector response after the Indian Ocean tsunami.

He has been a member of the White House Subcommittee for Disaster Reduction since 2006. He served as a review editor for the United Nations Intergovernmental Panel on Climate Change from 2009 to 2011.

# NETWORKING

*Strengthen your business and personal relationships and build a network of colleagues—in the U.S. and across the world—that you can call on at anytime!*

- Before You Arrive: Send meeting requests through the networking features of the **Virtual AEC—Your Meeting Companion**
- Monday: Mingle with peers and give back to the community hosting the AEC by signing up for the **Community Volunteer Event**. Reunite with friends at the always-exciting **UL Event** in the evening!
- Tuesday: Connect with exhibitors at the **Exhibition Grand Opening & Party**
- Wednesday: See exhibitors you missed the day before and chat with colleagues during the **Networking Luncheon**
- Thursday: Collaborate with other professionals at the **Town Hall Assembly**. Reconnect with everyone you have met during the AEC at the **President's Banquet**
- After the AEC: Stay connected to your friends and contacts after leaving the conference through the **AEC and NEHA social media channels**

## Annual UL Event



*A trip to Las Vegas would not be complete without enjoying its world-class entertainment.*

**Monday, July 7, from 6:30–10:30pm**

Join us for the Annual UL Event and get ready for an evening with one of the best entertainers in the industry today. As a successful headliner on the Las Vegas Strip, Terry Fator captures the hearts and funny bones of audiences from around the world with **Terry Fator: The VOICE of Entertainment**. Backed by a live band, Fator wows audiences nightly with singing, comedy, and unparalleled celebrity impressions. The “America’s Got Talent” winner brings to life a hilarious range of characters including Winston, the

impersonating turtle; Emma Taylor, the little girl with the big voice; and Monty Carlo, the lounge singer. Enjoy comedic banter and amazing vocal impressions of musical superstars such as Garth Brooks, Dean Martin, Aretha Franklin, Lady Gaga, and more. **Terry Fator: The VOICE of Entertainment** is a one-of-a-kind experience, only at The Mirage.

*The UL Event is not included in the registration pricing for the AEC. Price is \$65 per ticket for the first 175 tickets that are purchased and \$75 for each ticket thereafter. To register for this event, visit [neha2014aec.org/register](http://neha2014aec.org/register).*

## 4th Annual Community Volunteer Event



Clean the World™



*For more details and to sign up as a volunteer, visit [neha2014aec.org](http://neha2014aec.org).*

### **SORTING SOAPS TO CLEAN THE WORLD**

**Monday, July 7, from 1:00–3:00pm**

The community volunteer event is designed to give back to the AEC host city community and enhance NEHA’s “green” efforts to reduce the footprint of the NEHA 2014 AEC and IFEH 13th World Congress.

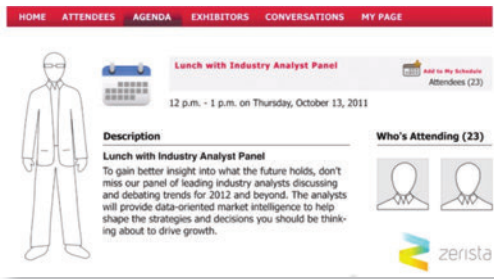
This year’s community volunteer activity helps reclaim and repurpose waste from the hospitality industry and provides for people in need. Clean the World is a non-profit organization that collects and redistributes personal care items and gives them to domestic homeless shelters and impoverished countries suffering from high death rates due to hygiene-related illnesses. Since its inception in 2009, Clean the World

has put over nine million soap bars and two million pounds of bottled amenities back into human use, simultaneously diverting over 600 tons of waste from landfills.

Network with colleagues and contribute to a local and global cause while participating in volunteer activities which may include sorting amenities by content and package type, cleaning and boxing amenities, assembling hygiene kits, taking inventory, or writing educational and inspirational notes to recipients.

When you sign up, please be sure to read and be prepared with required attire and waiver. Join your fellow environmental health colleagues at Clean the World’s Las Vegas Recycling Operations Center and make a difference locally and internationally!

# THE VIRTUAL EXPERIENCE



Enhance your learning experience whether you attend the AEC or participate online from your home or office via the Internet.



## Three Ways to Use The Virtual AEC

### 1) Virtual AEC: Your Meeting Companion

Make the most of your time by planning your AEC schedule, events, meetings, and more! Great for both attendees and those participating remotely via the live broadcast.

### 2) Virtual AEC: Live Broadcast

For those who are *not* able to attend the AEC in person, view some of the sessions live as they occur! You, too, can schedule your sessions and chat with live and remote attendees, speakers, etc.

### 3) Virtual AEC: Continuing Education Resource

After the conference, view sessions for up to one year to earn continuing education credits.

Wireless connections for meeting rooms sponsored by HealthSpace USA Inc.

## How Can the Virtual AEC Help You?

- **Stay connected and informed:** View interactive maps, session descriptions, speakers, exhibitors, and attendee profiles. Get the latest NEHA 2014 AEC news and announcements via live social feeds sent directly to you.
- **Create your customized conference schedule:** Add sessions and events you want to attend to your schedule. Then export the schedule to your Outlook or other electronic calendar.
- **Network and converse:** “Meet” other attendees, speakers, and exhibitors via the chat forums. Request meeting connections, swap digital business cards, or connect digitally with others in your area of specialty or geographic region.
- **Learn:** Attend some of the educational sessions as they occur via live streaming broadcast. Use the chat feature to ask questions, post comments, and communicate with speakers and other attendees. Discover the latest innovative products and services shared by AEC exhibitors. After the conference, you can still access the educational sessions, view presentation slides, and obtain supplemental material through the continuing education resource.

# CONFERENCE REGISTRATION

Registration information is available at [neha2014aec.org](http://neha2014aec.org). For personal assistance, contact Customer Service toll free at 866.956.2258 (303.756.9090 local), extension 0.

|                              | Before May 30<br>(Member/Non-member) | After May 30<br>(Member/Non-member) |
|------------------------------|--------------------------------------|-------------------------------------|
| Full Conference Registration | \$575/\$735                          | \$675/\$835                         |
| One Day Registration         | \$310/\$365                          | \$345/\$395                         |
| Student/Retired Registration | \$155/\$230                          | \$185/\$265                         |

**Special Savings!** Join NEHA for \$95 and get the AEC for \$575. Combined that is a **\$65 savings** over the non-member AEC registration rate. Plus, you get a whole year of NEHA member benefits!



# LAS VEGAS, NEVADA

*The Perfect Destination to Mix Business and Pleasure*

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When you come to Las Vegas, Nevada, you'll enjoy access to one of the most exciting and entertaining cities in the world, so it's no secret why the city welcomes millions of tourists each year. Whether you're looking for an exciting night life, live entertainment, or a place to find some peace and quiet, Las Vegas has everything you could ever want.

Take a walk down the Vegas Strip and try your luck at one of the many casinos that have made the city famous. And with hundreds of different restaurants, the city can cater to every taste and craving.

Las Vegas also plays host to almost any type of live entertainment you can imagine. You can see live comedy, stage shows, and concerts, or take in one of the many

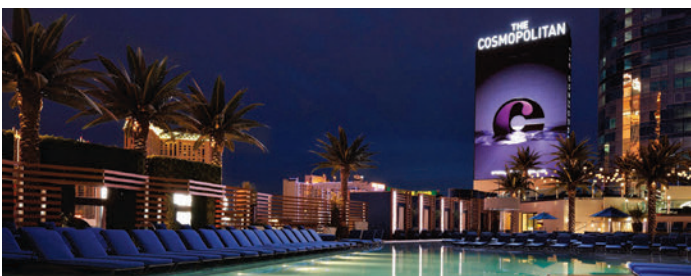
permanent fixtures of the Las Vegas entertainment industry like the Blue Man Group, Cirque du Soleil, or Penn and Teller.

For people looking to relax and unwind, Las Vegas has you covered. Treat yourself to a day at one of the city's many spas and resorts, or get out of the city and spend some time on the golf courses.

There's a reason they call Las Vegas the entertainment capital of the world. Whatever your idea of a good time is, you're almost sure to find it in Las Vegas.

**neha2014aec.org**

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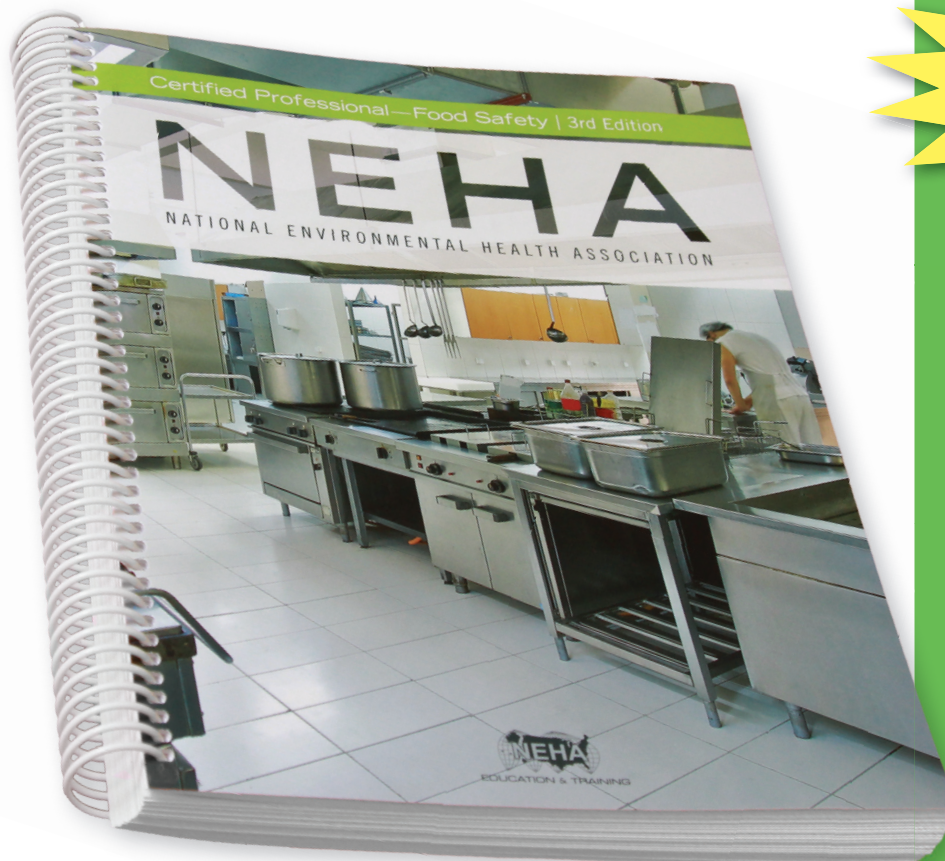


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[support@neha.org](mailto:support@neha.org)



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**Managing Editor's Desk***continued from page 78*

door, which is how I honestly feel. To this day, I still try to answer every call that comes into me. I will work deep into the night to ensure that people who write get a response from me. I love visiting with people and getting to know them as real people, as if I were their closest buddy. And I still vastly prefer listening over talking.

In any case, to understand me, it is also important to understand that I have taken from my deep studies of both science and philosophy that there are seldom single truths or single answers. For one thing, context matters mightily in both understanding and eventually solving a problem. For another, people come to issues with different life experiences, cultural groundings, age perspectives, demographic perspectives, values, and so forth. It is therefore hardly surprising that people see issues differently, and sometimes strongly so! (This was always one of the draws for me for getting into public policy work. The challenge [and reward] to such work involves finding the balance between competing yet meritorious viewpoints in the crafting of creative public policy. This also explains why, prior to joining NEHA, I ran for and won elective office, serving as mayor pro tem for the city of Berkeley, Michigan.)

By going about my work as more your friend and colleague and by listening a lot, boy, did I get exposed to all kinds of perspectives on issues! And boy, did I love it and did I ever learn a lot!

Even better, my learning extended far beyond just environmental health.

You've talked to me about being a single parent and even though you want communities more designed for recreation and exercise, you're afraid to let your children play in the park by themselves or with others for safety reasons. You've explained the history between England and Scotland and why you are sensitive to organizations in the other country creating markets in yours. You've told me that you fear for your jobs, which is why you want to have NEHA's Registered Environmental Health Specialist/Registered Sanitarian credential become mandatory for work in your department. As a college junior or senior, you've shared with me the sweep of uncertainties you face when you graduate and how NEHA can help relieve some of

*For a science nerd like myself, it was a learning experience for me to realize that nothing better defines the human condition than relationships and meaning to what we do with our lives.*

these anxieties by providing you with more answers about where jobs will exist and how to find them. You've shared with me your concerns about paying the family bills on the kinds of salaries available in environmental health and why you are conflicted about staying in this profession. You've talked to me about the danger you've felt to your personal safety when asked to perform certain types of work in areas of town where crime is high. You shared with me your fear of technology and how not keeping pace keeps you up at night. You've told me many amazing tales of how work can get accomplished on shoe-string budgets and how those lessons can be applied in virtually all areas of life. And on and on and on.

If I were working in a single local environmental health program, I have no doubt that I would learn a lot, since environmental health work touches almost every corner of every community in one way or another. But I have had the pleasure ... and the gift .... of listening to your stories from all across the country and even the world. Sometimes my head gets so full of stories and people that I have to unplug for a while! But it's great. The lessons, the insights, and the very ways in which so many people see the world all combine to teach me about life itself and even my place in it.

Thanks to you, my awareness now extends far beyond the personal life experiences that I've had. As I think about a problem or even a

personal challenge, I think back to what I've learned about how others have handled similar situations and what drove their response. You have given me this gift. And as I now leave NEHA, I take great delight in taking this gift with me. Each and every encounter with you has helped to shape the person I am today. As this is the kind of gift that can truly keep on giving, I fully expect to be shaped by it tomorrow as well.

I could never fully thank this organization and the people who make it happen, from our wonderful employees to our members to our institutional friends to our many volunteers and to the many board members over the years whom I have had the pleasure of serving. That is why I have written this column. Just saying thank you seemed woefully inadequate, given the gift I've been given. So please accept this column and the explanation it offers for why I am so grateful, as my more substantive thank you back to you.

As I said when I began, "The time has come." Susan and I have decided that we want to build our own enterprise. Over this past year, this exciting creative idea blossomed into a shared determination to make it work. We have each now chosen to leave our jobs to engage this new life adventure.

So, the time has come to turn the keys in. I'm happy to be leaving with a great staff in place and the organization possessing more human and financial capital than ever before.

*From my deepest reaches, I say, "thank you."*

As I move on to the next reinvention of myself and my next professional pursuit, I will do so as a better person thanks to you. Thank you for allowing me into your lives. And thank you again for sharing your many stories with me with such passion, color, and candidness. You have made a huge difference in the life of this person. 🐼



nelsonfabian@gmail.com



**FOOD SAFETY**

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**TRAINING**

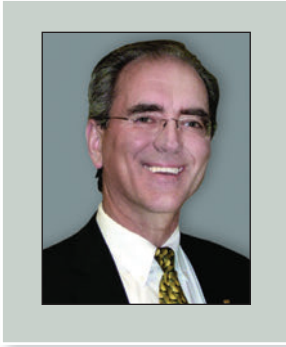
- HACCP
- Allergens
- Plan Review
- SQF, BRC, IFS
- Food Equipment
- Traceability and Recall
- Supply Chain Food Safety

**DRINKING WATER**

- Residential Point-of-Entry/ Point-of-Use Treatment Units
- Municipal Treatment Chemicals
- Distribution System Components
- Plumbing and Devices



## ▶ MANAGING EDITOR'S DESK



Nelson Fabian, MS

## The Time Has Come ... Thank You, NEHA!

Over the years, I've never given a lot of thought to what comes after NEHA for me. The nature of my work and the joy that I have always felt through it kept me focused and consumed. There just wasn't time for such idle thought.

I can't deny that there have been times, however, when I've wondered along with my wife Susan (who over the years has been my confidant and best friend, especially when it comes to brainstorming ideas and thinking through challenges), what I would say when that day came. What will I tell the NEHA membership whom I've had the pleasure of getting to know and sharing this long journey with?

Well, the day that was always "sometime down the road" has come. And to my surprise, the answer to the question of what I would say came to me immediately. In fact, I quickly realized that there can only be one answer to this question. That is so clear to me. From my deepest reaches, I say, "thank you."

But I hope you will read on because I think you'll soon see that my thank you isn't coming from the usual place. While I cherish the experiences, friendships, victories, and lessons that comprise my 31-year career at NEHA, my thank you isn't about anything I've done or anything I've seen or touched in the world *out there*. The focus of my thank you is *in here*—that is in the person I am. My thank you is for how the wonderful people of this wonderful organization have changed me and made me a better and more empathetic human being.

Instead of standing on some mountain to declare that the rightness of my position prevailed and as a result, some accomplishment

occurred, I instead need to acknowledge that it has been your positions that have changed me. I am so very grateful that my work at NEHA allowed me to come into contact with troves of people who helped me to see the light and develop deeper and more empathetic understandings of issues ... and people ... than I ever thought possible.

The e-mails, the conversations, the phone calls, the meetings, the debates, the brainstorming, and most importantly, the listening ... opened me up to see the world in so many different ways. No one ever told me or even hinted to me that this would be one of the greatest rewards of all when I first hired into my position at NEHA. What a resplendently beautiful surprise.

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*Editor's Note: After 31 years of serving as NEHA's executive director and managing editor of the Journal, Nelson Fabian announced to NEHA's board in April that "the time has come" to move on from these positions. Nelson's first column appeared in the March/April 1984 issue, along with an interview that introduced him to the membership. Over the years he has penned around 270 columns—which equates to over half a million words written. The thoughts and insights he shared over the years have undoubtedly and immeasurably enriched NEHA and the environmental health profession. The Journal bids a fond and sad farewell to its longest and most read columnist—thank you for your contributions to this publication!*

I have learned so much from so many. I have seen perspectives that I would never have otherwise known. I have gained penetrating insights into experiences that I never knew people went through. I have been deeply touched with sadness from stories of tragedy and with inspiration from stories of breaking through frontiers. And best of all, I have learned that relationships trump everything else when it comes to accomplishing anything. In fact, for a science nerd like myself, it was a learning experience for me to realize that nothing better defines the human condition than relationships and meaning to what we do with our lives.

It's kind of funny in a way. From day one, I've never really felt like an "executive director." I vividly recall just days after being hired, walking around my office and asking myself, OK, Nelson, now what are you going to do?!

There have certainly been times when carrying the title felt good to the ego. As I am a person who takes nothing for granted, I also admit that I have deeply appreciated the doors that this title has opened up for me. It has been absolutely exhilarating over the years to be able to represent the values, lives, and aspirations of the many people who work in environmental health in policy conversations. And I have certainly appreciated more than I can convey in words the creative latitude that NEHA boards over the years have extended to me because I was their "executive director."

But I still sign almost all of my communications just "Nelson" as if the unknown person I am writing to is my good friend next

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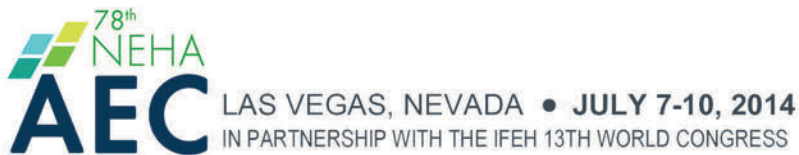


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