

Environmental Health

Dedicated to the advancement of the environmental health professional

Volume 75, No. 3 October 2012

Marking the Way

Setting the Standard for
Tattooing Regulations

40 million

Americans in 2008 had at
least one tattoo.

There are

21,000+

tattoo shops operating in the U.S.

And there was a

9% 

INCREASE

in tattooed adults from 2003 to 2006.

41 states

have at least one state statute
regulating tattooing.

Only

14 states

effectively regulate for sanitation,
training, and infection control.

This means there is a

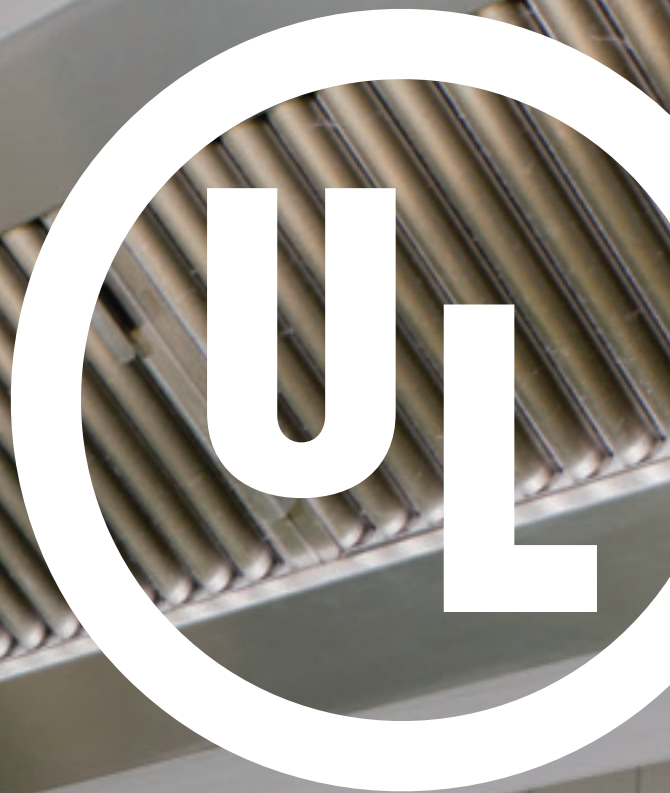


UNMET NEED
for effective tattooing regulation.*

*Based upon the three categories assessed in the study.



SAFER VENTILATION. LESS EXHAUSTION.



If you could take some of the legwork and a lot of the frustration out of your job, why wouldn't you? You're just an email or call away from trusted information from an impeccable source. Simply go straight to our website for a list of code experts in the U.S. and in Canada.

EXPERTISE IS EASY TO REACH AT

UL.COM/CODERESOURCE

Join the Discussion > Discover our new group at LinkedIn.com—search “UL Codes”



Environmental Health

Dedicated to the advancement of the environmental health professional

Volume 75, No. 3 October 2012

ABOUT THE COVER



As our cover this month points out, tattoos have been increasing in popularity over the past decade. The authors of our feature, “Tattooing Regulations in U.S.

States, 2011,” set out to discover whether the practice of tattooing is regulated effectively enough through state laws in order to protect the public’s health. They conducted a study that examined current tattooing regulations in all 50 states and found that much room for improvement exists in the adoption and enforcement of tattooing laws.

See page 30.

Cover photos © Ocean/Corbis

ADVANCEMENT OF THE SCIENCE

Altitude and Environmental Climate Effects on Bronchiolitis Severity Among Children Presenting to the Emergency Department.....	8
Evaluation of Fecal Coliform Samples From Oakland Bay, Washington, Using a New Sanitation Model.....	16
The Presence of Asbestos-Contaminated Vermiculite Attic Insulation or Other Asbestos-Containing Materials in Homes and the Potential for Living Space Contamination.....	24

ADVANCEMENT OF THE PRACTICE

Tattooing Regulations in U.S. States, 2011	30
Direct From ATSDR: <i>From Conversation to Action: Implementation of the National Conversation on Public Health and Chemical Exposures</i>	38
Direct From CDC: <i>The Food-Water Nexus: Irrigation Water Quality, Risks to Food Safety, and the Need for a Systems-Based Preventive Approach</i>	40
Direct From NCSL: <i>2012 Environmental Health Legislation</i>	42

ADVANCEMENT OF THE PRACTITIONER

Demystifying the Future: <i>Workerless Businesses—an Explosive New Trend Dancing With the Inner Entrepreneur</i>	46
Career Opportunities	48
EH Calendar.....	48
Resource Corner.....	52
JEH Quiz #2.....	54

YOUR ASSOCIATION

President’s Message: <i>Networking and the Power of Being Connected</i>	4
Special NEHA Members.....	57
Special Listing	58
NEHA 2012 AEC Report.....	60
NEHA 2013 AEC.....	72
NEHA News	77
Managing Editor’s Desk: <i>State of the Association</i>	78

ADVERTISERS INDEX

American Public University	15
Decade Software	79
Dynasil Products	45
HealthSpace USA	80
Mycometer	51
NSF International.....	7
Ozark River/Integrity Distribution.....	53
Shat-R-Shield.....	55
Sweeps Software, Inc.	5
Taylor & Francis	23
Toledo-Lucas County Health Dept.....	51
UCAR Visiting Scientist Programs	49
Underwriters Laboratories	2
University of Illinois Springfield.....	5

► PRESIDENT'S MESSAGE



Brian Collins,
MS, REHS, DAAS

Networking and the Power of Being Connected

Recently my city manager asked that I provide a “two pager” for city council consideration on the feasibility of regulating odor emanating from commercial and residential compost. Nuisance law, which is inherently subjective, would not be an option in this case as regulatory compliance and civil penalty would be players in deliberation. I needed education and guidance related to objective, scientific methods that would determine whether an odor is nuisance, noxious, or toxic. (My wife argues I should just pay her!) Since my knowledge of olfactory science is exclusively experiential, it was apparent a few phone calls were in order. Because of NEHA, I knew whom to call!

Networking, forming and maintaining a strong circle of contacts, has long been a staple of business practice in many fields. It often takes the form of person-to-person conversation, an exchange of business cards, e-mails, or even—OMG!—a phone call. In the environmental health community of practice, strong connections in the form of contacts represent great value, but relationships created through networking rest at the heart of what we do, at the heart of humanity, and at the heart of success. Further, it has been said that “Success depends on how people of diverse backgrounds and skills communicate with and complement each other. In a connected world, power shifts to those best able to connect (Dov Seidman, *How: Why HOW We Do Anything Means Everything...in Business [and in Life]*).” So with this prologue, I want to tell you about the opportunity NEHA provides to establish and utilize networks of

*...success comes
not only with
whom you know,
but also, with
who knows you!*

practitioners whether you are just entering the field, whether you are a freshman looking for answers, whether you are a journeyman, or you are well tenured. As they say, there is something for everyone!

Annual Educational Conference (AEC) & Exhibition: Of all networking opportunities, person-to-person (P2P) networking is most powerful. P2P networking doesn't just create contacts; it provides the opportunity to build relationships and connectivity. The AEC is an excellent opportunity to connect with more than 1,000 like-minded practitioners and professionals in a casual, congenial manner. The P2P concept allows connection with others who can help you help yourself and others. In the last two years, this has been evident to students and mentors attending the conference who are invested in the future of environmental health through workforce development. Relationships formed are even more valuable if they are reciprocal, i.e., if there is mutual benefit to participants. Often relationships resulting from networking develop beyond professional boundaries and

become coaching relationships, mentoring opportunities, or even friendships.

Technical Advisors: Under the tutelage of Past Presidents Keith Krinn and Mel Knight, NEHA converted the “Technical Section Chair” concept to a more utilitarian use of the resource in “Technical Advisors” or TAs. Thirty or so subject-matter experts (SMEs) volunteered, were vetted, and selected to be “go to” NEHA experts for all things within their specialty. This is where I found the answer to the odor quandary. Hint: names, phone numbers, and e-mail addresses for TAs are listed in the *Journal* (see page 59).

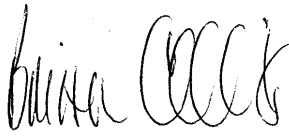
NEHA (the association): Membership has its privileges, as they say. As the association becomes more entrenched in advocacy, getting and staying connected to NEHA can assist not only through affiliation, but also via leveraging the reputation, expertise, and political capital NEHA enjoys. An example rests with use of NEHA position papers or letters of support/opposition related to relevant and current environmental health issues. In addition, I have witnessed how NEHA has positioned member-practitioners in certain places that ultimately provided vertical career movement.

Membership: As a member of this 4,500+ strong community, you are connected to practitioners, professionals, products, resources, vendors, academicians, specialists, leaders, and high potential achievers! Each can help you help yourself if the tool is utilized! There almost exists a natural synergy.

A final story about networking and then I'll close. In mid-July, I received an e-mail from Children's Environmental Health TA M.L.

Tanner in South Carolina. She explained how, through NEHA contacts and working outside her normal scope of work, she was able to help a fiscally strapped family with very young children and a baby. It appears they were living in a home with a persistent roach infestation without ability to remedy the problem themselves. M.L. made a few calls, one of which was to another NEHA TA, Zia Siddiqi, who is the vector control SME. Between them and their contacts, the home was professionally treated at no cost and the family now lives in a healthier environment. This happened in a matter of hours on a Friday afternoon! The point is that M.L., Zia, and the company that ultimately provided service cared. This was about caring. It was about being human and helping out. It was about being a professional and it illustrates in a very real way how being connected and networking in NEHA works!

Final thoughts...if you are the smartest person you know—you are not well networked! Your success is contingent upon your ability to interact and relate to others and that success comes not only with whom you know, but also, with who knows you! 🇺🇸



brianc@plano.gov

Did You Know?

Along with listing contact information for NEHA's board of directors, technical advisors, and staff in the *Journal*, you can find this information online at www.neha.org/about/neha.html. Valuable contact resources are just a click away.



UNIVERSITY OF
ILLINOIS
SPRINGFIELD

Master of Public Health Degree

Generalist degree or
Environmental Health
Concentration

ONLINE

- No campus visits required
- Affordable "e-tuition" rates
- Practitioner Focused
- Graduate Certificates Available On-campus or Online

For information contact Lenore Killam
217/206-6083 or e-mail
LKILL12@uis.edu
www.uis.edu/publichealth



Our MPH-Environmental Health Concentration is fully accredited by the National Environmental Science and Protection Accreditation Council.

Does Your Data Need A Clean SWEEP?

- ◆ Capturing and Reporting of Establishment and Inspection Information
- ◆ Documenting and Verifying Consumer Complaints
- ◆ Generating Code Enforcement Correspondence and Capturing Investigation Details
- ◆ Creating and Reporting of Accounts Receivable and Permitting Information

For More Information About Our User Friendly Software
Please Visit Our Website or Give Us a Call

www.SweepsSoftware.com • (800) 327-9337

SWEEPS[®]
Software Incorporated

Software for Environmental & Consumer
Health Agencies & Professionals



A C C E P T I N G N O M I N A T I O N S N O W

2013 Walter S. Mangold Award

The Walter S. Mangold Award recognizes an individual for extraordinary achievement in environmental health. Since 1956, this award acknowledges the brightest and the best in the profession. NEHA is currently accepting nominations for this award by an affiliate or by any five NEHA members, regardless of their affiliation.

The Mangold is NEHA's most prestigious award and while it recognizes an individual, it also honors an entire profession for its skill, knowledge, and commitment to public health.

Nominations are due in the NEHA office by Friday, March 15, 2013.

For information, please visit www.neha.org/about/awardinfo.html. Members can obtain nomination forms by calling 303.756.9090, ext. 302, or by sending an e-mail to tosner@neha.org.

don't
miss

in the Next *Journal of Environmental Health*

- A Summary of Health Outcomes: Multistate Foodborne Disease Outbreaks in the U.S.
- Outbreak of Cryptosporidiosis Associated With a Man-Made Chlorinated Lake
- Craft Cocktail Considerations: Fundamental Food Sanitation for Modern "Mixology"
- There's an App for That?? Making Public Health Information Obtainable at the Touch of a Button
- The Need for Congressional Action to Finance Arsenic Reductions in Drinking Water
- Relationship Between Food Safety and Critical Violations on Restaurant Inspections (online article)

Official Publication



Journal of Environmental Health
(ISSN 0022-0892)

Nelson Fabian, MS, Managing Editor
Kristen Ruby, Content Editor
Elizabeth Donoghue-Armstrong, PhD, Copy Editor
Hughes design|communications, Design/Production
Cognition Studio, Cover Artwork
Soni Fink, Advertising
For advertising call 303.756.9090, ext. 314

Technical Editors
William A. Adler, MPH, RS
Minnesota Department of Health, Rochester, MN
Nancy Culotta, MPH
Retired (NSF International), Ann Arbor, MI
Elizabeth Donoghue-Armstrong, PhD
NEHA, Denver, CO
Gary Erbeck, MPH
Retired (County of San Diego Department of Environmental Health), San Diego, CA
Carolyn Hester Harvey, PhD, CIH, RS, DAAS, CHMM
Eastern Kentucky University, Richmond, KY
Thomas H. Hatfield, DrPH, REHS, DAAS
California State University, Northridge, CA
Dhitinut Ratnapradipa, PhD, MCHES
Southern Illinois University, Carbondale, IL

Published monthly (except bimonthly in January/February and July/August) by the National Environmental Health Association, 720 S. Colorado Blvd., Suite 1000-N, Denver, CO 80246-1926. Phone: (303) 756-9090; Fax: (303) 691-9490; Internet: www.neha.org. E-mail: kruby@neha.org. Volume 75, Number 3. Subscription rates in U.S.: \$135 per year and \$250 for two years. International subscription rates: \$160 per year and \$300 for two years (airmail postage included). Single copies: \$12, if available. Reprint and advertising rates available at www.neha.org/JEH/. CPM Sales Agreement Number 40045946.

Claims must be filed within 30 days domestic, 90 days foreign, © Copyright 2012, National Environmental Health Association (no refunds). All rights reserved. Contents may be reproduced only with permission of the Content Editor.

Opinions and conclusions expressed in articles, reviews, and other contributions are those of the authors only and do not reflect the policies or views of NEHA. NEHA and the *Journal of Environmental Health* are not liable or responsible for the accuracy of, or actions taken on the basis of, any information stated herein.

NEHA and the *Journal of Environmental Health* reserve the right to reject any advertising copy. Advertisers and their agencies will assume liability for the content of all advertisements printed and also assume responsibility for any claims arising therefrom against the publisher.

Full text of this journal is available through Bigchalk.com at www.bigchalk.com and from ProQuest Information and Learning, (800) 521-0600, ext. 3781; (734) 973-7007; or www.umi.com/proquest. The *Journal of Environmental Health* is indexed by Current Awareness in Biological Sciences, EBSCO, and Applied Science & Technology Index. It is abstracted by Wilson Applied Science & Technology Abstracts and EMBASE/Excerpta Medica.

All technical manuscripts submitted for publication are subject to peer review. Contact the Content Editor for Instructions for Authors, or visit www.neha.org/JEH/.

To submit a manuscript, visit <http://jeh.msubmit.net>. Direct all questions to Kristen Ruby, Content Editor, kruby@neha.org.

Periodicals postage paid at Denver, Colorado, and additional mailing offices. POSTMASTER: Send address changes to *Journal of Environmental Health*, 720 S. Colorado Blvd., Suite 1000-N, Denver, CO 80246-1926.



Printed on recycled paper.





Standards • Audits • Testing • Certification • Code Compliance • Webinars • Regulatory Support

NSF International • 1-800-NSF-MARK • www.nsf.org/regulatory

Altitude and Environmental Climate Effects on Bronchiolitis Severity Among Children Presenting to the Emergency Department

Vincent J. Wang, MD, MHA
Division of Emergency Medicine
Children's Hospital Los Angeles

Christopher S. Cavagnaro, MD
Division of Pediatric Emergency Medicine
Children's Hospital at Montefiore

Sunday Clark, ScD
Departments of Medicine
and Epidemiology
University of Pittsburgh

Carlos A. Camargo, Jr., MD, DrPH
Department of Emergency Medicine
Massachusetts General Hospital

Jonathan M. Mansbach, MD
Department of Medicine
Children's Hospital Boston

Abstract Bronchiolitis, a respiratory illness, is the leading cause of hospitalization for infants. The authors examined whether environmental factors contributed to the severity of the bronchiolitis illness. They compiled environmental data (temperature, dew point, wind speed, precipitation, altitude, and barometric pressure) to augment clinical data from a 30-center prospective cohort study of emergency department patients with bronchiolitis. They analyzed these data using multivariable logistic regression. Higher altitude was modestly associated with increased retractions (odds ratio [OR] = 1.6; 95% confidence interval [CI] = 1.1–2.1; $p < .001$) and decreased air entry (OR = 2.0; 95% CI = 1.6–2.6; $p < .001$). Increasing wind speed had a minor association with more severe retractions (OR = 1.3; 95% CI = 1.1–1.7; $p = .02$). Higher dew points had a minor association with lower admission rates (OR = 0.9; 95% CI = 0.8–0.996; $p = .04$). Altitude and environmental climate variables appear to have modest associations with the severity of bronchiolitis in the emergency department. Further studies need to be conducted, however, on limiting exposure to these environmental variables or increasing humidity before making broad recommendations.

Introduction

Bronchiolitis is the leading cause of hospitalization for infants (Zorc & Hall, 2010). Bronchiolitis is an acute lower respiratory tract infection in young children most commonly caused by seasonal viruses, such as respiratory syncytial virus (50%–80%), human rhinovirus, parainfluenza viruses, and human metapneumovirus (Zorc & Hall, 2010). An American Academy of Pediatrics clinical practice guideline defined

bronchiolitis as the “constellation of clinical symptoms and signs including viral upper respiratory prodrome followed by increased respiratory effort and wheezing in children less than 2 years of age (Lieberthal et al., 2006).” Although multiple risk factors exist for hospitalization and increased severity (Lieberthal et al., 2006; Zorc & Hall, 2010), sparse data are available on how altitude and environmental climate may affect bronchiolitis severity.

Climate variables may contribute to other respiratory disease processes. For example, although low temperatures and decreased relative humidity favor transmission of influenza virus in animal models (Lowen, Mubareka, Steel, & Palese, 2007), absolute humidity is more strongly associated with influenza transmission and survival (Shaman & Kohn, 2009). Asthma severity in children has been associated with lower temperature (Hashimoto et al., 2004; Nastos, Paliatsos, Papadopoulos, Bakoula, & Priftis, 2008; Yuksel, Tanac, Tez, Demir, & Coker, 1996), humidity (Bar-Or, Neuman, & Dotan, 1977; Ehara et al., 2000; Hashimoto et al., 2004; Nastos et al., 2008), and increased wind speed (Nastos et al., 2008), but studies evaluating the effects of altitude (Gourgoulanis, Brelas, Hatziparasides, Papayianni, & Molyvdas, 2001; Kiechl-Kohlendorfer et al., 2007) and barometric pressure (Ehara et al., 2000; Hashimoto et al., 2004) have produced conflicting results. Choudhuri and colleagues reported that high altitude is a modest predictor for respiratory syncytial virus (RSV) bronchiolitis-associated hospitalization in Colorado (Choudhuri et al., 2006). RSV admission rates have also been associated with increased precipitation and lower mean temperatures (Chan, Chew, Tan, Chua, & Hooi, 2002).

Based on the associations between environmental factors and several respiratory diseases, we theorized that these factors might influence bronchiolitis severity. Many climate variables are readily available on a daily basis in newspapers and Internet weather

sources. We surmised that these data could be applied to children at risk for severe disease. Therefore, we hypothesized that these environmental factors (altitude, temperature, dew point, wind speed, precipitation, and barometric pressure) could contribute to the severity of bronchiolitis presentation and to hospital admission rates.

Patients and Methods

Data Collection

We conducted a prospective cohort study during the 2004 to 2006 winter seasons as part of the Multicenter Airway Research Collaboration (MARC). MARC is a division of the Emergency Medicine Network (www.emnet-usa.org). A goal of this prospective cohort study was to create a large, comprehensive, and generalizable database to help improve our understanding of bronchiolitis. Personnel at 30 emergency departments (EDs) in 15 states across the U.S. enrolled patients for up to three weeks during consecutive winters. Collectively, patients were enrolled from January 3, 2005, to March 27, 2005, in the first year and from December 12, 2005, to April 29, 2006, in the second year. Efforts were made to screen all consecutive bronchiolitis patients during the study period. All bronchiolitis visits, including those not enrolled, were recorded and tracked in a bronchiolitis registry. Patients were managed per the discretion of the attending physician in the ED. The institutional review boards at Massachusetts General Hospital and Children's Hospital Boston initially approved the study protocol. Each participating ED adopted this protocol and obtained institutional review board approval at their respective institutions.

Patients were included in the study if they were <2 years old and if they were diagnosed with bronchiolitis by one of the ED physicians. For the prospective portion of the study, a parent or guardian consented to the study. The only exclusion criterion was previous enrollment in the study. Duplicate visits, however, were tracked in the bronchiolitis registry.

Data collection included an interview in the ED and chart review. On the day of enrollment, caretakers of patients underwent a 15-minute survey to obtain demographic data, medical history, and a detailed history of the current illness. Chart review

was conducted by one of the study investigators for data concerning the patient's ED presentation, physical examination, and management.

Respiratory rates and oxygen saturation via pulse oximetry were recorded in the original MARC-25 database, but were not used as outcome variables for this study, since normal respiratory rates by age have significant variability, and children living at higher altitudes have a lower baseline oxygen saturation than children at sea level and relatively lower mean oxygen saturations at younger ages. Chest retractions and decreased air entry, which are more consistent across age groups and altitude, were used as the primary markers for bronchiolitis severity.

Chest retractions were defined as supraclavicular, intercostal, or subcostal retractions of the neck or chest wall, suggesting respiratory distress. Decreased air entry was determined by chest auscultation by the treating physician at the time of evaluation. Retractions and decreased air entry were originally recorded as categorical data: absent retractions/normal air entry versus mild, moderate, or severe retractions/decreased air entry. For data analysis, the retractions data were converted to a dichotomous variable, either absent or present. Air entry data were also analyzed as a dichotomous variable, either normal air entry or decreased air entry. For the current analysis, environmental factors were compared to the three severity outcomes: chest retractions, decreased air entry, and hospital admission rates.

Altitude and Climate Data

Environmental factors included altitude, temperature, dew point, wind speed, precipitation, and barometric pressure. Daily climate data are readily accessible on multiple public Web sites. The Google search engine was used to search for the altitude of the study site, using the key word "elevation" followed by the medical center zip code. If this search did not yield results, "elevation" and the city of the medical center were used. In some cases, the search yielded altitude results for other cities involved in our study. Results were used if they were comparable to searches using the other key words.

The remainder of the predictor variable data was obtained from the *Los Angeles Times* weather section online (2007), which utilizes

data from the National Oceanic and Atmospheric Administration's National Weather Service. National data were collected using the corresponding dates of presentation to the ED for each of the centers of enrollment. For temperature, the mean, maximum, and minimum temperatures and daily change in temperature were abstracted for each day and city. The dew point and wind speed were presented as daily averages, and precipitation was given as a daily total. The National Weather Service reports barometric pressure readings in intervals throughout the day, though not as daily averages. The first barometric pressure reading of the calendar day was used in our study.

Altitude was defined as the height above sea level measured in feet, and temperature as degrees Fahrenheit (°F). The dew point is the temperature (°F) to which air must be cooled to produce dew (assuming a constant barometric pressure). Although dew point is associated with relative humidity, the relative humidity changes with temperature changes, while the dew point does not. As a result, dew point is a better indicator of moisture in the air and is preferred by most meteorologists. Also, the dew point does not vary much throughout a 24-hour period.

Wind speed is the rate at which air moves horizontally past a given point, reported as a two-minute average speed in miles per hour. Precipitation measured in inches includes rain, sleet, snow, or hail. Barometric pressure is the pressure exerted by the earth's atmosphere at a given point and is measured in inches.

Statistical Analysis

All data analyses were performed using STATA 9.0. Data are presented as medians with interquartile ranges. The unadjusted associations between environmental factors and clinical outcomes were examined using Kruskal-Wallis rank tests. All *p*-values are two-tailed, with *p* < .05 considered statistically significant. Multivariable logistic regression was used to evaluate independent associations between environmental factors and clinical outcomes (retractions, air entry, and hospital admission).

Factors were evaluated in the multivariable model if they had an unadjusted association with the outcome of interest at *p* < .2. The interval chosen for the multivariable analy-

sis of altitude was one in which physiologic changes might be expected based upon prior literature (Choudhuri et al., 2006; de Meer, Heymans, & Zijlstra, 1995; Milledge, 2006). The intervals for the remainder of the climate variables were chosen after reviewing the distribution of the data. Because the outcomes of interest were common in this cohort and odds ratios (OR) of frequent outcomes do not approximate the relative risk, all analyses were repeated using a log-binomial model to obtain the relative risk. All of the major findings remained statistically significant regardless of technique used (data not shown), so results are presented as OR with 95% confidence intervals (CI).

Results

Demographic Data

A total of 1,459 patients were enrolled in the original prospective study. Demographic data were available for 1,456 (99%) patients. With regard to clinical outcomes, data on patient retractions were available for 1,384 (95%), air entry for 1,288 (88%), and ED disposition for 1,456 (99%). An overview of the demographic data is presented in Table 1. The mean age of patients in our study was 5.9 months and 851 (58%) patients were male.

Presentation Severity

Retractions were present for 61% of children (42% mild, 17% moderate, 2% severe). In the unadjusted analysis of retractions, significant predictors were higher altitudes, a higher minimum temperature, a higher dew point, increased precipitation, and a smaller change in temperature (Table 2). When these variables were analyzed in the multivariable model, increasing altitude (OR = 1.6; 95% CI = 1.1–2.1; *p* < .001) and increasing wind speed (OR = 1.3; 95% CI = 1.1–1.7; *p* = .02) remained statistically significant predictors of increased retractions.

Air entry was abnormal for 47% of children (36% mild, 11% moderate, 1% severe). In the unadjusted analysis of decreased air entry, significant predictors were higher altitude; higher mean, maximum, and minimum temperatures; and an increased change in temperature (Table 3). In the multivariable model, only increasing altitude was associated with a statistically significant decrease in air entry (OR = 2.0; 95% CI = 1.6–2.6; *p* < .001).

TABLE 1

Demographic Data of Children Presenting to the Emergency Department With Bronchiolitis (N = 1,456)

Demographic Factors	#
Age (months), median (IQR ^a)	5.9 (2.9–10.2)
Male	851 (58%)
Race/ethnicity	
Caucasian	558 (40%)
African-American	447 (32%)
Hispanic	382 (27%)
Estimated median household income (\$), median (IQR)	43,810 (30,970–56,772)
Insurance	
Private	473 (33%)
Medicaid	860 (59%)
Public	68 (5%)
None	49 (3%)
Has primary care provider	1,418 (97%)
Environmental factors [metric equivalent]	
Altitude (ft.), median (IQR)	480 (20–792) [146.3 m (6–241.4)]
Mean temperature (°F), median (IQR)	38 (29–46) [3.3°C (-1.6–7.8)]
Maximum temperature (°F), median (IQR)	44 (35–55) [6.7°C (1.6–12.8)]
Minimum temperature (°F), median (IQR)	30 (24–38) [-1.1°C (-4.4–3.3)]
Change in temperature (°F), median (IQR)	14 (10–20) [8°C (6–11)]
Dew point (°F), median (IQR)	25 (16–34) [-3.9°C (-8.9–1.1)]
Wind (mph), median (IQR)	8 (5–11) [12.9 kph (8–17.7)]
Precipitation (in.), median (IQR)	0 (0–0.06) [0 cm (0–0.15)]
Barometric pressure (in.), median (IQR)	30.06 (29.91–30.24) [76.35 cm (75.97–76.81)]
Clinical outcomes	
Admitted	619 (43%)
Retractions	
Absent	540 (39%)
Present	844 (61%)
Air entry	
Normal	684 (53%)
Abnormal	604 (47%)

^aIQR = interquartile range.

Admission Rates

In the unadjusted analysis of hospital admission, significant predictors were lower altitudes; higher mean, maximum, and minimum temperatures; and a lower barometric pressure (Table 4). Although a higher dew point was associated with increased admission rates in the unadjusted analyses, controlling for other factors in the multivariable logistic regression analysis revealed that a higher dew point actually was associated with a lower risk of hospital admission (OR = 0.9; 95% CI = 0.8–0.996; *p* = .04).

Discussion

In our multivariable analysis of this large geographically diverse sample of children presenting to the ED with bronchiolitis, we found the following: 1) an increase in dew point was associated with lower admission rates; 2) an increase in altitude was associated with both an increase in severity of retractions and decreased air entry; and 3) increased wind speed was associated with an increase in severity of retractions. To our knowledge these data are the first multicenter, prospective data examining the

TABLE 2

Retractions: Multivariable Logistic Regression Model of Associations Between Environmental Factors and Retractions (Absent vs. Present) Among Children Presenting to the Emergency Department With Bronchiolitis

Environmental Factor	Univariable			Multivariable ^a
	None (n = 540)	+, ++, +++ (n = 844)	p-Value	Odds Ratio (95% CI ^b)
Altitude, median (IQR ^b)	200 (20–792)	480 (20–900)	<.001	1.6 (1.1–2.1)
Mean temperature, median (IQR)	37 (29–46)	38 (30–47)	.19	0.8 (0.6–1.1)
Maximum temperature, median (IQR)	43 (35–57)	45 (36–56)	.47	–
Minimum temperature, median (IQR)	30 (21–37)	32 (25–39)	.02	1.2 (0.9–1.6)
Change in temperature, median (IQR)	16 (11–21)	14 (9–20)	.04	1.1 (0.9–1.2)
Dew point, median (IQR)	24 (15–33)	26 (18–35)	.005	1.1 (0.9–1.3)
Precipitation, median (IQR)	0 (0–0.04)	0 (0–0.09)	.01	1.6 (0.9–3.0)
Wind, median (IQR)	7 (5–11)	8 (5–11)	.08	1.3 (1.1–1.7)
Pressure, median (IQR)	30.06 (29.94–30.25)	30.06 (29.90–30.24)	.26	–

^aFor multivariable model, odds ratio reflects a change in altitude per increase of 1,000 feet, temperature per increase of 1°F, dew point per increase of 10°F, precipitation per increase of 0.1 in., and wind per increase of 10 mph.

^bCI = confidence interval; IQR = interquartile range.

TABLE 3

Air Entry: Multivariable Logistic Regression Model of Associations Between Environmental Factors and Air Entry (Normal vs. Abnormal) Among Children Presenting to the Emergency Department With Bronchiolitis

Environmental Factor	Univariable			Multivariable ^a
	Normal (n = 684)	-, --, --- (n = 604)	p-Value	Odds Ratio (95% CI ^b)
Altitude, median (IQR ^b)	126 (20–792)	600 (21–1080)	<.001	2.0 (1.6–2.6)
Mean temperature, median (IQR)	37 (29–46)	40 (32–48)	.002	0.9 (0.7–1.1)
Maximum temperature, median (IQR)	43 (35–56)	46 (37–58)	<.001	1.1 (0.9–1.2)
Minimum temperature, median (IQR)	30 (23–37)	32 (26–39)	.004	1.1 (1.0–1.3)
Change in temperature, median (IQR)	14 (9–20)	15 (11–22)	.006	–
Dew point, median (IQR)	25 (16–35)	26 (18–35)	.08	0.9 (0.8–1.1)
Precipitation, median (IQR)	0 (0–0.09)	0 (0–0.05)	.73	–
Wind, median (IQR)	8 (5–11)	7 (4–11)	.07	1.0 (0.8–1.2)
Pressure, median (IQR)	30.06 (29.91–30.24)	30.06 (29.91–30.24)	.78	–

^aFor multivariable model, odds ratio reflects a change in altitude per increase of 1,000 ft., temperature per increase of 1°F, dew point per increase of 10°F, and wind per increase of 10 mph.

^bCI = confidence interval; IQR = interquartile range.

influence of daily environmental climate variables on the severity of a child's bronchiolitis.

In comparison to our study, a recent single-center study in Germany examined the association between climate variables and pediatric admissions for acute respiratory

illnesses (du Prel et al., 2009). Of the 326 admissions for RSV, the investigators found weak correlations between wind velocity and admission, and an inverse association with humidity. These correlations were similar to those of our study. Compared to our larger

study, however, the age of the patients was ≤16 years, instead of <2 years, and the environmental data were taken as 14-day averages instead of as daily data.

Our multivariable analysis of bronchiolitis hospital admissions revealed that patients

TABLE 4

Hospital Admissions: Multivariable Logistic Regression Model of Associations Between Environmental Factors and Risk of Hospital Admissions Among Children Presenting to the Emergency Department With Bronchiolitis

Environmental Factor	Univariable			Multivariable ^a
	Sent Home (n = 837)	Admitted (n = 619)	p-Value	Odds Ratio (95% CI) ^b
Altitude, median (IQR) ^b	480 (20–792)	258 (20–792)	.04	0.9 (0.7–1.1)
Mean temperature, median (IQR)	36 (28–46)	39 (32–48)	<.001	1.0 (0.8–1.3)
Maximum temperature, median (IQR)	42 (34–55)	46 (37–57)	<.001	1.0 (0.9–1.1)
Minimum temperature, median (IQR)	30 (21–37)	32 (26–39)	<.001	1.0 (0.9–1.1)
Change in temperature, median (IQR)	14 (10–20)	14 (10–21)	.60	–
Dew point, median (IQR)	25 (15–34)	27 (18–35)	.02	0.9 (0.8–0.996)
Precipitation, median (IQR)	0 (0–0.05)	0 (0–0.09)	.39	–
Wind, median (IQR)	8 (5–11)	8 (5–11)	.77	–
Pressure, median (IQR)	30.07 (29.93–30.26)	30.05 (29.89–30.21)	.02	0.7 (0.4–1.0)

^aFor multivariable model, odds ratio reflects a change in altitude per increase of 1,000 ft., temperature per increase of 1°F, dew point per increase of 10°F, and pressure per increase of 1 in.
^bCI = confidence interval; IQR = interquartile range.

were less likely to be admitted with an increasing dew point (higher moisture content). Limited data is available on the physiologic effects of dew point or relative humidity, although studies have addressed the effects of humidification on patients receiving respiratory support. These studies concur that an optimal high respiratory relative humidity exists (between 95% and 100%) above which and below which clinical problems may arise (Irlbeck, 1998; Sottiaux, 2006; Williams, 1998; Williams, Rankin, Smith, Galler, & Seakins, 1996). A relative humidity that is too low may lead to changes in airway surface tension and the alveolar-arterial oxygen gradient, osmotic challenges (Williams, 1998), retention of secretions (Sottiaux, 2006), and mucociliary dysfunction (Irlbeck, 1998; Sottiaux, 2006; Williams, 1998). As discussed in the Methods section, dew point is a better measure of moisture content of air compared to relative humidity, but its physiologic effects on respiration have not been well studied.

Other studies have evaluated the association between RSV bronchiolitis and relative humidity, but results are varied. Indeed, increased numbers of children with RSV bronchiolitis have been associated with higher relative humidity (du Prel et al., 2009; Meerhoff, Paget, Kimpen, & Schellevis, 2009; Omer et al., 2008), lower relative humidity

(Chew, Dorasingham, Ling, Kumarasinh, & Lee, 1998; Lapena et al., 2005), or relative humidity of 45%–65% (Welliver, 2007; Yusuf et al., 2007). Few studies, however, address the effects of either dew point or relative humidity on bronchiolitis severity, especially as measured clinically in the ED.

A study in Chile of 541 children aged <1 year with bronchiolitis demonstrated no association between humidity, temperature, or precipitation with the frequency of presentations to the ED or outpatient clinics (Zamorano, Marquez, Aranguiz, Bedregal, & Sanchez, 2003). The results of our study suggest a minor association between an increasing dew point and a decrease in admissions. As a possible practical application of this finding, humidifiers in the home may simulate the environmental effects of increased dew point, and should be studied further. In a recent Cochrane review, studies were found to be lacking, with a single study comparing three groups: nebulized salbutamol, nebulized saline, and humidification in a mist tent (Umoren, Odey, & Meremikwu, 2011). While the study did not show a decrease in respiratory distress score with humidification, the Cochrane review concluded that insufficient evidence exists to formulate conclusions about the utility of humidification.

While increasing altitude was modestly associated with increased retractions and decreased air entry, it was not associated with increased hospitalizations. High altitude climate therapy has been associated with reduced airway inflammation (Karagiannidis et al., 2006), and a recent review by Rijssenbeek-Nouwens and Bel suggests that the effects of high altitude might benefit those with severe refractory asthma (Rijssenbeek-Nouwens & Bel, 2011). Choudhuri and co-authors (2006) demonstrated that altitude above 2,500 m is a modest predictor for RSV bronchiolitis-associated hospitalization in a statewide study in Colorado. It should be noted, however, that most of the world's population lives well below the altitude defined as high altitude, and none of the centers in our study even reached the criteria that Choudhuri used for moderate altitude (1,500–2,500 m). Increasing altitude is associated with lower barometric pressure and a decreased partial pressure of inspired oxygen (de Meer et al., 1995). We had little variation in the barometric pressures or dew points, which may be explained by the relatively low altitudes of the centers in our study (Choudhuri et al., 2006).

An increase in wind speed had a minor association with patients presenting with chest retractions. The effect of wind speed on bronchiolitis has not been well studied, although

an increase in circulating pollutants and allergens may be responsible for these findings. The pathophysiology of this finding was beyond the scope of our study, but may be valuable to investigate in the future.

Limitations

Our study is subject to several limitations. Although bronchiolitis is associated with multiple different viruses (Zorc & Hall, 2010), the diagnosis remains clinical (Lieberthal et al., 2006). Therefore, it is possible that children with bronchiolitis due to different viruses may respond differently to climate and altitude variables. To control for this potential variability, future studies could perform microbiological testing to determine the organisms associated with concurrent illnesses. Future studies could assess the living situations of patients to determine allergic or other environmental causes that may contribute to the intercurrent symptoms. Our study did not collect specific living environment data or whether or not the patients were exposed to many different settings.

Assessment of decreased air entry and chest retractions is inherently subjective (Wang et al., 1996), but physician subjectivity was minimized by dichotomizing the data so that any retractions or any decrease in air entry was compared to a normal examination. Furthermore, chest retractions in bronchiolitis are associated with increased hospital admission rates, need for supplemental oxygen (Mai, Selby, Simpson, & Isaacs, 1995), and duration of hospitalization (Weigl, Puppe, & Schmitt, 2004). Decreased air entry has been associated with degree of hypoxemia in hospitalized children with acute lower respiratory tract infections (Weber, Usen, Palmer, Jaffar, & Mulholand, 1997). Even though we did not analyze respiratory rate or room air saturation in our study, multivariable analysis in another

study revealed that they were not independent predictors of severity of illness as defined by intensive care unit admission (Damore, Mansbach, Clark, Ramundo, & Camargo, 2008).

Other limitations exist in the collection of our climate data. We used daily means and points in time for some of the data, but weather patterns can change throughout a given day. This may change more frequently with wind speed and precipitation, but slower changes may also occur with the other variables. Analysis of each of these changing values would have been an excessively complex study, which we thought would not lead to clinically significant data. Furthermore, some climate data may not be relevant to the patients, such as in the case of wind speed and patients who spend all of their time indoors. It is possible that the effects of climate variables may not manifest their clinical effect until subsequent days. Future studies could be designed to prospectively assess the affects of climate variables at the time of bronchiolitis evaluation. Such “real time” studies would provide a more accurate assessment of the affects of climate variables on the disease presentation.

Using hospital rather than residential zip codes also added confounders that were not addressed. The residential zip code may have had different environmental variables and the travel distance to the study center was not accounted for in the analysis. Given the normal catchment area served by each medical center, however, it is unlikely that the differences in patient zip code were accompanied by significant differences in environmental climate variables for the majority of the patients enrolled in this study.

Internet searches for elevation data regularly yielded different results. For each city, multiple elevation values were found. No single source or Web site had all elevation data, and therefore multiple Web sites were neces-

sary. We attempted to use the values that best approximated the area of the medical center. It is unlikely that this variability would have affected the results, since most of the values were within proximity of each other, and not disparate to the degree of being labeled moderate or high elevation (Choudhuri et al., 2006). For example, Toledo, Ohio, had elevation values of 183 m, 186 m, 187 m, 188 m, and 189 m.

Conclusion

Our data indicate that numerous environmental climate factors influence the severity of bronchiolitis for infants and children. Altitude is a predictor of severity of bronchiolitis presentation to EDs, even at altitudes lower than previously reported. Days with a higher wind speed may also be predictive of bronchiolitis severity; and the dew point appears to be inversely related to the frequency of bronchiolitis admissions. These climate data may help predict severity of bronchiolitis on a daily basis, and may help medical centers plan for days when bronchiolitis severity and admission rates may increase. While there are limited proven medications or other interventions to improve the care of children with bronchiolitis, parents could consider limiting their infants' exposure to windy winter days or using a humidifier or vaporizer. Further studies need to be conducted on these interventions before making broad recommendations. These data, however, support further study of humidification, a simple, low-cost intervention, which may help improve the care of children with bronchiolitis. 🐼

Corresponding Author: Vincent J. Wang, Associate Division Head, Emergency Medicine and Transport, Children's Hospital Los Angeles, 4650 Sunset Blvd, Mailstop #113, Los Angeles, CA 90027. E-mail: vwang@chla.usc.edu.

References

- Bar-Or, O., Neuman, I., & Dotan, R. (1977). Effects of dry and humid climates on exercise-induced asthma in children and pre-adolescents. *Journal of Allergy and Clinical Immunology*, 60(3), 163–168.
- Chan, P.W., Chew, F.T., Tan, T.N., Chua, K.B., & Hooi, P.S. (2002). Seasonal variation in respiratory syncytial virus chest infection in the tropics. *Pediatric Pulmonology*, 34(1), 47–51.
- Chew, F.T., Doraisingham, S., Ling, A.E., Kumarasinhe, G., & Lee, B.W. (1998). Seasonal trends of viral respiratory tract infections in the tropics. *Epidemiology and Infection*, 121(1), 121–128.
- Choudhuri, J.A., Ogden, L.G., Ruttenber, A.J., Thomas, D.S., Todd, J.K., & Simoes, E.A. (2006). Effect of altitude on hospitalizations for respiratory syncytial virus infection. *Pediatrics*, 117(2), 349–356.

continued on page 14

References *continued from page 13*

- Damore, D., Mansbach, J.M., Clark, S., Ramundo, M., & Camargo, C.A., Jr. (2008). Prospective multicenter bronchiolitis study: Predicting intensive care unit admissions. *Academic Emergency Medicine*, 15(10), 887–894.
- de Meer, K., Heymans, H.S., & Zijlstra, W.G. (1995). Physical adaptation of children to life at high altitude. *European Journal of Pediatrics*, 154(4), 263–272.
- du Prel, J.B., Puppe, W., Grondahl, B., Knuf, M., Weigl, J.A., Schaaff, F., & Schmitt, H.J. (2009). Are meteorological parameters associated with acute respiratory tract infections? *Clinical Infectious Disease*, 49(6), 861–868.
- Ehara, A., Takasaki, H., Takeda, Y., Kida, T., Mizukami, S., Hagiwara, M., & Yamada, Y. (2000). Are high barometric pressure, low humidity, and diurnal change of temperature related to the onset of asthmatic symptoms? *Pediatrics International*, 42(3), 272–274.
- Gourgoulianis, K.I., Brelas, N., Hatziparasides, G., Papayianni, M., & Molyvdas, P.A. (2001). The influence of altitude in bronchial asthma. *Archives of Medical Research*, 32(5), 429–431.
- Hashimoto, M., Fukuda, T., Shimizu, T., Watanabe, S., Watanuki, S., Eto, Y., & Urashima, M. (2004). Influence of climate factors on emergency visits for childhood asthma attacks. *Pediatrics International*, 46(1), 48–52.
- Irlbeck, D. (1998). Normal mechanisms of heat and moisture exchange in the respiratory tract. *Respiratory Care Clinics of North America*, 4(2), 189–198.
- Karagiannidis, C., Hense, G., Rueckert, B., Mantel, P.Y., Ichters, B., Blaser, K., Menz, G., & Schmidt-Weber, C.B. (2006). High-altitude climate therapy reduces local airway inflammation and modulates lymphocyte activation. *Scandinavian Journal of Immunology*, 63(4), 304–310.
- Kiechl-Kohlendorfer, U., Horak, E., Mueller, W., Strobl, R., Haberland, C., Fink, F.M., Schwaiger, M., Gutenberger, K.H., Reich, H., Meraner, D., & Kiechl, S. (2007). Living at high altitude and risk of hospitalization for atopic asthma in children: Results from a large prospective birth-cohort study. *Archives of Disease in Childhood*, 92(4), 339–342.
- Lapena, S., Robles, M.B., Castanon, L., Martinez, J.P., Reguero, S., Alonso, M.P., & Fernandez, I. (2005). Climatic factors and lower respiratory tract infection due to respiratory syncytial virus in hospitalized infants in northern Spain. *European Journal of Epidemiology*, 20(3), 271–276.
- Lieberthal, A.S., Bauchner, H., Hall, C.B., Johnson, D.W., Kotagal, U., Light, M.J., Mason, W., Meissner, H.C., Phelan, K.J., & Zorc, J.J. (2006). American Academy of Pediatrics, subcommittee on diagnosis and management of bronchiolitis: Diagnosis and management of bronchiolitis. *Pediatrics*, 118(4), 1774–1793.
- Los Angeles Times. (2007). Los Angeles Times weather section online. Retrieved from http://weather.latimes.com/US/CA/Los_Angeles.html?main=1
- Lowen, A.C., Mubareka, S., Steel, J., & Palese, P. (2007). Influenza virus transmission is dependent on relative humidity and temperature. *PLoS Pathogens*, 3(10), 1470–1476.
- Mai, T.V., Selby, A.M., Simpson, J.M., & Isaacs, D. (1995). Use of simple clinical parameters to assess severity of bronchiolitis. *Journal of Paediatrics and Child Health*, 31(5), 465–468.
- Meerhoff, T.J., Paget, J.W., Kimpen, J.L., & Schellevis, F. (2009). Variation of respiratory syncytial virus and the relation with meteorological factors in different winter seasons. *Pediatric Infectious Disease Journal*, 28(10), 860–866.
- Milledge, J.S. (2006). Altitude medicine and physiology including heat and cold: A review. *Travel Medicine and Infectious Disease*, 4(3–4), 223–237.
- Nastos, P.T., Paliatsos, A.G., Papadopoulos, M., Bakoula, C., & Priftis, K.N. (2008). The effect of weather variability on pediatric asthma admissions in Athens, Greece. *Journal of Asthma*, 45(1), 59–65.
- Omer, S.B., Sutanto, A., Sarwo, H., Linehan, M., Djelantik, I.G., Mercer, D., Moniaga, V., Moulton, L.H., Widjaya, A., Muljati, P., Gessner, B.D., & Steinhoff, M.C. (2008). Climatic, temporal, and geographic characteristics of respiratory syncytial virus disease in a tropical island population. *Epidemiology and Infection*, 136(10), 1319–1327.
- Rijssenbeek-Nouwens, L.H., & Bel, E.H. (2011). High-altitude treatment: A therapeutic option for patients with severe, refractory asthma? *Clinical and Experimental Allergy*, 41(6), 775–782.
- Shaman, J., & Kohn, M. (2009). Absolute humidity modulates influenza survival, transmission, and seasonality. *Proceedings of the National Academy of Sciences*, 106(9), 3243–3248.
- Sottiaux, T.M. (2006). Consequences of under- and over-humidification. *Respiratory Care Clinics of North America*, 12(2), 233–252.
- Umoren, R., Odey, F., & Meremikwu, M.M. (2011). Steam inhalation or humidified oxygen for acute bronchiolitis in children up to three years of age. *Cochrane Database of Systematic Reviews*, 19(1), CD006435.
- Wang, E.E., Law, B.J., Stephens, D., Langley, J.M., MacDonald, N.E., Robinson, J.L., Dobson, S., McDonald, J., Boucher, F.D., de Carvalho, V., & Mitchell, I. (1996). Study of interobserver reliability in clinical assessment of RSV lower respiratory illness: A pediatric investigators collaborative network for infections in Canada (PICNIC) study. *Pediatric Pulmonology*, 22(1), 23–27.
- Weber, M.W., Usen, S., Palmer, A., Jaffar, S., & Mulholland, E.K. (1997). Predictors of hypoxaemia in hospital admissions with acute lower respiratory tract infection in a developing country. *Archives of Disease in Childhood*, 76(4), 310–314.
- Weigl, J.A., Puppe, W., & Schmitt, H.J. (2004). Variables explaining the duration of hospitalization in children under two years of age admitted with acute airway infections: Does respiratory syncytial virus have a direct impact? *Klinische Pädiatrie*, 216(1), 7–15.
- Welliver, R.C. (2007). Temperature, humidity, and ultraviolet B radiation predict community respiratory syncytial virus activity. *Pediatric Infectious Disease Journal*, 26(11 Suppl.), S29–S35.
- Williams, R.B. (1998). The effects of excessive humidity. *Respiratory Care Clinics of North America*, 4(2), 215–218.

References

- Williams, R., Rankin, N., Smith, T., Galler, D., & Seakins, P. (1996). Relationship between the humidity and temperature of inspired gas and the function of the airway mucosa. *Critical Care Medicine*, 24(11), 1920–1929.
- Yuksel, H., Tanac, R., Tez, E., Demir, E., & Coker, M. (1996). Childhood asthma and atmospheric conditions. *Acta Paediatrica Japonica*, 38(6), 606–610.
- Yusuf, S., Piedimonte, G., Auais, A., Demmler, G., Krishnan, S., Van Caesele, P., Singleton, R., Broor, S., Parveen, S., Avendano, L., Parra, J., Chavez-Bueno, S., Murguia De Sierra, T., Simoes, E.A.,

- Shaha, S., & Welliver, R. (2007). The relationship of meteorological conditions to the epidemic activity of respiratory syncytial virus. *Epidemiology and Infection*, 135(7), 1077–1090.
- Zamorano, A., Marquez, S., Aranguiz, J.L., Bedregal, P., & Sanchez, I. (2003). Association of acute bronchiolitis with environmental variables. [Article in Spanish]. *Revista Medica de Chile*, 131(10), 1117–1122.
- Zorc, J.J., & Hall, C.B. (2010). Bronchiolitis: Recent evidence on diagnosis and management. *Pediatrics*, 125(2), 342–349.

Did You Know?

Valuable PowerPoint presentations covering several pertinent topics related to children's environmental health issues, such as body art, food, recreational water, methamphetamines, and safe sun exposure are available on NEHA's Web site at www.neha.org/childrens_eh/index.html. These presentations can be used for training or outreach programs within your community.

When you're ready to further develop your team

When you're ready to invest in your organization's future

You are ready for American Public University

American Public University is ready to help your team succeed. We're a nationally recognized university with bachelor's and master's degrees for environmental science, policy, and management professionals—completely online. So your employees can take classes on their own time. And people are taking notice. 99% of employers surveyed would hire one of our graduates again.*

When you're ready, visit StudyatAPU.com/jeh



*APUS Alumni Employer Survey, January 2011–December 2011

We want you to make an informed decision about the university that's right for you. For more about our graduation rates, the median debt of students who completed each program, and other important information, visit www.apu.edu/disclosure.



 American
Public
University
Ready when you are.™

Evaluation of Fecal Coliform Samples From Oakland Bay, Washington, Using a New Sanitation Model

Fred S. Conte, PhD
Abbas Ahmadi, PhD
*Department of Animal Science
University of California, Davis*

Abstract The study described in this article analyzed the current statistical procedure used by the National Shellfish Sanitation Program (NSSP) to manage opening and closing of conditionally approved shellfish harvest areas and identified a deficiency in the statistical analytical method used by NSSP. The authors propose a new statistical model to address this deficiency. Over 2,100 fecal coliform samples, collected by the Washington Department of Public Health from 15 shellfish stations in Oakland Bay, Washington, over 10 years from January 13, 2000, to December 9, 2009, were analyzed. The results suggest that the estimated 90th percentile criterion, which is currently used by NSSP, is not sufficient to protect the public from risks caused by consumption of biologically contaminated shellfish. To reduce this risk, the NSSP procedure should be augmented by applying the upper limit of the estimated 90th percentile of fecal coliform samples at the .05 significance level.

Introduction

Aquaculture in the western U.S. is a viable industry with large-scale production in both finfish and shellfish. The term “shellfish” in this context is limited to oysters, clams, and mussels. The shellfish industry is tightly regulated under the National Shellfish Sanitation Program (NSSP), which is administered federally by the Food and Drug Administration and by departments of health or agriculture at the state level. These health regulations, which are necessarily stringent to protect public health, instruct state shellfish authorities to shut down the harvest of the shellfish if water quality indices drop below food safety levels.

Many pathogens associated with fecal material are discharged into coastal waters. Because monitoring for all human pathogens

is not feasible, an indicator group of bacteria is used to assess the likelihood that human pathogens are present. Fecal coliform is the indicator group of bacteria used by NSSP. The state agencies routinely monitor fecal coliform and water quality parameters at established stations in each shellfish harvesting area. Subsurface water samples are collected, chilled, and shipped to a certified laboratory. The analysis for fecal coliform takes 24 hours, and numbers of bacteria are expressed in the units of most probable number (MPN) per 100 mL (Clem, 1994).

NSSP establishes bacteriological standards for shellfish harvesting area classification. For areas to be classified approved or conditionally approved, the level of fecal coliform in subsurface water samples must meet NSSP standards. The standards for growing area classification have two components. The first

component establishes a geometric mean value expressed as MPN/100 mL. The second component establishes an estimated 90th percentile also expressed as MPN/100 mL. The limit for the estimated 90th percentile is 43 and 49 MPN/100 mL for the fecal coliform samples tested using the five- and three-tube, decimal dilution MPN procedures, respectively. The limit for the geometric mean is 14 MPN/100 mL for both tests. To meet the NSSP water quality standards, the fecal coliform sample's geometric mean and estimated 90th percentile must be less than the NSSP limits (Interstate Shellfish Sanitation Conference [ISSC], 2009).

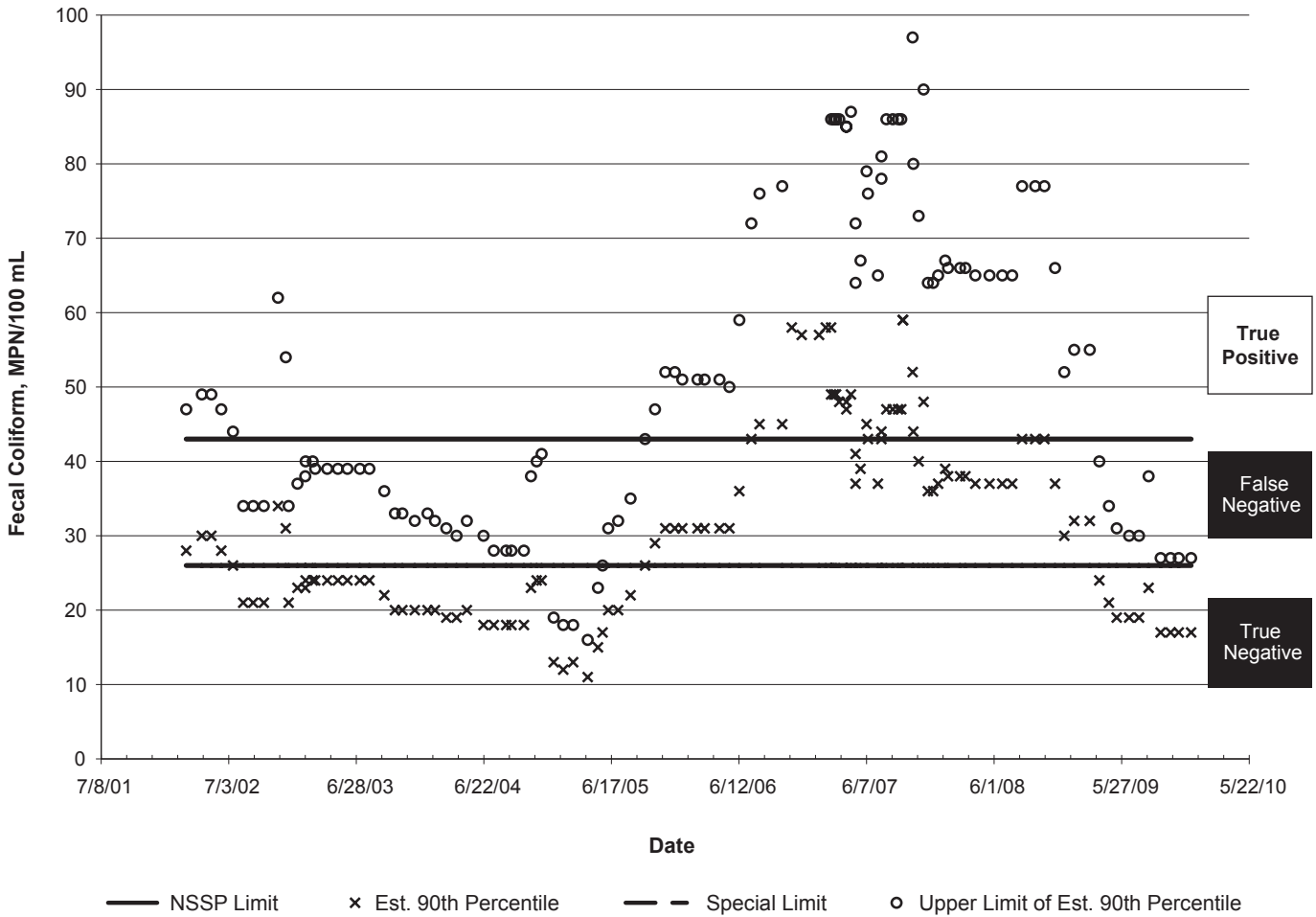
The NSSP guidelines allow the shellfish-growing areas to be open for harvest when the 90th percentile values are below the NSSP limit of 43. We hypothesized that the estimated 90th percentile criterion, which is currently used by NSSP, is not sufficient to protect the public from risks caused by consumption of biologically contaminated shellfish. To reduce this risk, NSSP procedure should be augmented by applying the upper limit of the estimated 90th percentile of fecal coliform samples at the .05 significance level.

Materials and Methods

The study site for our project was Oakland Bay, Washington. This bay, which is located in South Puget Sound, is one of the most important commercial shellfish areas in the country, producing over three million pounds of manila clams a year. Oakland Bay and the adjacent Hammersley Inlet are typical of the narrow, shallow embayments that characterize South Puget Sound. While highly productive areas for shellfish, the bay's low flushing rates increases the area's sensitivity to human

FIGURE 1

Comparison of the Estimated 90th Percentile Values With Their Upper Limits at the .05 Significance Level for Fecal Coliform Samples



Collected from station 129 in Oakland Bay, Washington, during the open and closed periods from January 13, 2000, to December 9, 2009.

impacts. The city of Shelton, Washington, operates a domestic wastewater treatment plant that discharges treated sewage near the junction of Hammersley Inlet and Oakland Bay (Department of Ecology, State of Washington, 2011).

The data set in our study consisted of 2,134 fecal coliform samples collected by the Washington Department of Public Health from 15 shellfish stations in Oakland Bay, Washington, over 10 years from January 13, 2000, to December 9, 2009. The 15 sampling stations are grouped into four growing areas: (1) growing area cen-

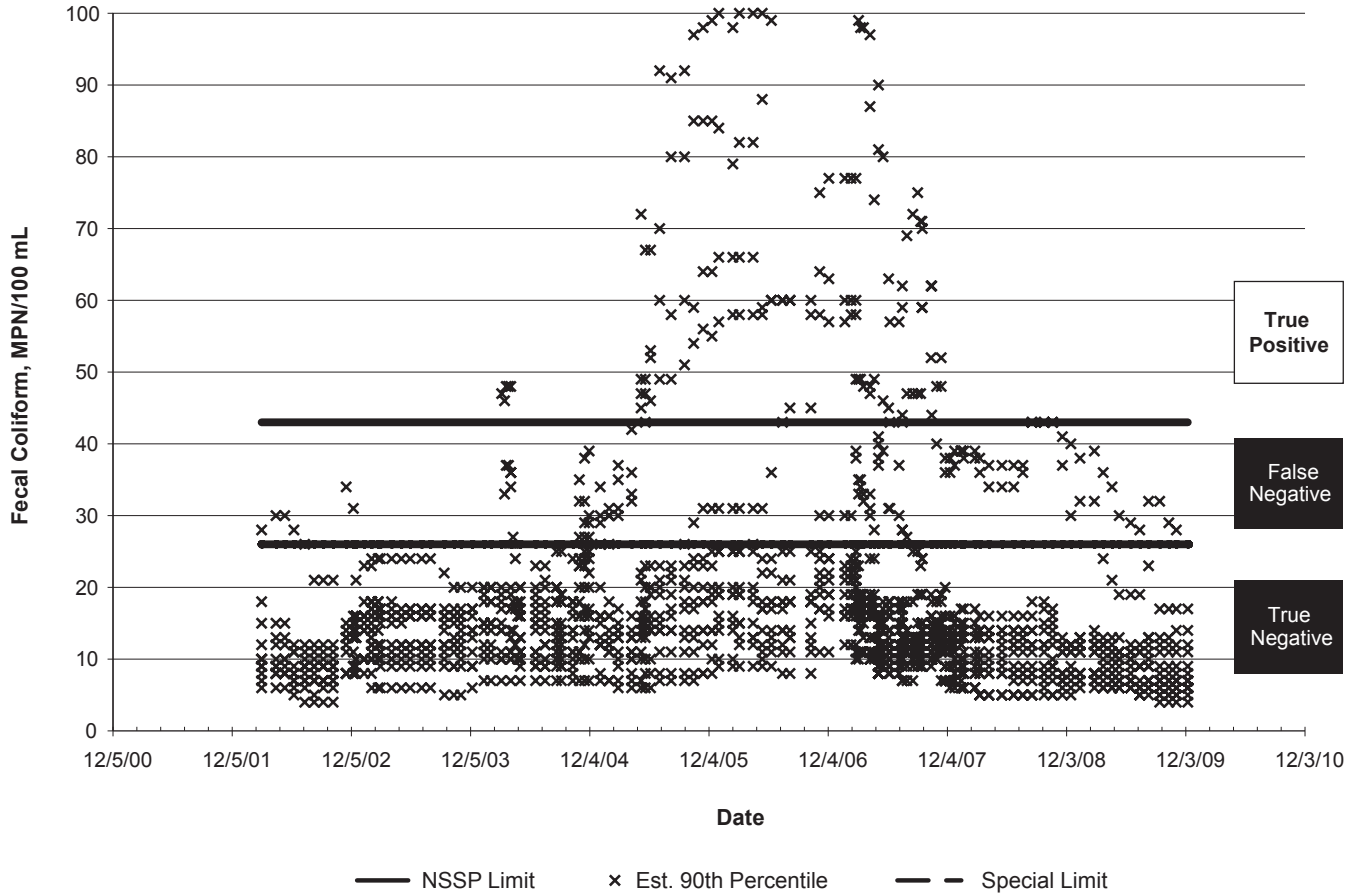
tral, which consists of stations 116, 117, 119, 120, 123, and 128; (2) growing area Chapman Cove, which consists of stations 615 and 639; (3) growing area north, which consists of stations 118, 121, 125, 126, 127, and 129; and (4) growing area north upper, which consists of station 614. The central growing area is a conditionally approved area based on both the rainfall and the wastewater treatment plant discharge. The Chapman Cove growing area is a conditionally approved area based on the rainfall only. The north growing area is also a conditionally approved area based on the

rainfall. The north upper growing area is restricted from June through September and is conditionally approved from October through May. The rainfall closure rule for conditionally approved shellfish growing areas is as follows:

The shellfish growing area will be closed to harvesting for a minimum period of 120 hours (five days) following any period in which the 24-hour rainfall total exceeds 25.4 mm (1.00 in.); and the start of the closure will occur immediately after the rainfall threshold is exceeded (no grace period).

FIGURE 2

Scattergram of the Estimated 90th Percentile Values for Fecal Coliform Samples



Collected from all stations in Oakland Bay, Washington, during the open and closed periods from January 13, 2000, to December 9, 2009.

The data set (2,134 samples) was divided into two subsets: one subset with 1,835 samples collected when the areas were open and the other subset with 299 shellfish samples collected when the areas were closed for harvest under the existing rainfall closure rules. The fecal coliform samples for each station were organized into continuous groups, each with 30 samples, as recommended by NSSP (ISSC, 2009). For example, the first group was constructed using the first 30 samples. The second group began with the second sample and added the next 29 samples that follow. That sequence was repeated until the end of the data set was reached. A station with less than 30 samples generated zero groups, a sta-

tion with 30 samples generated one group, a station with 31 samples generated two groups, and a station with n samples generates $(n - 29)$ groups. A data set containing 11 stations generated $(n1 - 29) + (n2 - 29) + \dots + (n11 - 29)$ groups or $(N - 319)$ groups, where N is the total number of samples in the data set.

The 2,134 samples for all open and closed periods were organized into 1,699 continuous sliding groups as described above. The subset containing the open period samples (1,835) was organized into 1,400 groups, using the same method of grouping.

For each continuous group, four statistics (geometric mean, estimated 90th percentile, upper limit of geometric mean, and upper

limit of estimated 90th percentile) are calculated using the following equations.

Calculate the arithmetic mean and standard deviation of the sample result logarithms (base 10) by

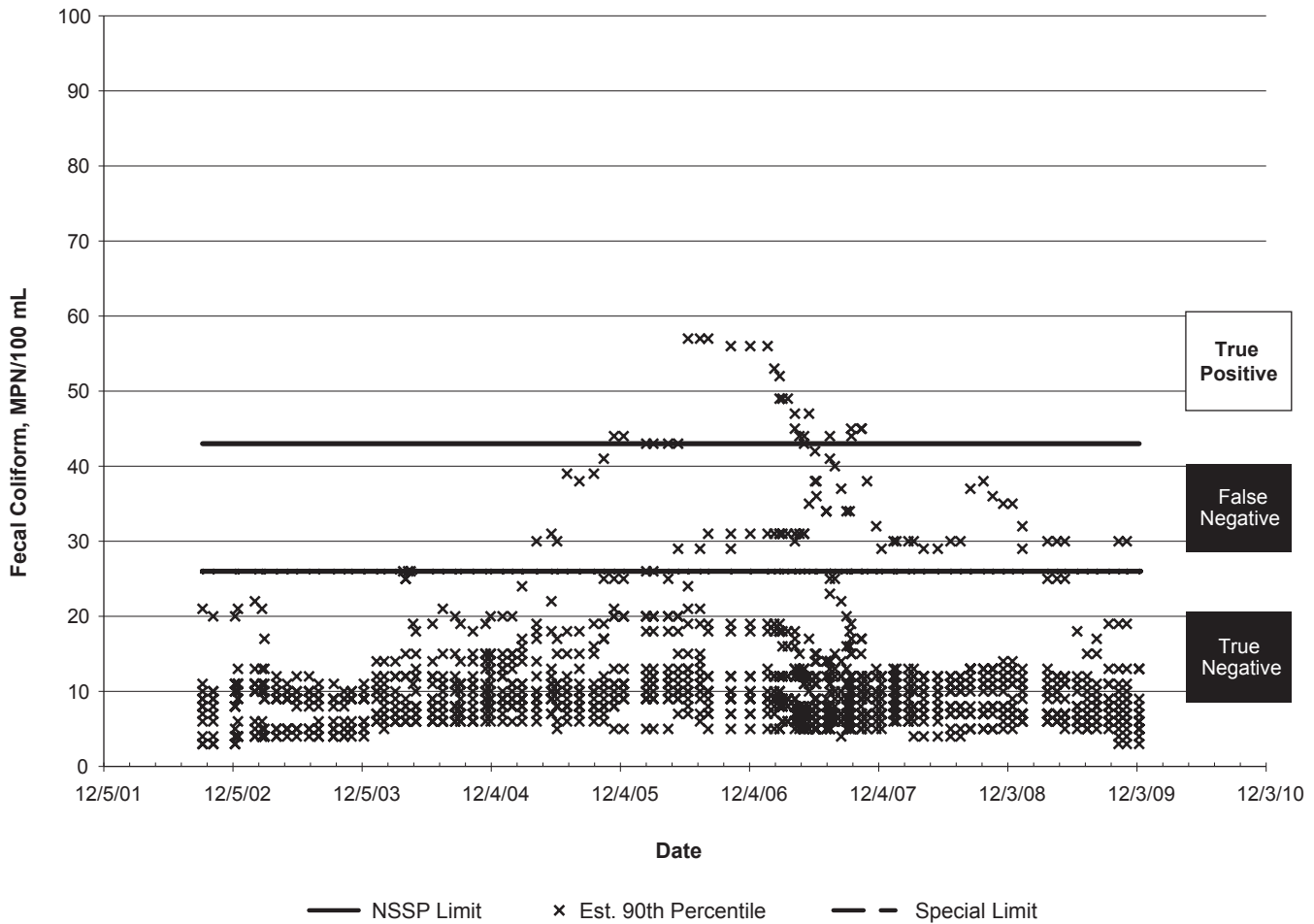
$$\bar{x} = \sum_{i=1}^n x_i / n \quad \text{(Equation 1)}$$

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1}} \quad \text{(Equation 2)}$$

Calculate geometric mean by
 $= \text{anti} \log(\bar{x}) \quad \text{(Equation 3)}$

FIGURE 3

Scattergram of the Estimated 90th Percentile Values for Fecal Coliform Samples



Collected from all stations in Oakland Bay, Washington, during the open periods from January 13, 2000, to December 9, 2009.

Calculate the estimated 90th percentile by

$$= \text{anti} \log(\bar{x} + s * 1.28) \quad (\text{Equation 4})$$

Calculate the upper limit of geometric mean at α significance level by

$$= \text{anti} \log \left(\bar{x} + \frac{s}{\sqrt{n}} * t_{\alpha, (n-1)df} \right) \quad (\text{Equation 5})$$

Calculate the upper limit of estimated 90th percentile at α significance level by

$$= \text{anti} \log \left(\bar{x} + \frac{\sqrt{(n-1) * s^2}}{\sqrt{\chi_{1-\alpha, (n-1)df}^2}} * t_{0.10, (n-1)df} \right) \quad (\text{Equation 6})$$

Where x_i denotes fecal coliform sample result converted to logarithm base 10, \bar{x} denotes the sample estimate of arithmetic mean, s denotes the sample estimate of standard deviation, n denotes the sample size, α denotes the significance level, t denotes the t -distribution, and df denotes the degree of freedom. The term $t_{\alpha, (n-1)df}$ was calculated using the Excel function $\text{tinv}(2 * \alpha, n - 1)$. The term $\chi_{1-\alpha, (n-1)df}^2$ is calculated using the Excel function of $\text{chiinv}(1 - \alpha, n - 1)$. The value 1.28 in Equation 4 is obtained from the standard normal distribution and is equal to $z_{\alpha=0.10}$ for one-sided test.

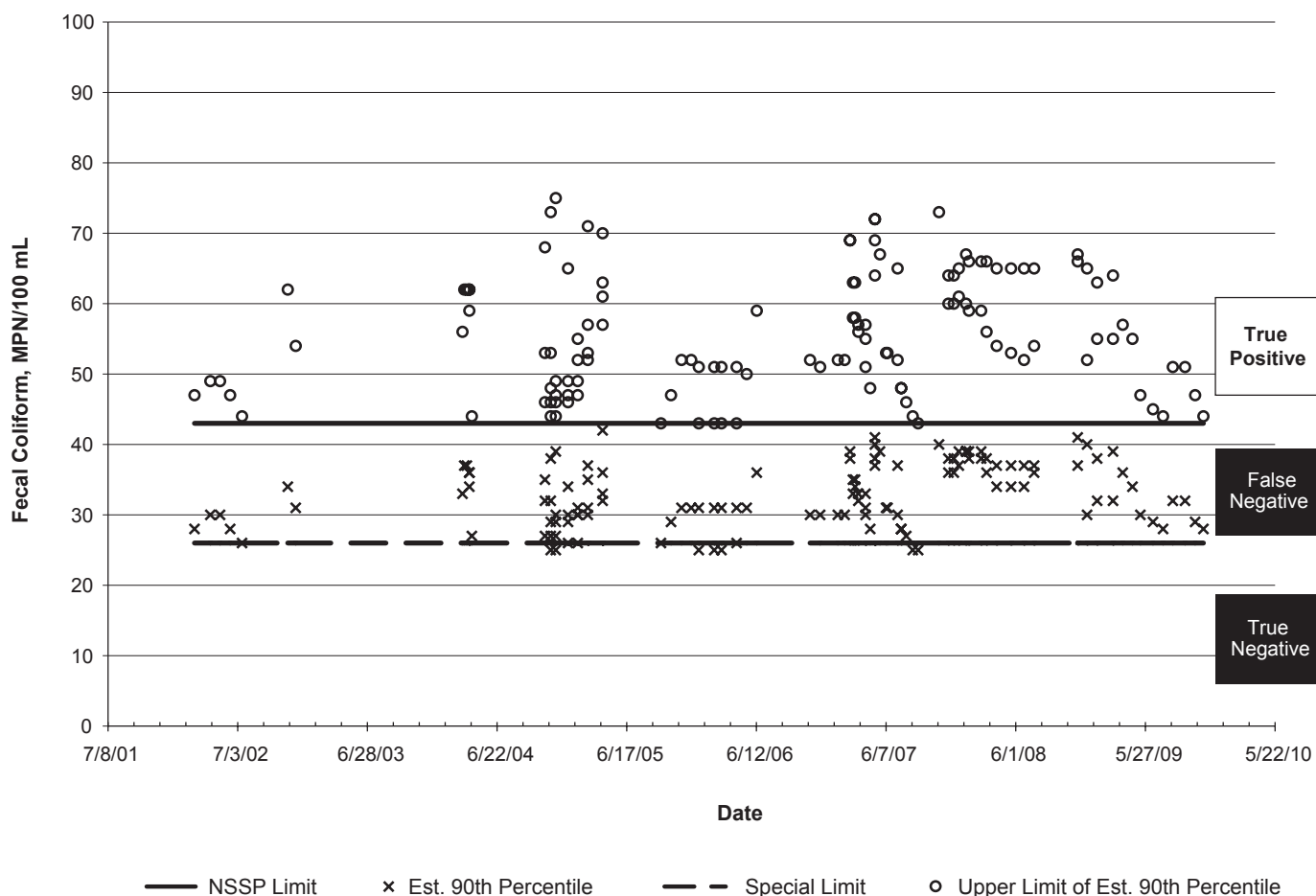
The addition of two new parameters in Equations 5 and 6 is based on the follow-

ing rationale. In the standard NSSP calculation, the geometric mean and the estimated 90th percentile are used in the calculation for compliance. In our revised calculation, to increase sensitivity, both the upper limits of the geometric mean and the upper limits of the estimated 90th percentile are calculated, but only the upper limit of the estimated 90th percentile is used. Equations 3 and 4 are calculated according to the NSSP guidelines (ISSC, 2009), Equation 5 is calculated according to Mann (1998), and Equation 6 is calculated according to Sheskin (2007) and Snedecor and Cochran (1967).

Following the NSSP recommendations, MPN values that signify the upper or lower

FIGURE 4

Scattergram of the Estimated 90th Percentile Values in the False-Negative Zone for Fecal Coliform Samples



Collected from all stations in Oakland Bay, Washington, from January 13, 2000, to December 9, 2009, showing that when the estimated 90th percentile values appear in the false-negative zone between 26 and 43 MPN/100 mL, the upper limits of these data points are all above the National Shellfish Sanitation Program limit of 43 MPN/100 mL.

range of sensitivity for that test were increased or decreased one significant number. For example, an MPN value of “less than 2” was decreased by one significant number to 1.9 to indicate the lower level of sensitivity of the five-tube, decimal dilution MPN test. Logarithms were rounded to three decimal places. Antilog of log MPN calculation was rounded down to the next lower integer (ISSC, 2009).

Results

In Figures 1, 2, 3, and 4, each data point in the figures represents 30 samples constructed, using the continuous sliding grouping

method. Figure 1 shows the results of comparing the estimated 90th percentile during the open and closed periods with its upper limit at the .05 significance level for station 129. Comparing these two parameters, three categories, or zones, are identified as follows:

1. True positive—when both the estimated 90th percentile and its upper limit are greater than or equal to the NSSP limit of 43 MPN/100 mL.
2. True negative—when both the estimated 90th percentile and its upper limit are less than the NSSP limit.
3. False negative—when the estimated 90th percentile is less than the NSSP limit, but

its upper limit is greater than or equal to the NSSP limit.

If the 90th percentile is greater than 43, and its upper limit is less than 43, the result produces false positives. In our model, however, false positives are not possible because the upper limit of an estimate, by definition, cannot be less than the estimate itself.

Figure 2 shows the distribution of the estimated 90th percentile values (1,699 data points) during both closed and open periods over a 10-year span for Oakland Bay’s 15 sampling stations. The data points are scattered over three zones: the true-positive zone, with 164 data points above 43 MPN/100 mL; the

TABLE 1

Percentage of True-Negative Values for Fecal Coliform Samples Collected

Growing Area	Station Number	Count True Positives	Count False Negatives	Count True Negatives	% True Negatives
Central	116	0	0	101	100.00
Central	117	0	0	101	100.00
Central	119	0	0	101	100.00
Central	120	0	0	101	100.00
Central	123	0	0	102	100.00
Central	128	0	0	101	100.00
Chapman Cove	615	23	13	51	58.62
Chapman Cove	639	0	0	82	100.00
North	118	0	0	100	100.00
North	121	0	0	101	100.00
North	125	0	0	101	100.00
North	126	0	0	98	100.00
North	127	0	0	101	100.00
North	129	5	41	55	54.46
North Upper	614	0	8	14	63.64

false-negative zone, with 127 data points between 26 and 43 MPN/100 mL; and the true-negative zone, with 1,408 data points below 26 MPN/100 mL.

Figure 3 shows the distribution of the estimated 90th percentile values (1,400 data points) during the open periods over a 10-year span for the same 15 sampling stations. As shown in Figure 3, 93.6% of the data points (1,310 data points) are in the true-negative zone, 4.4% of data points (62 data points) are in the false-negative zone, and 2% of data points (28 data points) are in the true-positive zone.

Figure 4 shows the distribution of the estimated 90th percentile values for false-negative zone (127 data points) over a 10-year span for the bay's 15 sampling stations. As shown in Figure 4, the estimated 90th percentage values appear in the false-negative zone between 26 and 43 MPN/100 mL. The upper limits of these data points, however, are all above the NSSP limit of 43 MPN/100 mL. This means that harvesting shellfish under these conditions presents a public health risk.

Table 1 shows the percentage of true-negative values for fecal coliform samples collected from January 13, 2000, to December 9, 2009, at Oakland Bay's 15 sampling stations. A value of 100% indicates complete success

in meeting NSSP standards. A value of 0% would indicate a complete failure in meeting NSSP standards. A value between 1% and 99% indicates a varying degree of failure of the growing area to meet NSSP standards.

Discussion

NSSP guidelines allow the shellfish growing areas to be open for harvest when the estimated 90th percentile values appear below the NSSP limit of 43 MPN/100 mL. Figure 4 shows that when the estimated 90th percentile values are below the NSSP limit of 43 MPN/100 mL but above 26 MPN/100 mL (false-negative zone) their upper limit values are above the NSSP limit of 43 MPN/100 mL. Harvesting shellfish when data points appear in the false-negative zone presents a public health risk.

Harvesting shellfish when the data points are in the true-positive zone, where the estimated 90th percentile values are above the NSSP limit of 43 MPN/100 mL, would represent a violation of NSSP rules (Figure 3). The occurrence of data points in the false-negative zone, where the estimated 90th percentile values are between 26 and 43 MPN/100 mL, although not in violation of the existing NSSP rules, can potentially expose the public to risks caused by consumption of biological-

ly contaminated shellfish, because the upper limits of the 90th percentile values are above the NSSP limit of 43 MPN/100 mL.

In Table 1, 12 stations with 100% of the samples appearing as true-negative values appear to be operating under adequate harvest closure rules. Three stations (north 129, north upper 614, and Chapman Cove 615), with only 54% to 64% of the samples appearing as true-negative values, are good candidates for tightening the rainfall closure rules. Stations 129 and 114 are located at the north end of the bay, and station 615 is located at the east end of Chapman Cove. The watersheds draining into these areas are generating higher concentrations of fecal coliform bacteria. To force these areas into compliance, their closure rules should be modified by increasing the closure period or by lowering the rainfall threshold. The rationale behind the enforcement of more restricted closure rules are twofold: 1) a lower rainfall threshold closes the shellfish harvesting areas before the concentration of fecal coliform bacteria reaches elevated levels, and 2) a longer closure period allows tidal cycles to flush the bay and clear the elevated concentration of fecal coliform bacteria and associated pathogens.

We have developed two separate models for modifying and evaluating rainfall closure rules. The first model, called Aquarius (Conte & Ahmadi, 2011), can be used to simulate the closure periods of shellfish growing areas under different hypothetical rainfall closure rules. The second model, called Pearl (Conte & Ahmadi, 2012), is used to evaluate the effects of simulated closure periods generated by Aquarius on the concentrations of fecal coliform bacteria in the bay. The closure rules for the three shellfish growing areas can be repeatedly modified using Pearl, in tandem with Aquarius, until 100% of their samples appear as true-negative values.

In Oakland Bay, the rainfall is the influential factor, and many pathogens associated with fecal material are discharged into the bay from the surrounding watersheds. Our study demonstrates how the sanitation models can be applied more widely to any other shellfish growing areas that are managed by rainfall closure rules.

Conclusion

The results of our study suggest a new model for evaluating shellfish growing areas. According to this proposed model, opening the

shellfish beds for harvest when the estimated 90th percentile values for fecal coliform samples appear in the false-negative zone between 26 and 43 MPN/100 mL, although permitted by the current NSSP standards, would pose a potential risk to public health and should trigger lowering the classification of the growing area from approved to conditionally approved or a tightening of the rainfall closure rules if the area is conditionally approved. The model consists of four steps:

1. Use fecal coliform samples collected when the shellfish growing areas are open for harvest. These samples are readily available as they are routinely collected for compliance purposes.
2. Calculate two parameters, the estimated 90th percentile and the upper limit of

estimated 90th percentile, for each sampling station using the continuous sampling method.

3. By comparing the estimated 90th percentile with its upper limit, calculate the number of true positives, false negatives, and true negatives for each station.
4. If any data points fall within the false-negative zone, the rainfall closure rule should be tightened to remove these false negatives.

The result of our study suggests that the estimated 90th percentile criterion, which is currently used by NSSP, is not sufficient to protect the public from risks caused by consumption of biologically contaminated shellfish. To reduce this risk, the NSSP procedure should be augmented by applying the upper limit of the estimated 90th percentile of fecal coliform samples at the .05 significance level. 🐌

Acknowledgements: Our thanks are extended to Lawrence Sullivan, Public Health Advisor, Office of Shellfish and Water Protection, Washington State Department of Health; Teri L. King, Marine Water Quality Specialist, Mason County, Washington Sea Grant; and Andrew D. Suhrbier, Senior Biologist, Pacific Shellfish Institute, for their assistance in providing the fecal coliform and rainfall datasets; and to Dr. Thomas Famula, Department of Animal Science, University of California Davis, for his assistance in researching statistical formulations. This project was partially funded by the Western Regional Aquaculture Center.

Corresponding Author: Fred S. Conte, Aquaculture Specialist, Department of Animal Science, University of California, 1 Shields Ave., Davis, CA 95616. E-mail: fsconte@ucdavis.edu.

References

- Clem, D. (1994). Historical overview. In C.R. Hackney & M.D. Pierson (Eds.), *Environmental indicators and shellfish safety* (pp. 1–29). New York: Chapman and Hall.
- Conte, F.C., & Ahmadi, A. (2011). A computerized model for evaluating new rainfall closure rules for conditionally approved shellfish growing areas. *Transactions of the ASABE*, 54(3), 909–914.
- Conte, F.C., & Ahmadi, A. (2012). *Pearl: A new model for evaluating and managing shellfish growing water*. Manuscript submitted for publication.
- Department of Ecology, State of Washington. (2011). *Water quality improvement projects*. Retrieved from http://www.ecy.wa.gov/programs/wq/tmdl/oakland_bay/index.html
- Interstate Shellfish Sanitation Conference. (2009). *National Shellfish Sanitation Program guide for the control of molluscan shellfish (2007 revision)*. Retrieved from http://www.issc.org/client_resources/2007%20nssp%20guide/2007%20nssp%20guide%20issc%20print%20version%207-6-09.pdf
- Mann, P.S. (1998). *Introductory statistics* (3rd ed.). New York: John Wiley & Sons.
- Sheskin, D.J. (2007). *Handbook of parametric and nonparametric statistical procedures* (4th ed.). London: Chapman & Hall.
- Snedecor, G.W., & Cochran, W.G. (1967). *Statistical methods* (6th ed.). Ames: Iowa State University Press.

Advertise

in the Journal of Environmental Health

Be seen by **20,000+** environmental health readers!

Call now! 303.756.9090, ext. 314

Ask about special rates for first-time advertisers and long-term contracts.



Stay Informed with the Latest in Occupational Health Research!

For more than 90 years, **Archives of Environmental & Occupational Health** has provided objective documentation of the effects of environmental agents on human, and in some cases, animal populations. This noted journal consolidates the latest research from such varying fields as epidemiology, toxicology, biostatistics, and biochemistry.

Publishing cutting edge research based on the most rigorous methods, **Archives** addresses topics of current concern such as health significance of toxic waste, new energy technology, industrial processes, and the environmental causation of neurobiological dysfunction, birth defects, cancer, and chronic degenerative diseases.

Archives of Environmental & Occupational Health has a 2-Year Impact Factor of 0.846 and a 5-Year Impact Factor of 1.034*

*©2012 Thomson Reuters, 2011 Journal Citation Reports®

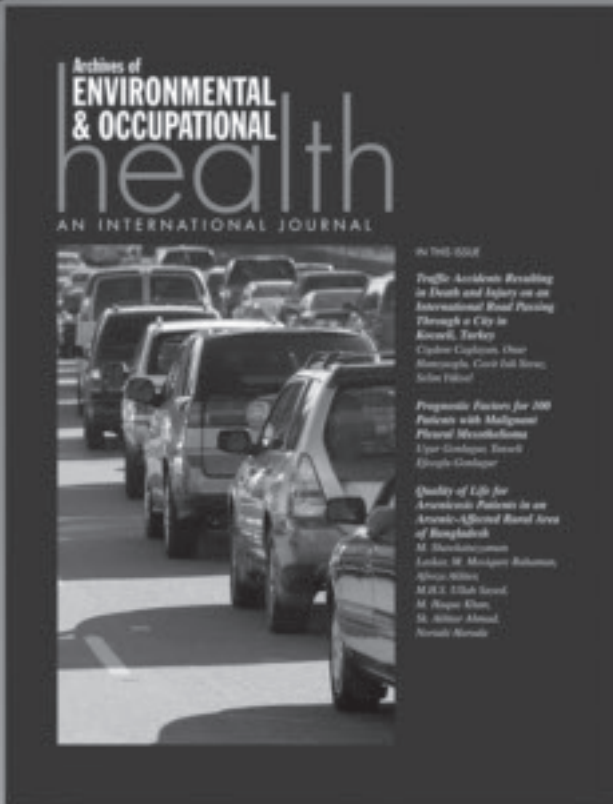
Easy to Subscribe!

North America

Taylor & Francis, Attn: Journals Customer Service
325 Chestnut Street, Philadelphia, PA 19106
Toll Free: (800) 354-1420, Press "4"
customerservice@taylorandfrancis.com

UK and all other territories

Informa UK Ltd., T&F Customer Service
Sheepen Place, Colchester, Essex CO3 3LP, UK
Ph: +44 20 7017 5544
subscriptions@tandf.co.uk



Visit tandfonline.com/VAEH today to:

- Sign up for table of contents alerts
- Take advantage of special offers for FREE access
- Submit your manuscript
- Easily subscribe



The Presence of Asbestos-Contaminated Vermiculite Attic Insulation or Other Asbestos-Containing Materials in Homes and the Potential for Living Space Contamination

Terry M. Spear, PhD
 Julie F. Hart, MS, CIH
 Tessa E. Spear, MS
 Molly M. Loushin, MS
 Natalie N. Shaw
 Mohamed I. Elashhab, MS
*Department of Safety, Health,
 and Industrial Hygiene
 Montana Tech of the
 University of Montana*

Abstract Asbestos-contaminated vermiculite attic insulation (VAI) produced from a mine near Libby, Montana, may be present in millions of homes along with other commercial asbestos-containing materials (ACM). The primary goal of the research described here was to develop and test procedures that would allow for the safe and effective weatherization of low-income homes with asbestos. The presence of asbestos insulation was confirmed by bulk sampling of the suspect asbestos material. The homes were then tested for the presence of asbestos fibers in the living spaces. All 40 homes containing VAI revealed the presence of amphibole asbestos in bulk samples. Asbestos (primarily chrysotile) was confirmed in bulk samples of ACM collected from 18 homes. Amphibole asbestos was detected in the living space of 12 (26%) homes, while chrysotile asbestos was detected in the living space of 45 (98%) homes. These results suggest that asbestos sources in homes can contribute to living space contamination.

Introduction

For 70 years Vermiculite Mountain (also called Zonolite Mountain), located seven miles northeast of Libby, Montana, supplied over 70% of the world's vermiculite (U.S. Environmental Protection Agency [U.S. EPA], 2011a). Vermiculite was used extensively in home insulation despite the fact that it was contaminated with fibrous and nonasbestiform amphibole asbestos (Pardee & Larsen, 1929). The precise number of U.S. homes insulated with Zonolite brand vermiculite attic insulation (VAI) is unknown (Gunter, Singleton, Bandli, Lowers, & Meeker, 2005; U.S. EPA, 2011a; Zalac, 2003); however, vermiculite was widely distributed via processing plants

throughout the country and may be present in millions of homes, including thousands of homes in Montana (U.S. EPA, 2011a).

In addition to vermiculite insulation, many older homes contain serpentine asbestos in commercial products such as thermal insulation, floor tiles, roofing tiles or shingles, gaskets, ceiling texture materials, and siding (Dodson & Hammar, 2006).

In the state of Montana, the Department of Public Health and Human Services (DPHHS), the Low Income Home Energy Assistance Program (LIHEAP), and the Weatherization Assistance Program participate in grant-funded weatherization activities with the goal of increasing the energy efficiency of homes that meet various program

qualification guidelines. An estimated 1,500 to 2,000 qualified homes are weatherized per year throughout the state.

Unfortunately, weatherization services are denied to approximately 200 high-energy LI-HEAP recipient households annually due to the presence of asbestos-containing materials (ACM) in their homes, either as loose-fill insulation in attics, in pipe or duct insulation, or in certain wall, ceiling, and siding materials. Because of potential health and safety hazards to residents and agency workers, Department of Energy weatherization rules prevent agencies from weatherizing homes with VAI or with other ACM that are friable or brittle and could potentially become airborne.

The research discussed in this article is part of a two-phase project funded by DPHHS to assess and develop weatherization protocols that may be used to safely weatherize homes that have been found to contain ACM or VAI (National Center for Appropriate Technology, 2010).

Research Aim

The objective of our research was to confirm the presence of VAI or other ACM in homes via bulk sampling and to assess the potential for living space contamination associated with these sources. Baseline data from this Phase I study were used to develop sampling strategies, personal protective equipment (PPE) selections, and exposure control strategies for Phase II. The aim of Phase II (currently being prepared for publication) was to determine the impact of weatherization activities in asbestos-laden homes on potential living space contamination and weatherization worker exposure and to develop asbestos-safe weatherization protocols.

Previous Studies

While substantial literature exists regarding occupational asbestos exposure, limited information is available concerning asbestos exposure in residential settings (Ewing, Hays, Hatfield, Longo, & Millette, 2010). The majority of studies associated with residential living space asbestos contamination have focused on exposure and related disease among household members of occupationally exposed workers (Anderson, Lilis, Daum, & Selikoff, 1979; Epler, Fitz Gerald, Gaensler, & Carrington, 1980; Kilburn et al., 1985; Miller, 2005; National Institute of Occupational Safety and Health [NIOSH], 1995; Peretz, Van Hee, Kramer, Pitlik, & Keifer, 2008; Sider, Holland, Davis, & Cugell, 1987; Whitehouse, 2004) or residential exposure in areas near asbestos-related industries or naturally occurring asbestos deposits (Adgate et al., 2011; Kumaqai, Kurumatani, Tsuda, Yorifuji, & Suzuki, 2010; Pan, Day, Wang, Beckett, & Schenker, 2005; Reid et al., 2007).

Cowan (1997) discussed contractor asbestos exposures from a building demolition that contained VAI. The majority of bulk VAI samples collected prior to demolition revealed less than 0.1% asbestos, with detectable concentrations ranging from 0.1% to 5%–10% actinolite or tremolite. The initial demolition work was conducted without dust suppression and air monitoring revealed asbestos concentrations ranging from 13 to 172 structures per mL (s/mL) by transmission electron microscopy (TEM).

A study (U.S. EPA, 2003) was conducted to estimate asbestos exposures from vermiculite insulation in containment structures and occupied and unoccupied Vermont homes with asbestos concentrations in bulk VAI samples ranging from nondetect to <0.1% by TEM. The implications of that study were that routine disturbances of vermiculite insulation by homeowners can result in asbestos exposure via inhalation of airborne fibers.

In another study, activity-based air and surface sampling was conducted in three homes to evaluate amphibole asbestos exposures during specific activities in attics containing VAI (Ewing et al., 2010). Personal and area air sampling revealed significant concentrations of airborne amphibole asbestos above background concentrations when VAI was disturbed. The highest personal and area concentrations were observed when VAI was moved aside with a dry sweeping method.

While the studies described above provided initial insight into potential exposures associated with demolition of structures containing VAI and the potential for exposure associated with activities that may be performed primarily in the attic of homes with VAI, the impact of VAI or other ACM on potential living space contamination outside of U.S. EPA Superfund sites such as Libby, Montana, has not been fully addressed.

Methods

Sampling for our research was conducted in 46 single-dwelling homes throughout Montana. Participants who were previously denied weatherization benefits because of the presence of asbestos in their home were recruited via telephone contacts and mailings. Participants first received an explanation of the research. Investigators then conducted a visual inspection of the home and collected bulk samples of VAI or other suspect sources of ACM. When the presence of asbestos was confirmed in VAI or other bulk sources of ACM via independent laboratory analyses, baseline air and surface sampling was performed to assess potential living space contamination.

Bulk Sampling Methodology

Prior to bulk sample collection, a visual inspection was conducted in each home. This inspection included occupant interviews to obtain home construction histories, identification of attic access ports, inspection of living spaces for potential pathways of vermiculite insulation contamination (holes or gaps in the ceiling), and documentation of other suspect ACM in the homes as well as the condition of these materials.

A visual inspection of the attic was documented and recorded with photos. If VAI was observed in any portion of the attic, a one-gallon sample was collected. Several attics revealed vermiculite mixed with cellulose or fiberglass insulation. Suspect ACM samples were also collected, most commonly from thermal system insulation (TSI) sources. Bulk VAI and ACM samples were sent to an independent laboratory for analysis by polarized light microscopy for asbestos using a modified U.S. EPA/600/R-04/004 and U.S. EPA-600/R-93/116 method, respectively (U.S. EPA, 2004). The laboratory used is accredited by the American Industrial Hygiene Association, the National Voluntary Labora-

tory Accreditation Program, and the New York State Department of Health Environmental Laboratory Approval Program.

Baseline Living Space Sampling Methodology

After positive identification of asbestos was documented through bulk sampling, high-volume air and surface dust samples were collected from each home. High-volume air samples were collected using a minimum of five high-flow (9.5–9.9 L/min.) vacuum pumps positioned throughout the living spaces of each home. Sampling cassettes fitted with 0.8 μm 25 mm mixed cellulose ester membrane filters were positioned five to six feet above the ground. The mean sample duration was two hours. The air samples were analyzed for asbestos per National Institute of Occupational Safety and Health's (NIOSH's) *Asbestos and Other Fibers by PCM: 7400* (NIOSH, 1994) by the independent laboratory. Samples that revealed phase contrast microscopy (PCM) concentrations greater than 0.01 fibers/mL (f/mL) were further analyzed by U.S. EPA's Asbestos Hazard Emergency Response Act, Airborne Asbestos by TEM (Asbestos, 1987). In the event that none of the samples revealed PCM concentrations greater than 0.01 f/mL, the two highest PCM samples from each home were selected for TEM analysis.

Surface dust samples were collected from numerous room surfaces via wet wipe and micro-vacuum techniques. Wipe samples were collected from floors, interior window sills, ductwork, furniture, and appliances using the American Society for Testing and Materials (ASTM) D 6480-05 procedures, "Wipe Sampling for Settled Asbestos" (ASTM, 2010) and analyzed by TEM by the independent laboratory.

Micro-vacuum samples were also collected throughout homes on surfaces not suitable for surface wipes (carpets, porous furniture) using ASTM Method D 5755-03 procedures, "Micro-vacuum Sampling and Indirect Analysis of Dust by TEM for Asbestos Structure Number Concentration (ASTM, 2009)." Ten percent field blanks were submitted for the high-volume air, surface wipes, and micro-vacuum samples.

Background Concentrations

Air and surface concentrations of 0.01 f/mL (70 structures per square millimeter [s/mm²]) (confirmed by TEM analysis) and 10,000 structures per square centimeter (s/cm²),

respectively, were adopted for this project as values, that if exceeded, required the home to be cleaned by a state licensed asbestos abatement contractor (LAAC) and cleared via air sampling prior to the home being considered for the Phase II component of our research. The air concentration of 0.01 f/mL (70 s/mm²) represents the Montana state asbestos abatement project clearance concentration (State of Montana Department of Quality Permitting and Compliance Division, 2005). In terms of surface concentration, a review of available literature indicates that a surface may be considered “clean” when the asbestos concentration is below 1,000 s/cm². A surface would be considered contaminated when the asbestos concentration is greater than 100,000 s/cm² (Millette & Hays, 1994). Based on existing scientific literature, an acceptable background level for surface samples of 10,000 s/cm² was adopted for this research.

Precautionary Measures

The study protocol was approved by the institutional review board at Montana State University. Study participants received an explanation of the research and provided written consent prior to any research activities. In an effort to minimize potential asbestos exposures to home occupants and research investigators, the following additional precautions were taken.

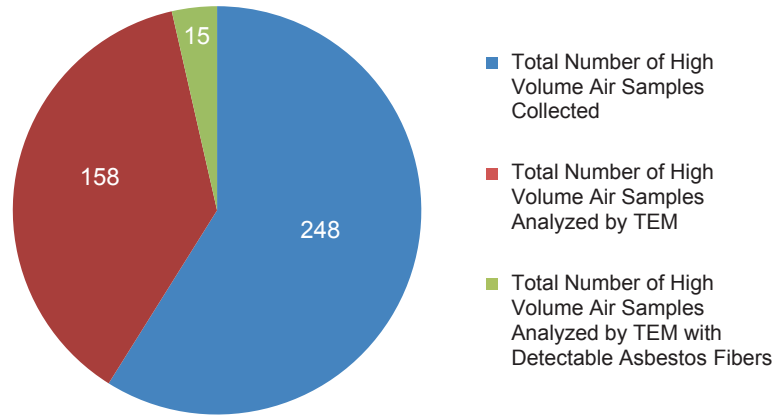
High-volume air sampling was conducted with nonaggressive sampling methods. Attic spaces were accessed from the exterior of the home whenever possible. If attic spaces were entered from the home interior, a 6-mL plastic containment structure was constructed around the access port prior to entry. Similar containment practices were used for all bulk ACM sample collection. Investigators were suited in level C PPE prior to entering any attic space. All investigators obtained medical clearance to wear negative pressure respirators and passed quantitative fit tests within the past year.

Results

Visual inspection and bulk sampling in the 46 homes that were part of our Phase I assessment revealed VAI present in 40 of the 46 homes. In addition, one of the homes without VAI contained vermiculite insulation in two walls. Bulk vermiculite asbestos concentrations were reported by the laboratory as “present” or “absent.” All of the bulk VAI samples collected revealed the presence of

FIGURE 1

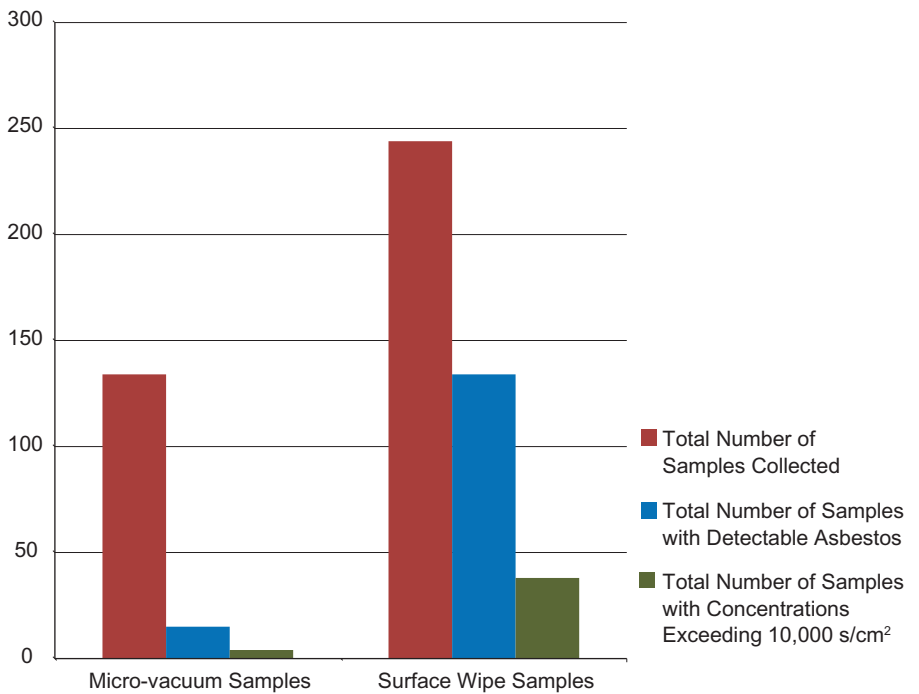
Summary Results for High-Volume Air Sampling



Two hundred forty-eight high-volume samples were collected (excluding field sample blanks) and analyzed by phase contrast microscopy. Of these, 158 were further analyzed by transmission electron microscopy (TEM). Fifteen of the TEM air samples revealed detectable asbestos fibers.

FIGURE 2

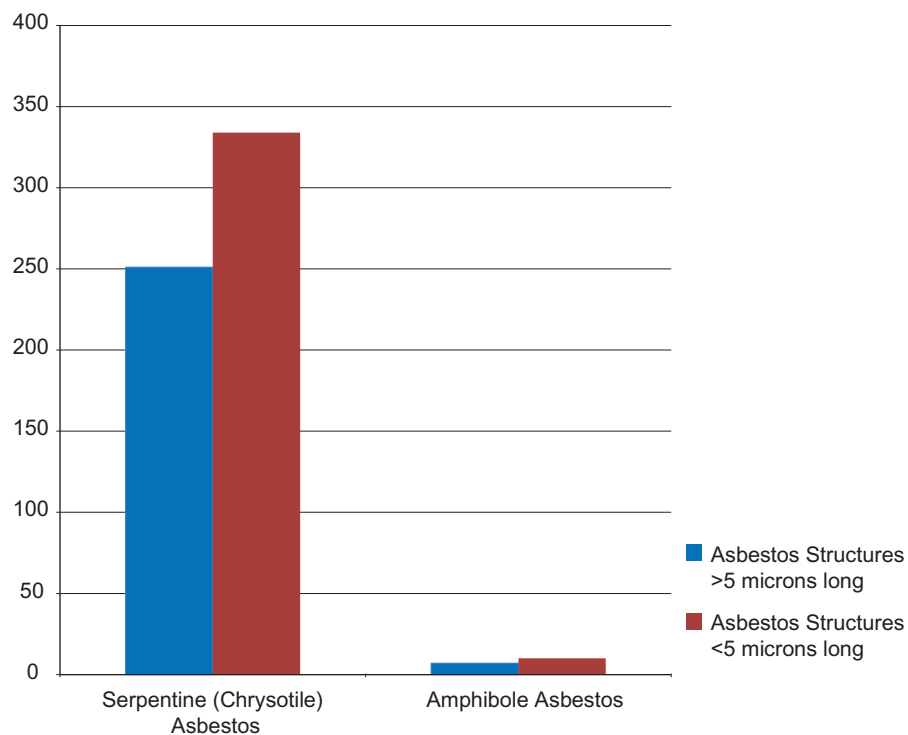
Summary Results for Surface Sampling



One hundred thirty-four micro-vacuum surface samples and 244 surface wipe samples were collected. Of these, 23 and 134 micro-vacuum and surface wipe samples, respectively, revealed detectable asbestos fibers. Four micro-vacuum and 38 surface wipe samples revealed asbestos concentrations exceeding the 10,000 s/cm² concentration adopted as the background surface concentration for our study.

FIGURE 3

Summary Results for Surface Wipe Sampling



In terms of individual asbestos structures identified in surface wipe samples, 585 structures were chrysotile while 17 were identified as Libby amphibole or actinolite/tremolite. Asbestos structures less than 5 μm are distinguished from asbestos structures greater than 5 μm for both families.

asbestos. Thirty-nine samples of bulk ACM were also collected in these homes. Twenty-five (64%) of these samples contained greater than 1% asbestos. The majority of positive bulk ACM samples were collected in the basement area and were chrysotile-based TSI materials. These were collected in eighteen homes. Fourteen homes contained both VAI and other ACM, while four homes contained only ACM other than VAI.

Summary high-volume air sampling results are presented in Figure 1. Two hundred forty-eight high-volume air samples (excluding field blanks) were collected in the 46 homes. All of the samples were initially analyzed by PCM. The mean PCM concentration for these samples was 0.016 f/mL with a standard deviation (SD) of 0.014 (not shown in Figure 1). Samples with PCM concentrations greater than the clearance concentration of 0.01 f/mL were further analyzed by TEM. If none of

the samples from an individual home sample set exceeded this value, the two highest PCM samples were selected for TEM analysis.

One hundred fifty-eight (64%) of the PCM samples were analyzed by TEM. Of these, 15 (9.5%) samples revealed detectable levels of asbestos. These 15 samples were collected in 11 separate homes. One of the samples analyzed by TEM exceeded the clearance concentration of 0.01 s/mL (or 70 s/mm²). This sample was collected in the basement area of a home and revealed chrysotile asbestos structures.

One hundred thirty-four baseline micro-vacuum samples were collected in the 46 homes on porous surfaces not suitable for surface wipe sampling. Summary baseline micro-vacuum sample results are presented in Figure 2. Of the 134 samples, 23 (17%) revealed detectable asbestos concentrations. Four samples (3%) revealed asbestos concentrations greater than the background surface

concentration of 10,000 s/cm² adopted for this project. These four samples were collected in four separate homes. All four of these samples revealed chrysotile asbestos structures.

Summary surface wipe sample results are also presented in Figure 2. Two hundred forty-four surface wipe samples (excluding field blanks) were collected in the 46 homes during this Phase I research and analyzed by TEM. One hundred thirty-four (55%) of these samples revealed detectable levels of asbestos while 38 (16%) of the total wipe samples collected revealed asbestos concentrations greater than the background surface concentration of 10,000 s/cm² adopted for this project. All 38 of these samples greater than the adopted background surface concentration were due to chrysotile contamination and were collected in 27 separate homes.

For surface wipe samples, in terms of individual asbestos structure counts reported by the laboratory, 585 structures were chrysotile (Figure 3). Three hundred thirty-four of these chrysotile structures were <5 μm and 251 were >5 μm long. Seventeen asbestos structures were amphiboles identified as Libby amphibole or actinolite/tremolite. Ten of these amphibole structures were <5 μm and seven of these structures were >5 μm in length.

Discussion

The information presented in this article was derived from Phase I of a larger research project. For the Phase I assessment described here, homes that revealed any air or surface sample above the clearance concentrations adopted for this project were cleaned and cleared (via air sampling) by an LAAC prior to participation in Phase II. Twenty-one homes required cleaning prior to Phase II.

Since the majority of the homes had VAI insulation containing amphibole asbestos, it is very likely that the insulation was derived from the Libby, Montana, Zonolite Mine. While it was difficult to make predictions for other homes, these data indicate that a high likelihood exists that vermiculite insulation, especially in Montana homes, contains asbestos.

In addition to the VAI, 18 separate homes contained ACM materials primarily associated with TSI found in basement areas.

Although 87% of homes contained asbestos-contaminated VAI and 39% of the homes contained other ACM, chrysotile asbestos (associated with ACM) was the primary type of asbestos detected in living space air and surface samples.

This is most likely associated with historic asbestos sources in the home that may have been replaced in remodeling projects (furnaces and ductwork with TSI, flooring materials, etc.), suggesting that chrysotile asbestos associated with residential commercial products may pose a greater potential exposure risk to home occupants than amphibole asbestos from VAI.

It is important to note, however, that although the homes were inspected for suspect ACM and bulk samples were obtained when identified, the composition of all historical construction materials was not accounted for. Homes may have contained external asbestos siding, flooring, etc., that was covered by newer materials. This may result in substantial underreporting of the ACM sources in each home. This hypothesis is strengthened by the observation that 60% of homes with detectable chrysotile in air samples and 56% of homes with detectable chrysotile in surface samples contained no sources of ACM identified through visual inspection and bulk sampling.

Asbestos was not detected in the majority (89.5%) of high-volume air samples and only one high-volume air sample revealed an asbestos concentration above the clearance concentration of 0.01 s/mL. These findings are similar to Ewing and co-authors' (2010) study, which reported low amphibole air concentrations in the attics and living spaces prior to disturbing VAI. As with our research, the air sampling conducted in Ewing and co-authors' study did not employ active sampling methods (disturb-

ing settled asbestos with high velocity air). It is crucial to note, however, that when vermiculite was disturbed during attic cleaning (Ewing et al., 2010), worker personal breathing zone exposures were nearly 1,000 times greater than the background concentrations collected prior to cleaning.

Living space contamination was most commonly detected via surface sampling, specifically surface wipe sampling. Fifty-five percent of the surface wipes revealed detectable concentrations of asbestos in 27 homes while only 17.2% of the micro-vacuum samples revealed detectable asbestos. Although micro-vacuum techniques are most commonly used by regulatory agencies to assess asbestos surface contamination, in our study, surface wipe sampling presented a greater sensitivity for detecting asbestos fibers in living spaces.

Our study had some limitations. The 46 homes that were sampled in this study were previously identified as containing VAI or ACM. Therefore, only asbestos-positive homes were considered for this project. In addition, home occupants were required to demonstrate low-income eligibility in order to participate in our study, resulting in economic bias. Additionally, all of the homes considered for this study were in Montana. Due to the geographical proximity of these homes to the former Libby, Montana, Zonolite Mine, a high likelihood exists that vermiculite in Montana homes was derived from the Libby mine. Because the Libby Zonolite Mine supplied over 70% of the world's vermicu-

lite, however, and since vermiculite processing facilities were located throughout the U.S., this limitation may be insignificant. As noted previously, only the asbestos content in suspect ACM, identified through visual inspection, was quantified; therefore, the historical presence of ACM in homes may be underestimated.

Conclusion

Baseline surface sampling revealed that the living spaces of the majority of homes in the study were contaminated with asbestos above acceptable background levels and the majority of participating homes with asbestos in either vermiculite or thermal system insulation required cleaning of contaminated surfaces before weatherization activities began in Phase II of the research. A high likelihood exists that VAI in Montana homes contains asbestos, but the potential for living space contamination associated with VAI was not found to be as substantial as the potential for living space contamination associated with other ACMs present in residential building materials. The presence of asbestos in the surface dust in the older homes evaluated in Phase I of this research presents an exposure risk to home residents and building contractors who disturb the asbestos-containing dust. ☹☹

Corresponding Author: Terry M. Spear, Professor, Safety, Health, and Industrial Hygiene Department, Montana Tech of the University of Montana, 1300 W. Park St., Butte, MT 59701. E-mail: tspear@mtech.edu.

References

- Adgate, J.L., Cho, S.J., Alexander, B.H., Ramachandran, G., Raleigh, K.K., Johnson, J., Messing, R.B., Williams, A.L., Kelly, J., & Pratt, G.C. (2011). Modeling community asbestos exposure near a vermiculite processing facility: Impact of human activities on cumulative exposure. *Journal of Exposure Science and Environmental Epidemiology*, 21(5), 529–535.
- American Society for Testing and Materials Standards. (2009). *D5755-09 standard test method for micro-vacuum sampling and indirect analysis of dust by transmission electron microscopy for asbestos structure number surface loading*. Retrieved from <http://www.astm.org/Standards/D5755.htm>
- American Society for Testing and Materials Standards. (2010). *D6480-05 Standard test method for wipe sampling of surfaces, indirect preparation, and analysis for asbestos structure number concentrations by transmission electron microscopy*. Retrieved from <http://www.astm.org/Standards/D6480.htm>
- Anderson, H.A., Lilis, R., Daum, S.M., & Selikoff, I.J. (1979). Asbestosis among household contacts of asbestos factory workers. *Annals of the New York Academy of Sciences*, 330, 387–400.
- Asbestos (U.S. Environmental Protection Agency), 40 CFR Part 763 (1987).
- Cowan, B.W. (1997, May). *Elevated asbestos exposures from a building demolition which contained vermiculite insulation*. Paper presented at the American Industrial Hygiene Association Conference and Exposition, Dallas.
- Dodson, R.F., & Hammar, S.P. (2006). *Asbestos: Risk assessment, epidemiology, and health effects* (pp. 5–18). Boca Raton, FL: Taylor and Francis Group.

References

- Epler, G.R., Fitz Gerald, M.X., Gaensler, E.A., & Carrington, C.B. (1980). Asbestos-related disease from household exposure. *Respiration*, 39(4), 229–240.
- Ewing, W.M., Hays, S.M., Hatfield, R., Longo, W.E., & Millette, J.R. (2010). Zonolite attic insulation exposure studies. *International Journal of Occupational and Environmental Health*, 16(3), 279–290.
- Gunter, M.E., Singleton, E., Bandli, B.R., Lowers, H.A., & Meeker, G.P. (2005). Differentiation of commercial vermiculite based on statistical analysis of bulk chemical data: Fingerprinting vermiculite from Libby, Montana USA. *American Mineralogist*, 90(4), 749–754.
- Kilburn, K.H., Lilis, R., Anderson, H.A., Boylen, T., Einstein, H.E., Johnson, S.J.S., & Warshaw, R. (1985). Asbestos disease in family contacts of shipyard workers. *American Journal of Public Health*, 75(6), 615–617.
- Kumaqai, S., Kurumatani, N., Tsuda, T, Yorifuji, T., & Suzuki, E. (2010). Increased risk of lung cancer mortality among residents near an asbestos product manufacturing plant. *International Journal of Occupational and Environmental Health*, 16(3), 268–278.
- Miller, A. (2005). Mesothelioma in household members of asbestos-exposed workers: 32 United States cases since 1990. *American Journal of Industrial Medicine*, 47(5), 458–462.
- Millette, J.R., & Hays, S.M. (1994). *Settled asbestos dust sampling and analysis* (pp. 59–65). Boca Roton, FL: Lewis Publishers.
- National Center for Appropriate Technology. (2010). *Montana asbestos-safe weatherization demonstration project—final report*. Retrieved from www.ncat.org/special/reach.php
- National Institute for Occupational Safety and Health. (1994). *Asbestos and other fibers by PCM: 7400* (4th ed.). Retrieved from <http://www.cdc.gov/niosh/nmam/pdfs/7400.pdf>
- National Institute for Occupational Safety and Health. (1995). *Report to congress on workers' home contamination study conducted under the Workers' Family Protection Act* (Publication No. 95-123). Cincinnati: Department of Health and Human Services.
- Pan, X.L., Day, H.W., Wang, W., Beckett, L.A., & Schenker, M.B. (2005). Residential proximity to naturally occurring asbestos and mesothelioma risk in California. *American Journal of Respiratory and Critical Care Medicine*, 172(8), 1019–1025.
- Pardee, J.T., & Larsen, E.S. (1929). Deposits of vermiculite and other minerals in the Rainy Creek District near Libby, Montana. *United States Geological Services Bulletin*, 805, 17–28.
- Peretz, A., Van Hee, V.C., Kramer, M.R., Pitlik, S., & Keifer, M.C. (2008). Pleural plaques related to “take-home” exposure to asbestos: An international case series. *International Journal of General Medicine*, 1, 15–20.
- Reid, A., Berry, G., de Klerk, N., Hansen, J., Heyworth, J., Ambrosini, G., Fritschi, L., Olsen, N., Merler, E., & Musk, A.W. (2007). Age and sex differences in malignant mesothelioma after residential exposure to blue asbestos (crocidolite). *Chest*, 131(2), 376–382.
- Sider, L., Holland, E.A., Davis, T.M., Jr., & Cugell, D.W. (1987). Changes on radiographs of wives of workers exposed to asbestos. *Radiology*, 164(4), 723–726.
- State of Montana Department of Quality Permitting and Compliance Division Waste and Underground 80 Tank Management Bureau Asbestos Control Program. (2005). *Montana asbestos work practices and procedures manual*. Helena, MT: Author.
- U.S. Environmental Protection Agency. (2003). *Final draft: Pilot study to estimate asbestos exposure from vermiculite attic insulation*. Springfield, VA: Versar.
- U.S. Environmental Protection Agency. (2004). *Research method for sampling and analysis of fibrous amphibole in vermiculite attic insulation* (U.S. EPA Doc. No. 600/R-04/004). Retrieved from <http://www.epa.gov/asbestos/pubs/vairesearchmethodfinal.pdf>
- U.S. Environmental Protection Agency. (2011a). *Additional frequent questions on vermiculite*. Retrieved from http://www.epa.gov/asbestos/pubs/verm_questions2.html
- U.S. Environmental Protection Agency. (2011b). *U.S. EPA's asbestos cleanup activities*. Retrieved from <http://www.epa.gov/region8/superfund/libby/cleanup.html>
- Whitehouse, A.C. (2004). Asbestos-related pleural disease due to tremolite associated with progressive loss of lung function: Serial observation in 123 miners, family members, and residents of Libby, Montana. *American Journal of Industrial Medicine*, 46(3), 219–225.
- Zalac, F. (2003, February 7). *Deadly dust*. The National, CBC News. Retrieved from <http://www.sterlingiaq.com/photos/1049134528.pdf>

GREAT
Benefit
for Sustaining Members

NEHA Sustaining Members can post their URLs on NEHA's Web site for FREE.

To take advantage of this benefit, please e-mail your organization's Web site address (URL) to staff@neha.org.

We'll do the rest! Reciprocal links are appreciated. To access the links on NEHA's Web site, simply visit us at neha.org and click on "Links."



Tattooing Regulations in U.S. States, 2011

Valeria P. Carlson, MPH, CHES
*Health Department Systems
 Development Branch
 Centers for Disease Control
 and Prevention*

Everett J. Lehman, MS, MBA
*National Institute for
 Occupational Safety and Health
 Centers for Disease Control
 and Prevention*

Myrna Armstrong, RN, EdD, FAAN
*Texas Tech University Health Sciences
 Center School of Nursing*

Abstract Tattooing's popularity has led to regulatory concerns because medical complications linked to unsanitary practices can have a lasting health impact. The authors' study sought to determine whether existing state tattooing laws and regulations (rules) effectively protect public health. A 10-item checklist was created for each of three types of rules (sanitation, training, and infection control) identified as having the greatest public health impact. State rules were classified as effective if the state scored ≥ 7 on all three categories, moderate if ≥ 4 in all three categories, minimal if < 4 in one or more categories, and ineffective if ≤ 2 in all three categories.

Forty-one states have at least one state statute regulating tattooing practice. On the basis of the authors' study criteria, 36 states regulate sanitation effectively; 15 states regulate training effectively; and 26 states regulate infection control effectively. Fourteen states meet the criteria for regulating all three categories effectively. Specific rules vary substantially by state. Public health agencies should encourage states to adopt and enforce effective, evidence-based tattooing rules.

Introduction

Humans have been decorating their bodies to express religious beliefs, cultural values, and personal aesthetics for thousands of years. Although initially less common in Europe and the U.S., the past 200 years have seen major shifts in tattooing: the electric tattoo machine,

polymer-based pigments, and ease of access to equipment have led to tattoo shops becoming common throughout the Western world. The history and technical practice of tattooing have been described in detail elsewhere (Goldstein, 2007; Sperry, 1991, 1992) and are outside the scope of this article.

The majority of legally acquired tattoos are done by using a vertical vibrating electric tattoo machine and pigments purchased or created for the purpose. The design of a tattoo is limited only by the artist's imagination and the client's willingness to submit to the procedure, and millions of U.S. residents have gotten tattoos. This article examines existing state laws and regulations and focuses on standards protecting the health and safety of clients during tattooing procedures to determine whether tattooing practice is effectively regulated across the U.S.

Studies rarely have assessed the prevalence of tattooing among U.S. residents and populations are often not comparable. In the U.S., estimates among different populations vary widely, from 18% among patients at a spinal clinic in 1991 and 1992 (Haley & Fischer, 2001), to 36% among military recruits in the late 1990s (Armstrong, Murphy, Sallee, & Watson, 2000), and 23% among college undergraduates in 2001 and 2006 (Mayers & Chiffriller, 2007; Mayers, Judelson, Moriarty, & Rundell, 2002).

In 2003, an online poll by Harris Interactive concluded that the prevalence of tattooing among all U.S. adults is 16%, with substantially higher prevalence rates among certain age cohorts (Sever, 2003). In 2006, the Pew Research Foundation estimated that 36% of all U.S. adults aged 18–25 years and

40% aged 26–40 years had tattoos (Pew Research Center for the People and the Press, 2006). The same year, a random-digit-dialed survey of 500 U.S.-resident men and women aged 18–50 years found a 24% prevalence of tattoos (Laumann & Derick, 2006). By combining 2008 U.S. Census population estimates (U.S. Census, 2009) with available data on tattoo prevalence, at least 40 million U.S. residents have one or more tattoos and have been at risk for a tattoo-associated medical complication during their lifetime.

Complications of tattooing include infections transmitted during unsanitary tattoo procedures, allergies or adverse reactions to tattoo pigment, and coincidental lesions that appear on the skin surface covered by a tattoo but are not caused by the tattoo procedure (Jacob, 2002). Although no reliable estimates exist for the frequency with which complications of tattooing procedures occur, the risk of adverse effects can still be reduced by ensuring sanitary shops and equipment, comprehensive training of artists, and strong infection control practices (Armstrong, 2005; Armstrong & Fell, 2000; Armstrong & Kelly, 2001).

The most commonly identified complication of getting a tattoo is infection during healing (Antoszewski, Sitek, Jedrzejczak, Kasielska, & Kruk-Jeromin, 2006; Greif, Hewitt, & Armstrong, 1999). Potential transmission of bloodborne or dermatologic pathogens is possible if the tattoo needle or skin surface is not sterilized; many studies have documented infectious disease transmission during tattoo procedures (e.g., leprosy [Ghorpade, 2002], ringworm [Brancaccio, Berstein, Fisher, & Shalita, 1981], hepatitis [Nishioka & Gyorkos, 2001], and warts [Ragland, Hubbell, Stewart, & Nesbitt, 1994]). Extensive review of the infectious disease complications associated with tattooing is available in Armstrong and Kelly (2001), Kazandjeva and Tsankov (2007), and Papameletiou and co-authors (2003).

Adverse reactions to almost every color and type of tattoo pigment have been reported as isolated case studies in the scientific literature (Ashinoff, Levine, & Soter, 1995; Bjornberg, 1963; Bonnell & Russel, 1956; Duke, Urioste, Dover, & Anderson, 1998; Gallo, Parodi, Cozzani, & Guarrera, 1998; Loewenthal, 1960; Nguyen & Allen, 1979). Although tattoo pigments are considered to be cosmetics in the U.S. and should require

approval under the Food, Drug, and Cosmetic Act of 1938, pigments are approved for topical use only, and studies testing their safety for intradermal use have not been completed (Armstrong & Fell, 2000; U.S. Food and Drug Administration, 2009). National and international studies on the exact chemical composition of tattoo pigments have yielded inconclusive assessments of the long-term effects of intradermal placement, and further research is needed (Engel et al., 2008; Lundsgaard, 2002; Papameletiou et al., 2003). A discussion of the specific research needed, however, is outside the scope of this article.

Medical case reports documenting noninfectious tattoo-associated illnesses and dermatologic complications are uncommon, but do exist (e.g., skin papules [Kluger, Muller, & Gral, 2008; Lubeck & Epstein, 1952], malignant melanoma [Kircik, Armus, & Vandebroek, 1993; Kirsch, 1969], and pseudolymphoma [Kahofer, El Shabrawi-Caelen, Horn, Kern, & Smolle, 2003]). Isolated case reports also exist of ferromagnetic tattoo pigments causing complications for patients undergoing magnetic resonance imaging (Kreidstein, Giguere, & Freiberg, 1997; Wagle & Smith, 2000), although other research has questioned this premise (Tope & Shellock, 2002).

States have regulated tattooing for decades in an attempt to address public health concerns. In 1978, Maine became the first state to regulate tattooing (Braithwaite, Stephens, Sterk, & Braithwaite, 1999). Stauter (1988, 1989) reported that 19 states regulated tattooing in some way, including three that banned the practice altogether (Mississippi, Oklahoma, and South Carolina). Six years later, Tope (1995) reported that 29 states were regulating tattooing, including seven banning the practice (Connecticut, Florida, Indiana, Massachusetts, Oklahoma, South Carolina, and Vermont).

No clear guidance existed for states developing tattoo regulations until NEHA published *Body Art: A Comprehensive Guidebook and Model Code* (NEHA, 1999). The model code was written by an interdisciplinary collaboration of stakeholders, including university faculty members, public health professionals, medical doctors, representatives of professional organizations, environmental health professionals, and body art practitioners. The model

code provided detailed guidelines and recommended regulations on two of the three areas that are deemed as having the most public health impact—sanitation and infection control. Artist training was addressed by NEHA by specifying that artists should have training in sterilization procedures, anatomy, and infection control.

In 2005, Armstrong published a comprehensive review of body art regulations enacted through September 20, 2003, which reported that 39 states (78%) had body art legislation in place (Armstrong, 2005). Armstrong's 2005 article concluded with a call for comprehensive, strongly enforced body art regulations. This call was echoed internationally by Noah (2006) and by Vasold and co-authors (2008). Given that persons who want a tattoo are likely to obtain one regardless of the safety considerations or costs (Armstrong & Murphy, 1997), ensuring that existing regulations support safe tattooing practices and that health inspectors enforce those regulations effectively are important public health concerns.

Methods

Tattooing laws and regulations were downloaded from state legislatures' and enforcing agencies' Internet sites March 1–May 31, 2011; only laws and regulations enacted at the state level were included in this analysis (Table 1). To quantify the existing laws and regulations and make a standardized determination of the quality and strengths of each state's rules governing tattooing, a 10-item checklist was created for each of the three types of rules (sanitation, training, and infection control) with the greatest public health impact as identified by Armstrong's three papers (Armstrong, 2005; Armstrong & Fell, 2000; Armstrong & Kelly, 2001) (Table 2). The 30 items were chosen on the basis of a literature review, items included in the NEHA model code, initial review of state laws and regulations, and the researchers' knowledge of tattooing practice and infection control.

Categories were scored independently. A state's laws and regulations were classified as effectively regulated if they scored ≥ 7 on all three categories, moderately regulated if they scored ≥ 4 in all three categories, and minimally regulated if they scored < 4 in one or more categories. A state was classified as ineffectively regulated if it scored ≤ 2 in all three categories.

TABLE 1

Internet Addresses for State Tattooing Laws and Regulations

State	URL
Alabama	http://www.legislature.state.al.us/codeofAlabama/1975/22-17A-3.htm and http://www.adph.org/foodsafety/Default.asp?id=1138
Alaska	http://www.dec.alaska.gov/eh/fss/Public_Facilities/Body_Art_Home.html
Arizona	No state laws enacted; body art regulated at the county level only
Arkansas	http://www.healthy.arkansas.gov/programsServices/environmentalHealth/tattooBodyArt/Pages/default.aspx and http://www.healthy.arkansas.gov/aboutADH/RulesRegs/Tattoos.pdf
California	No state laws enacted; body art regulated at the county level only
Colorado	http://www.colorado.gov/oed/industry-license/337IndDetail.html and http://www.cdph.state.co.us/regulations/consumer/101022bodyartreg.pdf
Connecticut	http://www.ct.gov/dph/lib/dph/practitioner_licensing_and_investigations/plis/tatoo/tattoo_info.pdf
Delaware	http://dhss.delaware.gov/dhss/dph/hsp/files/bodyartregs.pdf and http://dhss.delaware.gov/dhss/dph/hsp/bodyart.html
Florida	http://www.doh.state.fl.us/Environment/community/Tattoo/index.html
Georgia	No permanent Internet link; state laws and regulations: Title 31 (Health), Chapter 40 (Tattoo Studios)
Hawaii	http://oeqc.doh.hawaii.gov/sites/har/AdmRules/11-17.pdf
Idaho	http://legislature.idaho.gov/idstat/Title18/T18CH15SECT18-1523.htm
Illinois	http://www.idph.state.il.us/rulesregs/2009_Rules/Adopted/77_IAC_797_1-9.pdf
Indiana	http://www.in.gov/legislative/iac/T04100/A00010.PDF (p. 89)
Iowa	http://www.idph.state.ia.us/eh/tattoo.asp and http://www.idph.state.ia.us/eh/common/pdf/tattoo/chapter_135.pdf and http://search.legis.state.ia.us/NXT/gateway.dll/ar/iac/6410_public%20health%20department%205b641_5d/0220_chapter%2022%20practice%20of%20tattooing/_c_6410_0220.xml?f=templates\$fn=default.htm
Kansas	http://www.kansas.gov/kboc/StatsandRegs.htm#tatoowlaws
Kentucky	http://chfs.ky.gov/dph/info/phps/tattoo.htm
Louisiana	http://dhh.louisiana.gov/index.cfm/page/622
Maine	http://www.maine.gov/sos/cec/rules/10/chaps10.htm (Chapter 210)
Maryland	No state laws and regulations other than Chapter 25, section 256, authorizing a single county in the state to establish tattoo/body piercing regulations in that county
Massachusetts	No state laws enacted; body art regulated at the city or town level only
Michigan	http://www.legislature.mi.gov/(S(u215f255enju5n2kxejuko45))/mileg.aspx?page=getobject&objectname=mcl-333-13101 through section 13112
Minnesota	http://www.health.state.mn.us/divs/hpsc/hop/tattoo/brochure.html and https://www.revisor.mn.gov/laws?id=317&doctype=chapter&year=2010&type=0

State	URL
Mississippi	http://www.msdh.state.ms.us/msdhsite/index.cfm/30,880,82.pdf/TattooBodyPiercingRegs.pdf
Missouri	http://www.sos.mo.gov/adrules/csr/current/20csr/20csr.asp#20-2267
Montana	http://www.mtrules.org/gateway/ChapterHome.asp?Chapter=37.112
Nebraska	http://nebraskalegislature.gov/laws/browse-chapters.php?chapter=38 sections 1007, 1053, 1054, 1060–1071
Nevada	http://health.nv.gov/BFHS_EHS_FAQs.htm (See the frequently asked questions regarding regulation of tattoo parlors.)
New Hampshire	http://www.gencourt.state.nh.us/rsa/html/xxx/314-a/314-a-mrg.htm and http://www.dhhs.nh.gov/oos/blc/bodyart/documents/bodyartrules.pdf
New Jersey	http://www.state.nj.us/health/eoh/phss/bodyart.pdf
New Mexico	http://www.nmcpr.state.nm.us/nmac/parts/title16/16.036.0001.htm through 16.036.0006
New York	http://www.health.state.ny.us/community/body_art/article_4a.htm and http://www.nyhealth.gov/community/body_art/
North Carolina	http://www.ncga.state.nc.us/enactedlegislation/statutes/pdf/bysection/Chapter_130a/gs_130a-283.pdf
North Dakota	http://www.legis.nd.gov/information/acdata/html/.%5Cpdf%5C33-41-01.pdf
Ohio	http://codes.ohio.gov/oac/3701-9 and http://codes.ohio.gov/orc/3730
Oklahoma	http://www.ok.gov/health/Protective_Health/Consumer_Protection_Division/Body_Piercing_and_Tattooing/
Oregon	http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_331/331_tofc.html (Division 915) and http://www.leg.state.or.us/ors/690.html and http://www.oregon.gov/OHLA/BAP/Tattoo_Arts_Licensure.shtml
Pennsylvania	No state laws enacted
Rhode Island	http://www2.sec.state.ri.us/dar/regdocs/released/pdf/DOH/4857.pdf
South Carolina	http://www.scdhec.gov/administration/regs/docs/61-111.pdf
South Dakota	http://legis.state.sd.us/rules/DisplayRule.aspx?Rule=44:12:01
Tennessee	http://tennessee.gov/sos/rules/1200/1200-23/1200-23-03.pdf
Texas	http://info.sos.state.tx.us/pls/pub/readtac\$ext.ViewTAC?tac_view=5&ti=25&pt=1&ch=229&sch=V&rl=Y and http://www.statutes.legis.state.tx.us/Docs/HS/htm/HS.146.htm
Utah	No state laws enacted
Vermont	http://www.leg.state.vt.us/statutes/fullchapter.cfm?Title=26&Chapter=079 and http://vtprofessionals.org/opr1/tattooists_piercers/rules/TAT_Rules.pdf
Virginia	http://www.dpor.virginia.gov/dporweb/tat_regs.pdf
Washington	http://www.dol.wa.gov/business/tattoo/laws.html
West Virginia	http://www.wvdhhr.org/phs/forms/16-38_Tattoo_Studio_Business.pdf
Wisconsin	http://www.legis.state.wi.us/rsb/code/dhs/dhs173.pdf
Wyoming	No state laws enacted

Note. All links confirmed live April 23, 2012. Some rules and regulations listed here have been updated since this research was completed.

TABLE 2

Checklist Items for States' Tattoo Laws and Regulations and Total Number of States That Address Each Item

Sanitary Standards of Working Environment	#	Training and Licensure of Artist and Workspace	#	Infection Control	#
Sharps disposal regulations specified or referenced	36	Artist must attend accredited bloodborne pathogens course	30	Detailed procedures for when and how to reglove specified	35
Health inspector must inspect tattoo shops (any schedule; range from once when shop opens, to annually, to every three months)	36	Artist must be cardiopulmonary resuscitation (CPR)-certified	8	Regulations require single-use items only, or shop must have sterilization capacity	37
Consumption of goods (food, drink, cigarettes) prohibited in procedural areas of tattoo shop	32	Artist must have first aid certification	19	Artists must have proof of hepatitis B vaccination, or immunity, or decline vaccination in writing	14
Biohazardous waste disposal regulations specified or referenced	37	Artist must have training in anatomy and physiology	17	Client must complete a medical history form disclosing selected risk factors	23
Physical restrictions on material for walls, floors, countertops, and other areas	36	Artist must have training in sanitation/sterilization procedures	25	Artist must report complications of procedures (that they become aware of) to public health authorities	14
Specifications for bathroom and other sanitary facilities	36	Artist must have training in local tattooing laws	16	Client's skin surface must appear healthy (i.e., no boils, rashes, or lesions)	31
Procedural areas must be separated from living areas by physical barrier (e.g., closed door or wall), or tattoo shops may not operate in residential buildings at all	34	Artist must complete an apprenticeship (any >300 hours assumed to include training on bloodborne pathogens, first aid, anatomy and physiology, sanitation/sterilization, and local tattooing regulations; range 360–4,500 hours)	14	Emergency procedures of any type are specified in regulations (i.e., first aid kit onsite, eyewash stations, evacuation routes, needlestick procedures)	12
Penalties specified for violations of regulations identified during inspections or reported to regulatory department by customers	36	Continuing education credits required (e.g., renewal of CPR or bloodborne pathogens training periodically)	16	Artist may not work if he or she is suffering from any kind of infection or transmissible illness (e.g., rash on hands, respiratory infection)	27
Specifications for workspace quality (i.e., ventilation standards, lighting minimums)	31	Artist must be licensed to practice	32	Aftercare instructions must be posted in tattoo shop or provided to all clients	32
Vermin must be excluded from tattoo shops	27	Facility must be licensed to operate	34	Autoclave must be spore-tested periodically (range weekly–quarterly)	34

Note. Only state-level regulations were examined during this research.

Results

Forty-one states have at least one statute in place regulating tattooing. The remaining nine states delegate all tattooing regulation to the local level, and individual jurisdictions within those states may not have adopted tattooing regulations. Fourteen states (28%) scored ≥ 7 in all three categories, meeting the definition of having effective laws and regulations; residents of the 14 states account for only 20% of the U.S. adult population. The highest scoring states were South Carolina and Oklahoma, each of which met 29/30 total checklist criteria. The other extensively regulated states are Alabama, Alaska, Arkansas, Kansas, Minnesota, Missouri, New Jersey, New Mexico, Oregon, Tennessee, Virginia, and Vermont (Figure 1). Nine states (20% of the U.S.

adult population) regulate tattooing moderately (≥ 4 on all three checklist categories), and 14 states (19% of the U.S. adult population) regulate tattooing minimally (< 4 in one or more checklist categories). Thirteen states (41% of the U.S. adult population) regulate tattooing ineffectively at the state level (≤ 2 in all three categories), and 9/15 ineffectively regulated states scored 0 in all three categories.

Thirty-six states regulate sanitary standards of tattooing facilities effectively (checklist score ≥ 7). Fifteen states regulate training and licensure effectively, and 26 regulate infection control effectively. The median scores were 9/10 for sanitation, 3/10 for training, and 7/10 for infection control; the overall median score was 20/30 (Table 2).

In 2006, Oklahoma became the last state to legalize tattooing. During January 2006–May 2011, a total of 25 states updated or reviewed their tattooing laws; in March 2011, a total of 10 states had body art laws being debated before their legislature. Although certain states have both updated existing laws and attempted to pass new laws, a total of 29 states (58%) changed or attempted to change their tattooing regulations during the five-year period examined in our study.

Thirty-one states depend on public health departments to write and enforce tattooing regulations, including performing inspections and issuing licenses. Eleven of those states can delegate enforcement of regulations to local health departments, and the remaining 20 have enforcement personnel at the state level. Eleven states have not

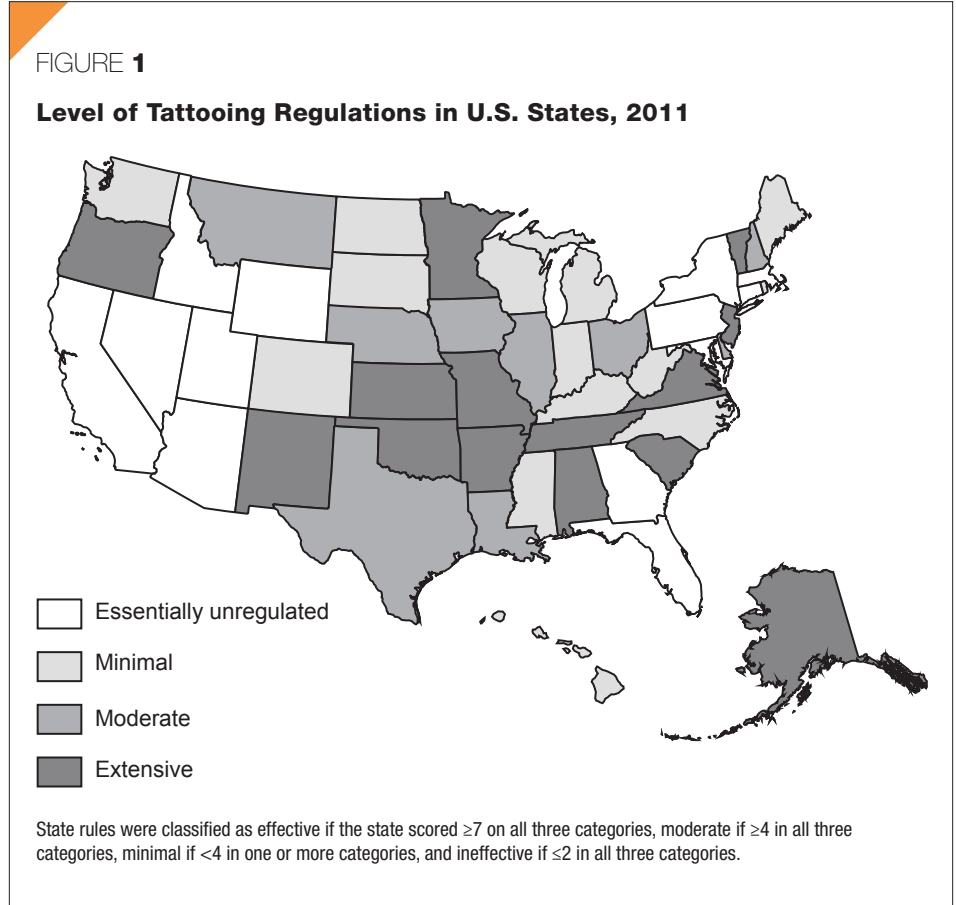
identified a responsible agency to regulate tattooing at the state level, although local jurisdictions can enact and enforce their own rules. Three states regulate tattooing through a state board or commission outside of public health (e.g., a board of medicine or a board of cosmetologists) and two states use the state environmental agency. Three states regulate tattooing through their labor or business licensing bureaus.

Discussion

Our study examined state laws and regulations in the context of their ability to protect public health by assessing regulations addressing sanitation, artist training, and infection control. Findings indicate that tattoo laws and regulations vary widely by state and 72% of states do not effectively regulate all three categories assessed in our study. On the basis of our study's criteria, only 20% of the U.S. adult population lives in a state with extensive rules that protect a client's health during tattoo procedures. Regulations change often, and they do not always focus on tattooing practices that have the most effect on protecting public health. For example, Ohio has an extensive list of how to determine fee schedules for tattoo shop permits; however, fee schedule requirements are unrelated to safe tattooing practices. The following sections highlight a few examples of laws and regulations in different states and demonstrate the wide variation in standards.

Sanitation

Sanitation is the most commonly and consistently regulated area of tattoo practice that affects public health. Perhaps public health agencies find drafting tattoo regulations that are grounded in other environmental health competencies (e.g., housing codes and restaurant regulations) easier than creating new, profession-specific rules. Comprehensive sanitation regulations noted during our research include regularly scheduled inspections (e.g., Tennessee's requirement that body art facilities be inspected every 90 days). South Dakota's regulations detail the minimum square footage and lighting standards for tattoo shops, and Mississippi requires that all flat surfaces including floors, walls, ceilings, and countertops be easy to clean as an aid to maintaining a sanitary environment. Alabama has detailed



regulations for the disposal of sharps and biohazardous material from tattoo facilities that are more stringent than biohazardous materials disposal regulations enacted by the federal government.

Certain states (e.g., New Jersey and South Carolina) use additional rules or statutes to regulate the sanitary conditions of businesses (e.g., building, fire, or plumbing codes). Tattoo shops might be required to comply with these codes even in states that essentially have no tattooing regulations. Our research focused only on the regulations specifically covering tattoo shops, and other standards for construction and maintenance of businesses were not analyzed.

Training and Licensing

Training was the least commonly and least consistently regulated of the three topics examined in our study. Certain states require no training before a tattoo artist obtains a license, whereas other states require a comprehensive apprenticeship under a licensed practitioner. The longest apprenticeship

specified in any tattooing regulations is New Hampshire's requirement that an artist seeking a new license must provide proof of apprenticeship and experience equaling three years of employment at 1,500 hours/year. Oregon is the only state in which the department of education licenses tattooing schools (as special career schools); Oregon also requires that all prospective tattoo artists pass a standardized exam before licensure, and the apprenticeship must be repeated if the applicant fails the exam three times. Kansas is the only state to include basic color theory and design as subject requirements for a tattoo apprentice, in addition to such traditional topics as first aid, bloodborne pathogens, business operations, and local tattooing laws. New Mexico's law includes a comprehensive list of subjects that a tattoo apprenticeship must address in its curriculum.

Infection Control

Infection control practices are regulated more strongly than training standards but less strongly than sanitation. The single

most commonly regulated practice on the 30-item checklist was regarding infection control (i.e., the requirement for using sterilized or single-use-only equipment during all tattooing procedures). The least commonly regulated practice on the 30-item checklist also was related to infection control: whether emergency procedures (of any type, from fire evacuation signage to blood exposure protocols) were specified in the laws or regulations. Vermont's regulations list detailed procedures for responding to blood spills and other biohazardous exposures, and tattoo shops in New Jersey must have a first aid kit and an eyewash station on site. Delaware's regulations have specific language regarding hepatitis B vaccinations or refusal thereof before an artist can practice, and Rhode Island has detailed rules covering the sterility of equipment and maintenance of the autoclave. South Carolina requires that tattoo shops enter into an agreement with the local fire station regarding response to emergencies before the shop can open.

Needed Regulations and Future Directions

Sanitation standards are the easiest for states to write and enforce, because they can be modeled after other public health measures. Inspections by environmental health professionals at least annually can contribute to protecting public health by ensuring safe, sanitary premises for tattoo shops.

Training standards are costly in terms of human and financial resources and thus the most difficult to create and enforce because of the specialized knowledge required. States rarely require comprehensive apprenticeship programs. Standardized examinations for licensure and continuing education requirements can also serve to protect public health by ensuring a cadre of knowledgeable artists that understand the importance of strict sanitary and infection control regulations.

Infection control standards are possibly the most important way to protect public health during tattoo procedures because of the potential for exposure to bloodborne pathogens. In addition, data regarding adverse reactions to pigments and medical complications of procedures are essential for collating epidemiologic data and developing educational materials for both clients

and artists. Our study did not assess the relationship between tattoo procedures and the risk of acquiring infections, because the data are not available in published literature. State-level tattooing laws that incorporate requirements for reporting adverse reactions to the public health department, whether infectious or allergic, can contribute to knowledge of complications in this field and will allow future research to assess the link between tattooing and adverse health outcomes.

One limitation of our study is that local tattoo regulations were not analyzed. No adequate estimate of the number of localities responsible for regulating tattooing in the U.S. exists, and local health departments responsible for regulation might not have adopted rules for doing so. Additionally, local regulations may not be available electronically.

Areas of regulation that were not examined in our study because they have less impact on clients' or artists' health include the fee structure for licenses and permits, penalties for violating regulations and legal recourse for appeal, tattooing of minors, use of alcohol and drugs during procedures, and licensing renewal schedules. Additional research might quantify the effectiveness of a state's regulations on the basis of these factors as a way to confirm the findings of our study (see Sidebar).

Conclusion

Tattoo regulations are shifting rapidly across the U.S. When our research was initially conducted in 2009, only nine states met the definition of being extensively regulated; by the time our analysis was redone in 2011, five additional states had passed statutes that met the criteria for extensive regulation. It is interesting that the shift in tattoo regulations seems to be extreme: that is, states that met the definition for "essentially unregulated" in 2009 have moved into the "moderate" or "extensive" categories, and states that minimally regulated tattooing in 2009 have not updated their regulations as of May 2011.

NEHA's publication on body art is more than 10 years old but is still the most pertinent and comprehensive source on the topic that we have identified. Periodic updates of the model code, led by such a nationally recognized leader in environmental health as NEHA, are essential to promoting high

Suggested Topics for Future Research on the Health Risks of Tattooing

- Obtaining an accurate estimate of the population at risk and frequency/type of complications
- Assessing the long-term safety of inks and pigments as intradermal cosmetics
- Determining if there is public health danger of unlicensed, unregulated (illegal or off-the-grid) shops
- Determining the feasibility of developing a standardized national curriculum for training tattoo artists
- Enumerating and evaluating locally enacted tattooing regulations in the U.S.
- Evaluating the actual enforcement of existing state and local regulations (vs. regulatory ideals)
- Reviewing and evaluating other types of regulations governing tattooing, such as fee schedules, license renewal, tattooing of minors, and penalties for violating regulations

standards for sanitation, training, and infection control during tattoo procedures. Public health professionals at all levels of practice should continue to use this valuable resource as a guide when developing or updating tattooing regulations until a newer version becomes available.

Further research remains to be done on enforcement of tattoo regulations at state and local levels. Our study did not test whether requirements for inspections and enforcement of sanitary codes are being met by state and local health departments, but only whether the laws and regulations exist and what the general standards are. Our study also did not address the potential public health dangers in getting a tattoo at an unlicensed shop because of the complexities of defining what is illegal or amateur on a state level.

Tattooing is a common type of self-expression in today's society, and yet it can be a risky practice if it is not done in a safe and sanitary

manner. Comprehensive, evidence-based regulation of tattooing practice, equipment, and artist training are needed to protect the public's health. Standards for sanitary practice of tattooing should continue to be reviewed periodically and enforced regularly by state public health agencies to reduce the risk of dangerous complications, including postprocedure

infection, allergic reactions, and bloodborne pathogen transmission. 🦠

Disclaimer: The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Corresponding Author: Valeria Carlson, Public Health Advisor, Office for State, Tribal, Local, and Territorial Support, Division of Public Health Performance Improvement, Health Department Systems Development Branch, Centers for Disease Control and Prevention, 4770 Buford Highway, MS E-70, Atlanta, GA 30341. E-mail: guz6@cdc.gov.

References

- Antoszewski, B., Sitek, A., Jedrzejczak, M., Kasielska, A., & Kruk-Jeromin, J. (2006). Are body piercing and tattooing safe fashions? *European Journal of Dermatology*, 16(5), 572–575.
- Armstrong, M.L. (2005). Tattooing, body piercing, and permanent cosmetics: A historical and current view of state regulations, with continuing concerns. *Journal of Environmental Health*, 67(8), 38–43, 54, 53.
- Armstrong, M.L., & Fell, P.R. (2000). Body art: Regulatory issues and the NEHA body art model code. *Journal of Environmental Health*, 62(9), 25–30.
- Armstrong, M.L., & Kelly, L. (2001). Tattooing, body piercing, and branding are on the rise: Perspectives for school nurses. *Journal of School Nursing*, 17(1), 12–23.
- Armstrong, M.L., & Murphy, K.P. (1997). Tattooing: Another adolescent risk behavior warranting health education. *Applied Nursing Research*, 10(4), 181–189.
- Armstrong, M.L., Murphy, K.P., Sallee, A., & Watson, M.G. (2000). Tattooed army soldiers: Examining the incidence, behavior, and risk. *Military Medicine*, 165(2), 135–141.
- Ashinoff, R., Levine, V.J., & Soter, N.A. (1995). Allergic reactions to tattoo pigment after laser treatment. *Dermatologic Surgery*, 21(4), 291–294.
- Bjornberg, A. (1963). Reactions to light in yellow tattoos from cadmium sulfide. *Archives of Dermatology*, 88, 267–271.
- Bonnell, J.A., & Russel, B. (1956). Skin reactions at site of green and red tattoo marks. *Proceedings of the Royal Society of Medicine*, 49(10), 823–825.
- Braithwaite, R.L., Stephens, T., Sterk, C., & Braithwaite, K. (1999). Risks associated with tattooing and body piercing. *Journal of Public Health Policy*, 20(4), 459–470.
- Brancaccio, R.R., Berstein, M., Fisher, A.A., & Shalita, A.R. (1981). Tinea in tattoos. *Cutis*, 28(5), 541–542.
- Duke, D., Urioste, S.S., Dover, J.S., & Anderson, R.R. (1998). A reaction to a red lip cosmetic tattoo. *Journal of the American Academy of Dermatology*, 39(3), 488–490.
- Engel, E., Santarelli, F., Vasold, R., Maisch, T., Ulrich, H., Prantl, L., König, B., Landthaler, M., & Bäuml, W. (2008). Modern tattoos cause high concentrations of hazardous pigments in skin. *Contact Dermatitis*, 58(4), 228–233.
- Gallo, R., Parodi, A., Cozzani, E., & Guarrera, M. (1998). Allergic reaction to India ink in a black tattoo. *Contact Dermatitis*, 38(6), 346–347.
- Ghorpade, A. (2002). Inoculation (tattoo) leprosy: A report of 31 cases. *Journal of the European Academy of Dermatology and Venereology*, 16(5), 494–499.
- Goldstein, N. (2007). Tattoos defined. *Clinics in Dermatology*, 25(4), 417–420.
- Greif, J., Hewitt, W., & Armstrong, M.L. (1999). Tattooing and body piercing: Body art practices among college students. *Clinical Nursing Research*, 8(4), 368–385.
- Haley, R.W., & Fischer, R.P. (2001). Commercial tattooing as a potentially important source of hepatitis C infection—clinical epidemiology of 626 consecutive patients unaware of their hepatitis C serologic status. *Medicine*, 80(2), 134–151.
- Jacob, C.I. (2002). Tattoo-associated dermatoses: A case report and review of the literature. *Dermatologic Surgery*, 28(10), 962–965.
- Kahofer, P., El Shabrawi-Caelen, L., Horn, M., Kern, T., & Smolle, J. (2003). Pseudolymphoma occurring in a tattoo. *European Journal of Dermatology*, 13(2), 209–212.
- Kazandjieva, J., & Tsankov, N. (2007). Tattoos: Dermatological complications. *Clinics in Dermatology*, 25(4), 375–382.
- Kircik, L., Armus, S., & Vandenbroek, H. (1993). Malignant-melanoma in a tattoo. *International Journal of Dermatology*, 32(4), 297–298.
- Kirsch, N. (1969). Malignant melanoma developing in a tattoo. *Archives of Dermatology*, 99(5), 596–598.
- Kluger, N., Muller, C., & Gral, N. (2008). Atypical mycobacteria infection following tattooing: Review of an outbreak in 8 patients in a French tattoo parlor. *Archives of Dermatology*, 144(7), 941–942.
- Kreidstein, M.L., Giguere, D., & Freiberg, A. (1997). MRI interaction with tattoo pigments: Case report, pathophysiology, and management. *Plastic and Reconstructive Surgery*, 99(6), 1717–1720.
- Laumann, A.E., & Derick, A.J. (2006). Tattoos and body piercings in the United States: A national data set. *Journal of the American Academy of Dermatology*, 55(3), 413–421.
- Loewenthal, L.J. (1960). Reactions in green tattoos: The significance of the valence state of chromium. *Archives of Dermatology*, 82, 237–243.

References

- Lubeck, G., & Epstein, E. (1952). Complications of tattooing. *California Medicine*, 73(2), 83–85.
- Lundsgaard, J. (2002). *Investigation of pigments in tattoo colors*. Copenhagen: Danish Ministry of the Environment.
- Mayers, L., & Chiffrieller, S. (2007). Sequential survey of body piercing and tattooing prevalence and medical complication incidence among college students. *Archives of Pediatrics & Adolescent Medicine*, 161(12), 1219–1220.
- Mayers, L.B., Judelson, D.A., Moriarty, B.W., & Rundell, K.W. (2002). Prevalence of body art (body piercing and tattooing) in university undergraduates and incidence of medical complications. *Mayo Clinic Proceedings*, 77(1), 29–34.
- National Environmental Health Association. (1999). *Body art: A comprehensive guidebook and model code*. Denver, CO: Author.
- Nguyen, L.Q., & Allen, H.B. (1979). Reactions to manganese and cadmium in tattoos. *Cutis*, 23(1), 71–72.
- Nishioka, S.A., & Gyorkos, T.W. (2001). Tattoos as risk factors for transfusion-transmitted diseases. *International Journal of Infectious Diseases*, 5(1), 27–34.
- Noah, N. (2006). Tattooing and piercing—the need for guidelines in the European Union. *Eurosurveillance*, 11(1), 589.
- Papameletiou, D., Zenie, A., Schwela, D., & Baumler, W. (2003). *Risks and health effects from tattoos, body piercing, and related practices*. Ipsra, Cyprus: Joint Research Commission of the European Union.
- Pew Research Center for the People and the Press. (2006). *How young people view their lives, futures, and politics: A portrait of "Generation Next."* Washington, DC: Author.
- Ragland, H.P., Hubbell, C., Stewart, K.R., & Nesbitt, L.T., Jr. (1994). *Verruca vulgaris* inoculated during tattoo placement. *International Journal of Dermatology*, 33(11), 796–797.
- Sever, J.M. (2003). *Harris interactive poll #58: A third of Americans with tattoos say they make them feel more sexy*. Retrieved from <http://www.harrisinteractive.com/vaultHarris-Interactive-Poll-Research-A-Third-of-Americans-With-Tattoos-Say-They-Make-Them-Feel-More-Sexy-2003-10.pdf>
- Sperry, K. (1991). Tattoos and tattooing. Part I: History and methodology. *American Journal of Forensic Medicine and Pathology*, 12(4), 313–319.
- Sperry, K. (1992). Tattoos and tattooing. Part II: Gross pathology, histopathology, medical complications, and applications. *American Journal of Forensic Medicine and Pathology*, 13(1), 7–17.
- Stauter, R.L. (1988). Tattooing: The protection of the public health. *Health Matrix*, 6(2), 51–59.
- Stauter, R.L. (1989). Laws regulating tattooing. *American Journal of Public Health*, 79(9), 1308–1309.
- Tope, W.D. (1995). State and territorial regulation of tattooing in the United States. *Journal of the American Academy of Dermatology*, 32(5), 791–799.
- Tope, W.D., & Shellock, F.G. (2002). Magnetic resonance imaging and permanent cosmetics (tattoos): Survey of complications and adverse events. *Journal of Magnetic Resonance Imaging*, 15(2), 180–184.
- U.S. Census. (2009). *Population tables, age and sex finder*. Retrieved from <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>
- U.S. Food and Drug Administration. (2009). *Tattoos and permanent makeup*. Retrieved from <http://www.fda.gov/Cosmetics/ProductandIngredientSafety/ProductInformation/ucm108530.htm>
- Vasold, R., Engel, E., Konig, B., Landthaler, M., & Baumler, W. (2008). Health risks of tattoo colors. *Analytical and Bioanalytical Chemistry*, 391(1), 9–13.
- Wagle, W.A., & Smith, M. (2000). Tattoo-induced skin burn during MR imaging. *American Journal of Roentgenology*, 174(6), 1795.

4 good reasons

to promptly renew your National Environmental Health Association (NEHA) membership!



1. You won't miss a single issue of this *Journal*!
2. Your membership benefits continue.
3. You conserve NEHA's resources by eliminating costly renewal notices.
4. You support advocacy on behalf of environmental health.

Renew today!
Call 303.756.9090, ext. 300,
or e-mail staff@neha.org.

▶ DIRECT FROM ATSDR

Jay A. Nielsen
on behalf of the National
Conversation on Public Health
and Chemical Exposures Team

From Conversation to Action: Implementation of the National Conversation on Public Health and Chemical Exposures

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 bring back the 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 (HHS) 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 conclusions of this article are those of the author(s) and do not necessarily represent the views of ATSDR, CDC, or HHS.

Jay A. Nielsen is an ORISE fellow and program analyst at ATSDR. He has worked on the National Conversation on Public Health and Chemical Exposures project and also coordinates the Collegiate Leaders in Environmental Health internship program, the Summer Program in Environmental Health internship, and the Graduate Environmental Health internship program.

As our society has advanced, chemicals have become increasingly present in our air, water, food and homes; thus, a key responsibility of environmental health professionals is to protect the public from these chemical exposures. In 2009, the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) launched the National Conversation on Public Health and Chemical Exposures project to help address national concerns about toxic exposures (Frumkin, 2009). The goal of the National Conversation was to develop an Action Agenda with clear, achievable recommendations to help government agencies and other organizations strengthen their efforts to protect the public from harmful chemical exposures. CDC and ATSDR engaged a broad range of groups and individuals—government agencies, professional organizations, tribal groups, community and nonprofit organizations, health professionals, business and industry leaders, and members of the public—to assist with this undertaking. This group developed the Action Agenda (“Addressing Public Health and Chemical Exposures: An Action Agenda”—www.nationalconversation.us/action-agenda) and released it in June 2011.

The Action Agenda offers useful recommendations for public health actions that can be implemented by all sectors. The agenda calls for an increased emphasis on preventing harmful chemical exposures, updating and improving policies and programs, promoting the health of children and other vulnerable popu-



Pictured from left to right: Montrece Ransom, Jennifer Van Skiver, Benjamin Gerhardtstein, Julie Fishman, Jay Nielsen, and C. Adam Brush. Not pictured: Kim Defeo.

lations, and improving our ability to make or engage in difficult decisions, often in the face of uncertainty. It also recommends improving data access and management, expanding systems for monitoring chemical exposures and health outcomes, building scientific knowledge (e.g., through faster evaluation of chemical hazards), incorporating environmental and occupational health into health professional education, and coordinating efforts to prevent and respond to chemical emergencies.

Several recommendations were directed specifically at ATSDR (in particular, recommendations 3.8 and 4.2). Over the past year, ATSDR has begun implementing key National Conversation recommendations. We've taken steps to better serve communities by reorganizing the agency and exploring opportunities to provide additional technical assistance services to communities. We held a Science Symposium with invited national experts to generate action-oriented recommendations for improving ATSDR's scientific approach to assessing health risks at sites. We also are participating in the National Conversation Network to support continued dialogue and learning on chemical exposure and public health issues, to identify opportunities for collaboration, and to spur implementation actions.

Better Serving Communities

The proposed ATSDR reorganization seeks to increase support for community public health assessments and improve effectiveness of public health operations by organizing into geographically focused branches and expanding staffing in ATSDR's regional offices. This will allow the agency not only to contin-

ue to provide capacity building and technical assistance to communities but also to foster innovation while ensuring that our work continues to consistently meet the highest quality standards.

Advancing ATSDR's Science

In April, ATSDR held a symposium to evaluate our scientific approach to assessing health risks at sites and generate action-oriented ideas for improvement. Participants included partners from federal, state, and local governments; nongovernmental organizations; and academia. One symposium track focused on the science behind ATSDR's public health assessment process while the other focused on toxicology and risk assessment at ATSDR. Participants gave thoughtful recommendations including the following:

- Increase the transparency of the ToxProfiles™ development process and scientific rigor of the product by incorporating a systematic review methodology for updating existing ToxProfiles™ and for developing new ToxProfiles™.
- Publish ToxProfiles™ using a web-based interface with a strong search function.
- Continue to explore methods for evaluating risks from combined chemical exposures that improve the existing Hazard Index method.
- Incorporate biomonitoring activities when appropriate in the public health assessment process. This would include enhancing support for collecting biomonitoring and other exposure data at sites and developing reference values for comparing biomarkers of exposure and biomarkers of effect.

- Develop mechanisms to better evaluate ATSDR's public health impact at sites.

ATSDR is exploring opportunities to implement these and other recommendations made at the symposium.

Engaging in a “National Conversation Network”

In June, a group of individuals who had been involved with the National Conversation process and the Action Agenda development convened a National Conversation Network. The network will serve as a venue for tracking progress towards implementing Action Agenda recommendations and identifying opportunities for collaboration. The network is coordinated by a steering committee comprising individuals representing the Action Agenda chapters (i.e., Prevention, Monitoring, Science, Communities, Public Engagement, Health Professionals, and Emergencies). The network will hold semiannual calls or webinars (or both) that are open to anyone working on issues addressed in the National Conversation Action Agenda. To join the National Conversation Network, sign up at www.nationalconversation.us. 🐼

Corresponding Author: Jay A. Nielsen, ORISE Fellow/Program Analyst, NCEH/ATSDR, CDC, 4770 Buford Highway, Mailstop F-61, Atlanta, GA 30341. E-mail: jnielsen@cdc.gov.

Reference

Frumkin, H. (2009). The public health approach to chemical exposures: A national conversation. *Journal of Environmental Health*, 71(7), 26–27.

Did You Know?

You can access
ToxProfiles™ information
online at [www.atsdr.cdc.gov/
toxprofiles/index.asp](http://www.atsdr.cdc.gov/toxprofiles/index.asp), and
even request a copy
of ToxProfiles™ on CD.

▶ DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES BRANCH



CAPT Richard
J. Gelting,
PhD, PE



Mansoor
A. Baloch,
PhD, LEED-AP
(BD+C), EIT

The Food-Water Nexus: Irrigation Water Quality, Risks to Food Safety, and the Need for a Systems-Based Preventive Approach

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, 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 services being developed through EHSB include access to topical, relevant, and scientific information; consultation; and assistance to environmental health specialists, sanitarians, and environmental health professionals and practitioners.

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

CAPT Rick Gelting is an environmental engineer in the CDC EHSB.

Mansoor Baloch is an ORISE fellow (environmental engineer/hydrologist) in the CDC EHSB.

This year's World Water Day focused on the food-water nexus with the theme "Water and Food Security: The World is Thirsty Because We are Hungry." While much of the emphasis under this theme focused on the quantities of water used for food production, the quality of water is also important to that function. Water quality can also have significant effects on health. In this context, the quality of irrigation water can have profound impacts on the microbiological integrity of food. Irrigation water has been implicated as a

possible source of pathogens in produce linked to major disease outbreaks in the U.S. and Europe. Many sources of irrigation water are subject to inputs of pathogenic loads from point and nonpoint sources stemming from multiple land uses in watersheds (Pachepsky, Shelton, Mclain, Patel, & Mandrell, 2011). Research on the potential effects of irrigation water quality on food safety therefore requires a systems-based environmental assessment on the watershed scale that accounts for various factors that may influence irrigation water quality.

Two nationwide disease outbreaks linked to fresh produce in the U.S. illustrate the concept of a watershed scale systems-based environmental assessment for investigation of potential effects of irrigation water quality on food safety.

In the first, fresh bagged spinach from a single farm in California was implicated as the source of a 2006 *E. coli* O157:H7 outbreak that caused over 200 illnesses and five deaths. The environmental investigation to determine how the spinach became contaminated included a watershed scale assessment of the farm's surroundings to identify factors related to irrigation water that may have contributed to that contamination. Based on the available information, groundwater used as irrigation water and its potential contamination by surface water recharge were identified as the most likely water-related contributing factors involved in this outbreak.

Because of the seasonal climate in this region of California, winter rains are stored in reservoirs and then released during the dry summer season to recharge aquifers used for irrigation. Analysis of water samples from a river flowing through the farm found a bacterial strain matching the outbreak strain found in patients as well as the bagged spinach. Analysis of the hydrogeologic conditions at the farm indicated that pathogens in surface water could potentially have reached wells on the farm and contaminated irrigation water. Those conditions included a groundwater table that dropped below the level of the river during the growing season, allowing surface water to recharge groundwater on the farm. High rates of irrigation well pumping and layers of coarse-grained soils would also have contributed to creating the conditions under which contamination from the river could have

reached the irrigation wells (Gelting, Baloch, Zarate-Bermudez, & Selman, 2011).

In the second example of a systems-based environmental assessment, iceberg lettuce served in chain restaurants was identified as the vehicle of transmission for a different *E. coli* O157:H7 outbreak in 2006. Samples from an initial environmental investigation revealed a genetic match between the outbreak strain and environmental samples from a single farm in a different region of California, leading to an in-depth systems-based analysis of the irrigation water systems on that farm. Three sources of irrigation water were used on the farm: groundwater pumped from on-site wells, surface water delivered through canals by a local water management agency, and effluent from wastewater lagoons on nearby dairy farms. The wastewater effluent was blended with water from the other sources and used only to irrigate animal feed crops. Water management on the farm, including control of the wastewater blending process, however, appeared to create the potential for cross contamination. Backflow prevention be-

tween piping networks used to convey blended wastewater and water from the other two sources was insufficient. In addition, the hydraulics in the combined piping networks were such that either high or low pressure situations could create the potential for cross contamination (California Food Emergency Response Team, 2008). The irrigation network on the farm had evolved over time to attempt to meet various needs, without an overall analysis of how that evolution created possibilities for contamination of irrigation water.

One implication of the results of these assessments is that the scope of produce-related outbreak investigations and potential prevention measures need to be conceptually broadened to include factors beyond those actually found on the farms identified as sources of produce involved in outbreaks. A systems-based, watershed scale analysis is necessary for comprehensive identification of factors potentially contributing to irrigation water contamination. A dimension of time also needs to be added; such environmental variables as water quality

are dynamic, with seasonal or other variations influencing the quality of irrigation water. Irrigation systems themselves also evolve over time to meet varying needs, and those incremental changes may lead to unintended vulnerabilities. A preventive approach such as that contained within the Water Safety Plan process for drinking water may also be useful in managing irrigation water quality (Davidson et al., 2005). Such an approach would include a systematic identification of risks to irrigation water quality, both within an irrigation system as well as in the broader watershed environment, and could help to identify and prevent contamination of produce from irrigation water. 🇺🇸

Corresponding Author: Mansoor A. Baloch, ORISE Fellow, Environmental Health Services Branch, Division of Emergency and Environmental Health Services, National Center for Environmental Health, CDC, 4770 Buford Highway, N.E., M.S. F-60, Atlanta, GA 30341. E-mail: mbaloch@cdc.gov.

References

- California Food Emergency Response Team. (2008). *Investigation of the Taco John's Escherichia coli associated with iceberg lettuce—final report*. Sacramento, CA: California Department of Public Health, Food and Drug Branch.
- Davidson, A., Howard, G., Stevens, M., Callan, P., Fewtrell, L., Deere, D., & Bartram, J. (2005). *Water safety plans: Managing drinking-water quality from catchment to consumer*. Geneva: World Health Organization.
- Gelting, R.J., Baloch, M.A., Zarate-Bermudez, M.A., & Selman, C. (2011). Irrigation water issues potentially related to the 2006 multistate *E. coli* O157:H7 outbreak associated with spinach. *Agricultural Water Management*, 98(9), 1395–1402.
- Pachepsky, Y.A., Shelton, D.R., Mclain, J.E., Patel, J.R., & Mandrell, R.E. (2011). Irrigation waters as a source of pathogenic microorganisms in produce: A review. *Advances in Agronomy*, 113, 73–138.
- World Health Organization. (2011). *Guidelines for drinking-water quality* (4th ed.). Geneva: Author.

Become a NEHA Member!

Why? Because the National Environmental Health Association (NEHA) is the only association at the intersection of the environmental and health professions! Nowhere else will you find representatives from all areas of environmental health and protection, including terrorism and all-hazards preparedness, food protection, hazardous waste, onsite wastewater, air and drinking water quality, epidemiology, management, etc.—in both the public and private sectors.

AS A NEHA MEMBER YOU RECEIVE

Journal of Environmental Health

A subscription to this esteemed, peer-reviewed journal, published ten times per year to keep you informed, is included with your membership.

Visit neha.org/member for an application.

Substantial Savings with Member Pricing on

- NEHA's Annual Educational Conference (AEC)
- NEHA credential renewal and exam fees
- Resources from NEHA's Online Bookstore

Opportunities for Important Professional Education Programs

- NEHA workshops at little or no cost
- NEHA Sabbatical Exchange Program

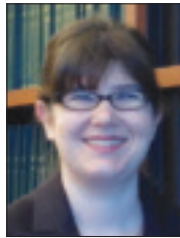
Discounts on

- Rental cars
- Air express services
- Freight services

Eligibility for

- Professional liability insurance
- Metrum Credit Union

▶ DIRECT FROM NCSL

Doug Farquhar,
JD

Ashley A. Noble

2012 Environmental Health Legislation

Editor's Note: The NEHA Government Affairs program has a long and productive association with the National Conference of State Legislatures (NCSL). The organizations have worked together on any number of legislative and policy areas that directly impact the environmental health profession. One of the keys to the successes of the NEHA/NCSL collaboration has been the recognition of the fact that often some of the most significant legislation and policy initiatives related to environmental public health occur in state legislatures. The states have, in a very real sense, been the innovators in developing new programs and practices. In recognition of this fact, we have asked NCSL to provide occasional overviews of state environmental public health legislative activity, covering topics that are of the most pressing public concern.

Doug Farquhar, program director for NCSL's Environmental Health Program, has worked with NCSL since 1990. Mr. Farquhar directs development, management, and research for the Environmental Health Program. These projects encompass consultation and policy analysis of state and federal policies and statutes, regulations, and programs regarding environmental and related topics for state legislatures and administrative programs. Ashley Noble is an environmental law clerk at NCSL. She is in her third year at the University of Denver School of Law. Prior to NCSL she has worked as a Green Mission Representative at Whole Foods Market and at Clean Water Action.

Overview
2012 marked the fourth year since the great recession began and the third since it ended, according to government statistics. For state legislatures, however, 2012 marked the first year the states had to balance budgets without federal stimulus funding, instead relying on state revenues. This forced the austerity measures that the states began during the recession to remain in

place. The good news is that states survived the past year without suffering from severe budget gaps (the difference between revenue and expenditures). The bad news is that they remain under fiscal constraint.

In 2012 state legislatures met in 44 of the 50 states, plus in Puerto Rico and the District of Columbia. Although the biggest concern remains the budget, health insurance exchanges came in a close second. Medicaid is

the largest single expenditure in most states; therefore bringing health care costs under control was a major issue, as were education, transportation, and welfare.

Bills on environmental health were introduced in every state in session. Of the states (and territories) in session, legislators proposed 1,556 pieces of legislation, of which 192 passed into law. The enacted laws have been categorized among 13 subject areas, including asbestos; asthma; biomonitoring, tracking, and surveillance; children's environmental health; drinking water; food safety; indoor air quality; lead; mercury; pesticides; swimming pools; toxics and chemicals; and miscellaneous. Food safety saw the greatest number of bills introduced (285), as well as the greatest number of enacted laws (45). Biomonitoring, surveillance, and tracking represents the category with the fewest laws proposed (14) and passed (1).

Asbestos

Thirteen bills were adopted relating to asbestos. Four of those laws were passed in three states (Louisiana, Virginia, and West Virginia) to recognize Mesothelioma Awareness Day. Virginia and West Virginia recognize this day of awareness on September 26; Louisiana chose October 17. Laws pertaining to the liability of successor corporations for asbestos claims passed in Arizona, Idaho, Michigan, and Utah. All four states limit a successor corporation's asbestos liability to "the fair market value of the gross assets of the transferor [at] the time of merger or consolidation."

Asthma

Of the six bills pertaining to asthma that passed into law, one allows schools to admin-

ister epinephrine to students in the event of an allergic reaction; all three protect school nurses from liability arising from the administration of epinephrine to students. These laws were passed in Illinois and Virginia (www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001847/). The remaining laws related to asthma were passed in Pennsylvania to recognize World Asthma Day. The dates chosen were May 3 for 2011 and May 1 for 2012.

Biomonitoring, Tracking, and Surveillance

One law was found to have passed that relates solely to biosurveillance. NE L 591 passed in May 2011. The law requires the Nebraska Department of Health and Human Services to develop a surveillance program to monitor “public health threats.” The law also requires the department to develop an immunization database and amends language in other statutes.

Children’s Environmental Health

Children’s environmental health covers a wide variety of topics. Consequently, most children’s environmental health laws overlap with the other topics surveyed. Three of the 25 bills that passed address the presence of bisphenol-A (BPA), in children’s products. The laws were passed in California, Delaware, and Maine. According to the U.S. Department of Health and Human Services, BPA has been used in packaging materials for over 40 years (<http://www.hhs.gov/safety/bpa/>).¹ CA A.B. 1319, which passed in 2011, bans the use of BPA in bottles or cups for young children in amounts exceeding 0.1 parts per billion, and requires manufacturers to “use the least toxic alternative.” Delaware will ban the use of BPA completely in products intended for children “under four years of age” beginning July 2012. Maine recognizes BPA “as a priority chemical,” subjecting it to the state’s chemical safety regimen.

Eight of the laws passed regarding children’s environmental health pertained to schools. One of these laws, AZ H 2520, passed in Arizona to amend language in a law which forbids the use of paraquat and highly toxic pesticides within ¼ mile of schools, daycare centers, and other facilities, with some exceptions.

Drinking Water

Drinking water laws included terms that ranged from funds that ensure access to water to protecting water from industrial pollutants (NC H 45). California amended its definition of drinking water to include water for cooking, preparing food, and washing food (CA A 1194 [2012]). Three states passed laws regarding water fluoridation: Nebraska, New Hampshire, and Tennessee. NE L 36, which passed in 2011, amends a statute that mandates that municipalities with more than 1,000 residents add fluoride to their water supplies. Municipalities with fewer than 1,000 residents may, upon reaching the requisite population level, put the issue of municipal water fluoridation to a public vote to determine whether to add fluoride to the water supply. NH H 1416 (2012) requires consumers to be notified if their water contains fluoride. TN S 1055 (2012) allows municipalities to either start or discontinue fluoridation of municipal water supplies; however, municipalities must notify the state of their decision, and must provide residents with written notice.

North Carolina added language in its site remediation and brownfields law to protect groundwater that is used for or may be used for drinking water (NC H 45 [2012]). Vermont now requires owners of potable water supplies to test their groundwater and disclose the results of those tests (VT S 183 [2012]).

Food Safety

Forty-five laws in 26 states and Puerto Rico were related to food safety. Connecticut S.B. 57 (2012) requires the licensure and oversight of food manufacturing facilities, and prohibits the employment of persons with known infectious or communicable diseases. MI HB 5130 revamps the state’s food law, bringing it into line with federal requirements. It also repeals the state law on eggs, instead adopting the federal standard, as well as exempting farms that have fewer than 3,000 layer hens. FL H 7021 (2012) also authorizes the state to update laws to meet federal standards and shifts food safety from the Department of Health to the Department of Agriculture and Consumer Services.

NH H.B. 339 (2012) requires the commissioner of agriculture to establish a state meat inspection program. SC SB 220 (2012) provides that food returned by the consumer cannot be resold.

Nine states adopted food safety laws pertaining to “cottage foods,” or foods that are prepared in home-based kitchens for sale directly to the consumer either at the site of production or at farmers’ markets. States that regulate cottage foods generally require the foods produced for sale to be nonhazardous. In 2012, the states of Colorado, Illinois, Indiana, Maryland, Minnesota, Michigan, New Hampshire, South Carolina, and Tennessee all adopted language to exempt certain foods and processing from state oversight.

Colorado’s legislature recognized the cottage food industry as a means to support the economy as well as to encourage healthy lifestyle choices (CO SB 48 [2012]). Michigan included cottage foods in its overhaul of its food law, and Illinois specifically exempts farmers’ markets from regulation. Indiana exempted poultry, as long as it is “frozen at the time of sale (IN HB 1298 [2012]).”

Utah passed one of the most unusual bills pertaining to home-produced foods in 2012. UT H 198 explicitly exempts foods produced in one’s home or grown on one’s property for personal consumption from confiscation by a “government entity,” so long as certain conditions are met.

Indoor Air Quality

Of the 26 laws passed regarding indoor air quality, four subjects comprised the bulk of legislation. Six laws address smoking, six pertain to radon, six pertain to mold, and five pertain to carbon monoxide.

CA S 332 (2012) allows landlords to forbid smoking on the premises of the rental property; however, if tenants had been allowed to smoke on the property prior to January 1, 2012, the landlord must provide the tenants with adequate notice before changing the policy. Maine has also enacted a law regarding smoking in rental units. ME H 802 (2012) allows a landlord to either permit or prohibit smoking on the rental property. A landlord may also choose to designate smoking areas on the rental property. Whichever policy is adopted by a landlord, tenants must be notified in writing of the smoking policy on the property.

Lead

Five of the 15 laws that passed regarding lead pertained to preventing lead poisoning in children. Of those five laws, two address the

presence of lead in jewelry and other items intended for use by children. One of these laws, IL S 1943, which passed in 2011, amends Illinois' Lead Poisoning Prevention Act by defining "body piercing jewelry," as well as jewelry in general, and mandates a warning statement on children's items that contain lead, but in amounts which comply with "federal standards." The warning is not necessary if the item in question does not contain lead components which are accessible to children.

CT SB 188 (2012) provides financial assistance to local health departments for lead poisoning prevention and control services. KY HB 294 (2012) requires all blood lead levels above 2.3 µg/dL, half of the revised Centers for Disease Control and Prevention standard of 5 µg/dL (down from 10 µg/dL). ME SB 89, which passed in 2011, enacts terms regarding blood testing for elevated lead levels in children.

LA S 200 (2012) requires the Department of Environmental Quality to conduct an inspection of a new daycare center, preschool, or certain elementary school facility buildings for the presence of lead hazards. Maryland revised its lead hazard reduction law, updating it to meet current issues and conditions (MD H 644 [2012]). NY S 2812 creates the state lead poisoning prevention task force. In Oklahoma, the legislature authorized the state to adopt a certification program for renovators who disturb lead-based paint (OK HJR 1110 [2012]).

Mercury

Like lead, exposure to mercury has been linked to cognitive impairments in children, as well as other negative health effects in children and adults (www.epa.gov/hg/effects.htm). State laws passed regarding mercury generally focused on preventing releases of mercury into the environment at the time of disposal, by reducing or eliminating the amount of mercury that may be used in manufactured goods, and by regulating the sale of mercury-containing products. A notable exception may be found in Missouri, which passed MO HCR 49 to encourage Congress "to adopt S.J. Res. 37, disapproving the Mercury and Air Toxics Standards regulation." According to the language of the law, compliance with the U.S. Environmental Protection Agency's (U.S. EPA's) Mercury Air Toxics Standards regulation is prohibitively expensive and places undue stress on the economy.

NY A 668 (2012) states that no person shall sell mercury sphygmomanometers, thermometers, or thermostats. The legislature in Oregon prohibited the sale of lighting containing mercury (OR S 1512 [2012]). In Washington, the legislature prohibited the sale of mercury thermometers, thermostats, or motor vehicle switches (WA S 6131 [2012]). UT S 133 (2012) repealed the Mercury Switch Removal Act.

Pesticides

Of the 21 bills that passed into law regarding pesticides, six pertained to mosquitoes, two related to pesticide registration, and four related to pesticide applicators. Only one law passed regarding bed bugs; Ohio passed OH HR 31 to ask U.S. EPA to approve the use of the pesticide propoxur for use on bed bugs, citing a dire infestation of the insects within the state.

Louisiana now requires pesticide dealers and agricultural consultants to maintain records of pesticide use (LA S 151 [2012]). North Carolina eliminated the requirement to submit a material data safety sheet to the state's pesticide board when registering a pesticide (NC S 603 [2012]). NY A 7638 (2012) requires lawn care companies to provide information on the pesticides they apply to property owners. The legislature in Oklahoma now allows the state to suspend the license of an applicator that has applied pesticides in a negligent manner (OK H 2715 [2012]). VA S 126 (2012) allows the use of methyl bromide gas on "forest tree seedlings" grown by the State Forester.

Swimming Pools

Swimming pools and aquatic venues entail several challenges to public health, leading to the enactment of several bills. Florida, in revising its environmental health program, altered its requirements to operate a swimming pool (FL S 704, FL H 887, FL H 1263 [2012]). Minnesota passed MN S 1675 (2011), which requires pools in daycare facilities to comply with the Abigail Taylor Pool Safety Act. The act was passed in response to an incident in which a six-year-old child died as a result of injuries caused by a drain in a wading pool. In 2012, Mississippi passed the "William Lee Montjoy Pool Safety Act" via MS HB 1281. The law, which requires "a multi-unit rental complex, prop-

erty owner's association, or private club," as well as "condominiums, cooperatives, or town home projects" that allow children below 12 years of age to install proper "pool yard enclosures," fencing, and gates, as well as promulgating regulations regarding doors that open into pool areas. The law was named for a child who drowned in a yacht club pool.

North Carolina also passed a law regarding pool fencing through NC SB 368 (2012). Pennsylvania, South Carolina, and Tennessee also passed laws related to pool safety. Pennsylvania and South Carolina both passed laws designating May 2011 as Water Safety Month; South Carolina (SC SB 1351 [2012]) also passed a law regulating the number of lifeguards that must be stationed at swimming pools; lastly, Tennessee passed a law pertaining to pool alarms (TN HB 1713 [2012]).

Toxics and Chemicals

Of the 56 enacted toxics and chemicals bills, three were passed in two states (California and Illinois) that request Congress "to modernize the Toxic Substances Control Act of 1976." Two were passed in Kansas and New Hampshire that addressed veterans of the Vietnam War who have been exposed to Agent Orange, which was widely used as a defoliant. The language of the laws is substantively the same; both laws ask for benefits for veterans of the Vietnam conflict who did not serve within that nation, but were nonetheless exposed to Agent Orange, to be made equal with those of veterans who were exposed to the substance during service within Vietnam.

GA H 40 (2012) requires "bittering agents" be applied to antifreeze to make it unpalatable to animals and young children. ME H 690 (2012) allows for Deca-BDE to be replaced with a less hazardous flame retardant. In Michigan, the legislature passed a law that prohibits the state Department of Natural Resources and Environment from adopting rules that restrict residential burn barrel bans (MI H 4207 [2012]).

Miscellaneous

Miscellaneous laws, by definition, include a variety of topics. Brownfields were addressed in six of the laws in this section, however, comprising the single largest subject. According to U.S. EPA, brownfields are lands which that been contaminated in such a manner as to impede putting the property to another use

(www.epa.gov/brownfields/). Hawaii passed HI H 1015 in 2011, which approved an emergency loan funding increase “to clean up a contaminated site in Kapolei.” IA S 514, an Iowa law which also passed in 2011, amends a statute that offers a tax credit to investors to restore brownfield properties.

Other laws of note in this section include Vermont’s VT H 202, which established a uni-

versal health care program within the state, known as “Green Mountain Care,” which includes language to study and implement health impact assessments within the state. New York’s NY A 5516 (2012), which expands the list of places in which smoking is banned to include “ticketing, boarding, or platform areas of railroad stations operated by the metropolitan transit authority.”

¹Note that the Centers for Disease Control and Prevention state that BPA has been used in a variety of products for over 50 years. See http://www.cdc.gov/biomonitoring/BisphenolA_BiomonitoringSummary.html. See also <http://www.cdc.gov/exposurereport/pdf/fourthreport.pdf>.

NEHA Credentials

Protecting human health
and the environment
since 1937

Why should your employees
hold a NEHA credential?

**BECAUSE YOU WANT
THE BEST WORKING
TO PROTECT YOUR
COMMUNITY!**

Professional credentials such as the Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) and Certified Professional – Food Safety (CP-FS) have been rigorously developed to insure that those who successfully pass the credentialing exams have the knowledge, skills, and abilities to competently practice environmental health.

For more information on NEHA credentials, please visit our Web site at neha.org/credential or contact the credentialing department at (303) 756-9090, ext. 337.

From Inspection to Report In No Time.

NEW! Touch-Screen

2 Second Readings*

K-Shell X-ray Technology

USB Rapid Data Transfer

LPX^{pro}
XRF LEAD PAINT ANALYZER

Contact Dynasil Products today
1-800-532-3763

44 Hunt St. Watertown, MA 02472 | www.dynasilproducts.com

* Results vary based on location and settings.

▶ DEMYSTIFYING THE FUTURE



Thomas Frey

Workerless Businesses— an Explosive New Trend Dancing With the Inner Entrepreneur

Editor's Note: Significant and fast-paced change is occurring across society in general and our profession in particular. With so much confusion in the air, NEHA is looking for a way to help our profession better understand what the future is likely to look like. 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 continually pushes the envelope of understanding, creating fascinating images of the world to come. His talks on futurist topics have captivated people ranging from high-level government officials to executives in Fortune 500 companies. He has also authored the book *Communicating with the Future*. Frey is a powerful visionary who is revolutionizing our thinking about the future.

When Chris Anderson released *The Long Tail* in 2004, the world was suddenly awakened to the potential for niche markets that appeal to an increasingly diverse consumer marketplace.

In business terms, it gave rise to the notion of online businesses selling relatively small quantities of unique products, yet generating enough income for a person to live without a job.

In 2007, Tim Ferriss pushed this idea several steps further in his book, *The 4-Hour*

Workweek. Not only can people create their own niche businesses, but they can build it up to something quite profitable and start regaining their freedom.

In 2008, I wrote an article on "The Empire of One" (www.futuristspeaker.com/2008/05/the-empire-of-one), about one-person enterprises that were being enabled by the rapidly evolving communication structure inside the Internet.

In 2009, writer Tina Brown coined the term "The Gig Economy" as she noticed a

growing number of young people (one-third of her survey group) were working multiple jobs and as freelancers.

Combining the growing freelance mentality of young people with the relative ease of launching a niche online business, and we have an explosive trend driving us towards a future of "workerless businesses."

Forced Entrepreneurship

Whenever the economy takes a nosedive, it is typical for people to begin to dance with their "inner entrepreneur" and brainstorm ideas for launching their dream business. But today's business climate no longer allows for people to wait for the ideal time or perfect conditions to make it happen.

When nothing else is working, they decide it's time to blow the doors off their "comfort zone" and enter the "entrepreneur zone."

To be sure, starting a business during a recession is not a bad thing. In fact, more than half of today's Fortune 500 companies were founded during a recession or bear market.

Forced entrepreneurship often starts with project work, temp jobs, consulting gigs, or other opportunities for making money. Sometimes the work is done as a trade-out to just get a foot in the door. Very often one opportunity will lead to another, and a patchwork business plan begins to form in the person's mind. Formal business plans are rare, but the key metrics for managing the operation begins to crystallize in their head.

The Internet is now enabling people and ideas to connect in ways never before possible. The business models that eventually spring to life often have little, if any, resemblance to their original idea for a dream busi-

ness. But the fluid nature of the startup world is more than enough to keep them engaged.

To succeed as a forced entrepreneur, bootstrapping is king. They quickly learn to never spend a dime unless it is absolutely necessary. Their skills, talent, and ideas become a form of currency that they can exchange for equally valued goods and services.

Building an “Empire of One” Business

An “Empire of One” business is a one-person (sometimes married couples) business with far reaching spheres of influence. Typically the business outsources everything—information products marketed and sold online, or products manufactured in China or India, sent to a distribution center in the U.S., with customers in the UK and Brazil. Manufacturing, marketing, bookkeeping, accounting, legal, and operations are all handled as part of “the gig economy.”

Yes, much of this has been done before, but a person’s ability to leverage people and products across country lines in a below-the-radar fashion and still maintain control of a vast and virtual empire is refreshingly new.

The “Empire of One” business model is one with great appeal to former corporate executives with global contacts and good ability to manage things remotely. With improving

economies and Boomers searching for meaning and significance in their lives, we are about to see an exponential increase in these types of businesses in the years ahead.

A Few Statistics

According to Gallup, 32% of Americans aged 18–29 are underemployed or unemployed.

Job Posting Trends on Elance.com

Elance, a site at the heart and soul of the gig economy, helping freelancers find their next gig, has seen dramatic increases in projects in turmoil countries like Greece (up 122%), Spain (up 142%), and Egypt (up 147%) over last year.

A recent survey by *The Guardian* showed that out of 112,179 vacancies advertised in Britain in February 2012, only 52% were for long-term positions.

In December of 2011, *The Guardian* reported an additional 166,000 Brits became self-employed over a three-month period, an increase of 4%. This meant that a total of 4.14 million people in Britain were self-employed, the highest since records began.

Going From Freelance to Empire of One

Transitioning people from doing piecemeal freelance work to running their own stable

of freelance workers is still not well defined. But the first step is finding a niche product or service to work with.

People typically do a lot of soul searching to uncover something they’re passionate about, and somehow stumble upon their core concept.

Recently, a seasoned entrepreneur and good friend of mine in South Dakota told me about one of his recent ventures.

“I had a good opportunity to go into the specialty tire business and the numbers looked great. It had a tremendous upside,” he said. “But then it occurred to me that if I owned a tire business that I’d have to spend lots of time talking about tires. I don’t like talking about tires. It’s not a subject that interests me. I love talking about fruit and ice cream (other businesses he owns), but I really don’t like thinking about tires.”

Interested in sharing your thoughts? Go to www.FuturistSpeaker.com. 🐼

Corresponding Author: Thomas Frey, Senior Futurist and Executive Director, DaVinci Institute®, 511 East South Boulder Road, Louisville, CO 80027. E-mail: dr2tom@davinciinstitute.com.

THANK YOU FOR SUPPORTING THE NETA/AAS SCHOLARSHIP FUND

James J. Balsamo, Jr.,
MS, MPH, MHA, RS, CP-FS
Metairie, LA

LeGrande G. Beatson, Jr.,
MS, REHS
Lynchburg, VA

D. Gary Brown,
DrPH, CIH, RS, DAAS
Richmond, KY

Vickie L. Church, MPA, REHS
San Diego, CA

Elwin B. Coll, RS
Ray, MI

Carolyn H. Harvey, PhD
Richmond, KY

John S. Horvath, REHS
Snellville, GA

Dion L. Lerman
Philadelphia, PA

Lloyd W. Mitchell, III,
RS, MPH, PhD
Spanaway, WA

Richard W. Mitzelfelt
Edgewood, NM

Wendell A. Moore,
RS, REHS, DAAS, HQDA
Bowie, MD

George Morris, RS
Dousman, WI

Edison E. Newman, RS
Bradenton, FL

Richard E. Pierce
Wilkes Barre, PA

Edward H. Rau,
RS, MS, CHSP
Frederick, MD

B. Robert Rothenhoefer, II, RS,
REHS, CP-FS
Falls Church, VA

Walter P. Saraniecki,
MS, LDN, LEHP, REHS/RS
Chicago, IL

Howard M. Stiver, MPH
Lebanon, OH

Dr. Bailus Walker, Jr.
Arlington, VA

CAREER OPPORTUNITIES

Food Safety Inspector

Everclean Services is the leader in the restaurant inspections market. We offer opportunities throughout the country. We currently have openings for professionals to conduct Q.A. audits of restaurants.

Alaska	New Orleans, LA
Albuquerque, NM	Oklahoma City, OK
Butte, MT	Pittsburgh, PA
Chicago, IL	Richmond, VA
Dallas, TX	Roger, AR
Des Moines, IA	Santa Clarita/Simi Valley, CA
Indianapolis, IN	Seattle, WA
Little Rock, AR	Spearfish, SD
McAllen, TX	Tulsa, OK
Mobile, AL	

Past or current food safety inspecting is required.

Interested applicants can send their resume to: Bill Flynn at Fax: 818-865-0465. E-mail: bflynn@evercleanservices.com. 🐾

Find a Job! Fill a Job!

Where the "best of the best" consult...

NEHA's Career Center

First job listing **FREE**
for city, county, and state health departments
with a NEHA member,
and for Educational and Sustaining members.

For more information, please visit
neha.org/job_center.html

EH CALENDAR

UPCOMING NEHA CONFERENCES

July 9–11, 2013: Hyatt Regency Crystal City at Reagan National Airport, Washington, DC. For more information, visit www.neha2013aec.org.

NEHA AFFILIATE AND REGIONAL LISTINGS

Illinois

November 8–9, 2012: IEHA Annual Education Conference, sponsored by the Illinois Environmental Health Association. For more information, visit www.iehaonline.org.

Iowa

October 23–24, 2012: 2012 Environmental Health Fall Conference, sponsored by the Iowa Environmental Health Association. For more information, visit www.ieha.net.

Minnesota

October 11, 2012: MEHA Fall Education Conference, sponsored by the Minnesota Environmental Health Association. For more information, visit www.mehaonline.org/events.

Missouri

October 3–5, 2012: 2012 Annual Education Conference, sponsored by the Missouri Environmental Health Association. For more information, visit www.mmfeha.org.

Montana

October 2–3, 2012: MEHA/MPHA Fall Conference: "Healthier People in a Healthier Environment," co-sponsored by the Montana Environmental Health and Public Health Associations. For more information, visit www.mehaweb.org.

New Mexico

October 24–25, 2012: NMEHA 2012 Symposium: "Emerging Environmental Health Issues in New Mexico," sponsored by the New Mexico Environmental Health Association. For more information, visit www.nmeha.org.

North Dakota

October 23–25, 2012: 2012 Fall Educational Conference and Meeting, sponsored by the North Dakota Environmental Health Association. For more information, visit www.ndeha.org/conference.htm.

Oregon

October 8–9, 2012: 2012 Annual Education Conference, sponsored by the Oregon Environmental Health Association. For more information, visit www.oregoneha.org/aec.htm.

Texas

October 9–12, 2012: 57th Annual Education Conference, sponsored by the Texas Environmental Health Association. For more information, visit www.myteha.org.

INTERNATIONAL LISTINGS

Jamaica

October 21–28, 2012: 66th Annual Conference and Exhibition, sponsored by the Jamaica Association of Public Health Inspectors. For more information, e-mail info@japhi.org.jm. 🐾

Information and opportunities abound behind the research and development button on NEHA's homepage. Visit neha.org/research to obtain the latest on the following NEHA federally funded programs, many of which include free or low-cost training and educational opportunities:

- ◆ Biology and Control of Vectors and Public Health Pests Program
- ◆ Environmental Public Health Tracking Program
- ◆ Epi-Ready Team Training Program
- ◆ Food Safe Schools Program
- ◆ Industry-Foodborne Illness Investigation Training (I-FIIT) Program
- ◆ Land Use Planning and Design Program
- ◆ Onsite Wastewater Treatment Systems Program
- ◆ Radon/Indoor Air Quality Program
- ◆ Workforce Development Program

"Keeping pace with a changing climate"

PACE | Postdocs Applying Climate Expertise Fellowship Program

Postdoctoral Fellowships Announcement of Opportunity for Postdoctoral Mentors

Application Deadline: 4 January 2013

UCAR's Visiting Scientist Programs seeks decision-makers and climate researchers to partner in hosting and mentoring early career scientists. The goal of this unique fellowship program is to grow the body of scientists that are skilled in both climate research and its application.

An important aspect of the program is to immerse the postdoctorate in the decision-making culture. The decision-making institution commits to support one half of the appointment costs. The NOAA Climate Programs Office supports the other half of the appointment costs. Decision-makers may be from the public, nonprofit or for-profit sectors to participate. Climate research mentors should be from an institution able to provide expert guidance.

For program and application details please visit the PACE website at www.vsp.ucar.edu/pace or call 303-497-8649.



Did You Know?

You can sign up to receive more information about the new credential NEHA is developing to meet the increasing need for highly qualified food safety professionals to provide oversight in preventing food safety breaches at U.S. facilities and abroad.

Sign up today to receive the latest news and information:
www.neha.org/credential/CPFSC.html

NEHA Food Safety Program

Your Food Safety Solution for Training and Certification



Save 50% on your food safety training costs vs. the competition.



You have a choice. Choose wisely.



Protect your customers. Protect your brand.

Working together to bring you a better choice in food safety training and certification.

Anyone who works in the food industry knows how critical an issue it is for food handling and safety protocol to be followed. Yet foodborne illness continues to attract attention on a global stage. Prometric, MindLeaders, and the National Environmental Health Association (NEHA) have joined forces to combat this issue by partnering to provide stronger, richer manual content; fast, reliable online training; and secure test delivery services.

This world-class partnership of experts brings together three unique strengths to provide you with one premiere food safety training and certification program.



EDUCATION & TRAINING

MindLeaders®

PROMETRIC



Food Protection Self-Audit Picture Guide and Poster Set



Empower restaurants and other food service facilities to improve worker practice



Access picture guides and poster sets to post at work stations as best practice guides



Gain access to food safety and security checklists

Free Toolkit Download • Go to apc.naccho.org/products • Login or Register. NACCHO membership is not required. • Search for **Food Protection Self-Audit Picture Guide and Poster Set** and click on download

For additional information or questions please contact Toledo-Lucas County Health Department APC: email: apc@co.lucas.oh.us

“The Food Protection Self Audit Picture Guide and Poster set was a good tool for food service facilities to improve food protection practices, provide education to employees and prevent food-borne illnesses.”

- Deb Scheer RN BSN



This product was developed by the Twin Cities Metro Advanced Practice Center (TCM) under the support of cooperative agreement number U50/CCU3020718 from CDC to NACCHO. It was revised by Toledo-Lucas County Health Department APC under cooperative agreement number 5H75TP000309-03. Its contents are the responsibility of TLCHD and TCM APCs and do not necessarily reflect the views of CDC or NACCHO.

mycometer
rapid microbiology – on-site technology

Rapid. Repeatable. Robust.

BACTIQUANT®-SURFACE

MYCOMETER®-SURFACE

MYCOMETER®-AIR

BACTIQUANT®-WATER

The Mycometer system can give you results onsite in 30 minutes.

- Mould on surfaces
- Mould inside porous materials
- Mould particles in air
- Bacteria on surfaces
- Bacteria in water

For questions or to order go to:
mycometer.com

Call Lisa Rogers at
(813) 831-6511

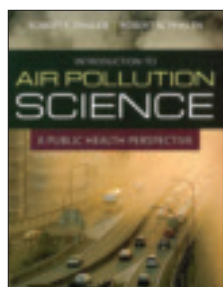
RESOURCE CORNER

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!



Introduction to Air Pollution Science: A Public Health Perspective

Robert F. Phalen and Robert N. Phalen (2012)



New! This book offers a broad foundation for understanding the environmental issues associated with air pollution and its impact on human health. Echoing the approach to air pollution currently used by the U.S. Environmental Protection Agency, this groundbreaking book gives readers a solid grasp of this evolving field. It contains in-depth coverage of diverse subjects including sampling and analysis; vis-

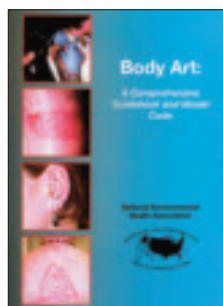
ibility, climate, and the ozone layer; human exposures to air pollutants; toxicology and epidemiology studies; as well as risk assessment and ethics. This timely resource also addresses more specific issues like acid deposition, ozone depletion, environmental justice, clean technologies, and global climate change, providing readers with the analytical skills they need to comprehend today's air pollution challenges.

331 pages / Paperback / Catalog #1123

Member: \$79 / Nonmember: \$85

Body Art: A Comprehensive Guidebook and Model Code

NEHA (1999)



Body Art: A Comprehensive Guidebook and Model Code offers a rare look into the world of tattooing, body piercing, scarification, and branding. This color-illustrated reference provides the reader with a comprehensive, consistent, reasonable, public health-oriented model code and guidelines. It also provides detailed definitions of different types of body art, forms used by professionals and regulators in

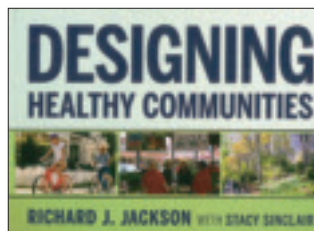
the industry, and personal stories. The model code that is presented in this publication was developed by a committee of knowledgeable environmental health professionals throughout the U.S. and has been endorsed by the Alliance for Professional Tattooists, the Association of Professional Piercers, and the Society of Permanent Cosmetic Professionals.

351 pages / Paperback / Catalog #797

Member: \$79 / Nonmember: \$99

Designing Healthy Communities

Richard J. Jackson with Stacy Sinclair (2012)



New! This book highlights how we design the built environment and its potential for addressing and preventing many of the nation's devastating childhood and adult health concerns. The author looks at the root causes of our malaise and highlights

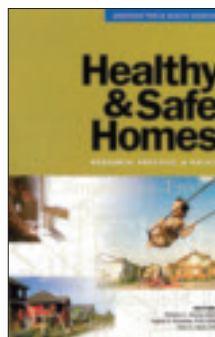
healthy community designs achieved by planners, designers, and community leaders working together. Ultimately, the author encourages all of us to make the kinds of positive changes highlighted in this book.

230 pages / Hardback / Catalog #1122

Member: \$48 / Nonmember: \$52

Healthy and Safe Homes: Research, Practice, and Policy

Edited by Rebecca L. Morley, MSPP, Angela D. Mickalide, PhD, CHES, and Karin A. Mack, PhD (2011)



This book marks an exciting advance in the effort to ensure that people across all socioeconomic levels have access to healthy and affordable housing. It provides practical tools and information to make the connection between health and housing conditions relatable to everyone. The book brings together perspectives from noted scientists, public health experts, housing advocates, and policy leaders to fully explain the problem of sub-

standard housing that plagues our nation and offers holistic, strategic, and long-term solutions to fix it. Study reference for NEHA's Healthy Homes Specialist credential exam.

225 pages / Paperback / Catalog #1111

Member: \$52 / Nonmember: \$55

Did You Know?

Past Sabbatical Exchange award winners are listed at www.neha.org/about/awardinfo.html. Many of the award winners submitted reports to NEHA that document their sabbatical experiences and lessons learned. These reports can be accessed through this link as well.

Award Winning, Hot Water & Portable Hand Washing Doesn't Get Much Better...

Did we mention we now offer outdoor too?



NSF

Ozark River
Portable Sinks

OzarkRiver.com 1-866-663-1982

NEHA OFFERS **Exchange** PROGRAM TO ENGLAND OR CANADA

NEHA offers wide-ranging opportunities for professional growth and the exchange of valuable information on the international level through its longtime Sabbatical Exchange Program. The sabbatical may be taken in England, in cooperation with the Chartered Institute of Environmental Health (CIEH), or in Canada, in cooperation with the Canadian Institute of Public Health Inspectors (CIPHI). The sabbatical lasts from two to four weeks, as determined by the recipient. The exchange ambassador will receive up to \$4,000 as a stipend, depending on the length of the sabbatical, and up to \$1,000 for roundtrip transportation.

The application deadline is **March 1, 2013**. Winners will be announced at the NEHA 2013 Annual Educational Conference & Exhibition in Washington, DC, in July 2013. The sabbatical must be completed between August 1, 2013, and June 1, 2014.

For more information, contact Terry Osner at tosner@neha.org.

To access the online application, visit www.neha.org/about/awardinfo.html.

JEH QUIZ

FEATURED ARTICLE QUIZ #2

Altitude and Environmental Climate Effects of Bronchiolitis Severity Among Children Presenting to the Emergency Department

Available to those holding an Individual NEHA membership only, the *JEH* Quiz, offered six times per calendar year through the *Journal of Environmental Health*, is a convenient tool for self-assessment and an easily accessible means to accumulate continuing-education (CE) credits toward maintaining your NEHA credentials.

1. Read the featured article carefully.
2. Select the correct answer to each *JEH* Quiz question.
3. a) Complete the online quiz at www.neha.org (click on "Continuing Education"),
b) Fax the quiz to (303) 691-9490, or
c) Mail the completed quiz to
JEH Quiz, NEHA
720 S. Colorado Blvd., Suite 1000-N
Denver, CO 80246.
Be sure to include your name and membership number!
4. One CE credit will be applied to your account with an effective date of October 1, 2012 (first day of issue).
5. Check your continuing education account online at www.neha.org.
6. You're on your way to earning CE hours!

Quiz Registration

Name _____

NEHA Member No. _____

Home phone _____

Work phone _____

E-mail _____

JEH Quiz #6 Answers May 2012

- | | | | |
|------|------|------|-------|
| 1. e | 4. b | 7. a | 10. b |
| 2. b | 5. d | 8. d | 11. a |
| 3. a | 6. b | 9. c | 12. d |

→ Quiz deadline: January 1, 2013

1. Bronchiolitis is an acute lower respiratory tract infection in younger children most commonly caused by seasonal viruses, such as
 - a. human rhinovirus.
 - b. parainfluenza viruses.
 - c. human metapneumovirus.
 - d. a and c.
 - e. all the above.
2. The pediatric clinical definition of bronchiolitis is the "constellation of clinical symptoms and signs including viral upper respiratory prodrome followed by decreased respiratory effort and wheezing in children less than 2 years of age."
 - a. True.
 - b. False.
3. Asthma severity in children has been associated with ___ and ___.
 - a. high temperature, decreased wind speed
 - b. high temperature, increased wind speed
 - c. low temperature, decreased wind speed
 - d. low temperature, increased wind speed
4. Absolute humidity is ___ associated with influenza transmission and survival.
 - a. more strongly
 - b. less strongly
 - c. not
5. This study involved patient enrollment at ___ emergency departments in ___ states across the U.S.
 - a. 15, 30
 - b. 30, 30
 - c. 30, 15
 - d. 45, 15
6. ___ and ___ were used as the primary markers for bronchiolitis severity as they are more consistent across age groups and altitude.
 - a. Respiratory rates, chest retractions
 - b. Respiratory rates, oxygen saturation
 - c. Chest retractions, decreased air entry
 - d. Decreased air entry, oxygen saturation
7. The environmental data compiled for this research included temperature, dew point, wind speed, precipitation, altitude, and barometric pressure.
 - a. True.
 - b. False.
8. Relative humidity is a better indicator of moisture in the air than dew point.
 - a. True.
 - b. False.
9. Air entry was severely abnormal for ___ of the children enrolled in the prospective study.
 - a. 61%
 - b. 42%
 - c. 17%
 - d. 2%
10. An increase in ___ was associated with lower admission rates.
 - a. humidity
 - b. dew point
 - c. altitude
 - d. wind speed
11. An increase in ___ was associated with both an increase in severity of retractions and decreased air speed.
 - a. humidity
 - b. dew point
 - c. altitude
 - d. wind speed
12. The study collected specific living environmental data.
 - a. True.
 - b. False.

Visit →

neha.org

- e-Learning
- R&D Programs
- NEHA in Action
- Credentials
- Continuing Education
- NEHA Food Safety Training
- Awards & Sabbaticals
- Scholaships
- Position Papers
- Affiliated Organizations
- Links
- Students Section

fyi

Address changes take approximately thirty days to become effective. To ensure that you don't miss a single issue of the *Journal*, please notify us as soon as possible of your new address.

Thanks!

Look For The Orange™

When experienced inspectors see lamps in the field with the familiar Shat-R-Shield orange label, they *know* the most reliable shatter-resistant lighting products are *on-the-job*. SRS has kept the workplace safe from the risks of unprotected glass since 1976.

Insist on the real deal--
Shat-R-Shield Orange.

- Fluorescents
- Heat Lamps
- Bug Lamps
- Incandescents
- Glass Globes
- UV/Germicidals
- Compact Fluorescents

SRS skin-tight, clear & tough safety coatings are guaranteed not to crack, peel or yellow.

shat-r-shield® INC.
PLASTIC-COATED, SHATTERPROOF LAMPS & LIGHTING PRODUCTS



Orange is a registered trademark of Shat-R-Shield, Inc.

tel: (800) 223-0853 www.shatshield.com



Did You Know?

NEHA credential holders must complete continuing education (CE) to maintain their credential. The *JEH* quiz is a convenient way to earn up to six hours of CE credit a year. To submit other CEs, find answers to frequently asked questions, and access a list of ways to earn CEs, go to www.neha.org/CEweb/CE.asp.

SUPPORT THE NEHA ENDOWMENT FOUNDATION

The NEHA Endowment Foundation was established to enable NEHA to do more for the environmental health profession than its annual budget might allow. Special projects and programs supported by the foundation will be carried out for the sole purpose of advancing the profession and its practitioners.

Individuals who have contributed to the foundation are listed below by club category. These listings are based on what people have actually donated to the foundation—not what they have pledged. Names will be published under the appropriate category for one year; additional contributions will move individuals to a different category in the following year(s). For each of the categories, there are a number of ways NEHA recognizes and thanks contributors to the foundation. If you are interested in contributing to the Endowment Foundation, please fill out the pledge card or call NEHA at 303.756.9090.

Thank you.

DELEGATE CLUB (\$25-\$99)

Name in the Journal for one year and endowment pin.

HONORARY MEMBERS CLUB

(\$100-\$499)

Letter from the NEHA president, name in the Journal for one year, and endowment pin.

Amer El-Ahraf, DrPH

Huntington Beach, CA

Scott M. Golden, RS, MSEH

Grove City, OH

David F. Ludwig, MPH

Gilbert, AZ

Bette J. Packer, REHS

Andover, MN

B. Robert Rothenhoefer, II, RS, REHS, CP-FS

Falls Church, VA

21st CENTURY CLUB (\$500-\$999)

Name in AEC program book, name submitted in drawing for a free one-year NEHA membership, name in the Journal for one year, and endowment pin.

James J. Balsamo, Jr., MS, MPH, MHA, RS, CP-FS

Metairie, LA

George A. Morris, RS

Dousman, WI

Peter Schmitt

Shakopee, MN

SUSTAINING MEMBER CLUB

(\$1,000-\$2,499)

Name in AEC program book, name submitted in drawing for a free two-year NEHA membership, name in the Journal for one year, and endowment pin.

Walter P. Saraniecki, MS, LDN, LEPH, REHS/RS

Chicago, IL

AFFILIATES CLUB

(\$2,500-\$4,999)

Name in AEC program book, name submitted in drawing for a free AEC registration, name in the Journal for one year, and endowment pin.

EXECUTIVE CLUB AND ABOVE

(\$5,000-\$100,000)

Name in AEC program book, special invitation to the AEC President's Reception, name in the Journal for one year, and endowment pin.

NEHA ENDOWMENT FOUNDATION PLEDGE CARD

I pledge to be a NEHA Endowment Foundation Contributor in the following category:

- | | | |
|---|--|--|
| <input type="radio"/> Delegate Club (\$25) | <input type="radio"/> Affiliates Club (\$2,500) | <input type="radio"/> Visionary Society (\$50,000) |
| <input type="radio"/> Honorary Members Club (\$100) | <input type="radio"/> Executive Club (\$5,000) | <input type="radio"/> Futurists Society (\$100,000) |
| <input type="radio"/> 21 st Century Club (\$500) | <input type="radio"/> President's Club (\$10,000) | <input type="radio"/> You have my permission to disclose the fact and amount (by category) of my contribution and pledge. |
| <input type="radio"/> Sustaining Members Club (\$1,000) | <input type="radio"/> Endowment Trustee Society (\$25,000) | |

I plan to make annual contributions to attain the club level of _____ over the next _____ years.

Signature _____ Print Name _____

Organization _____ Phone _____

Street Address _____ City _____ State _____ Zip _____

Enclosed is my check in the amount of \$ _____ payable to **NEHA Endowment Foundation**.

Please bill my: MasterCard/Visa Card # _____ Exp. Date _____

Signature _____

MAIL TO: NEHA, 720 S. Colorado Blvd., Suite 1000-N, Denver, CO 80246, or FAX to: 303.691.9490.

1210JEHEND

SPECIAL NEHA MEMBERS

Sustaining Members

Albuquerque Environmental Health Department
lstoller@cabq.gov

Allegheny County Health Department
Steve Steingart
www.county.allegheeny.pa.us

American Academy of Sanitarians (AAS)
Gary P. Noonan
www.sanitarians.org

Anua
Martin Hally
www.anua-us.com

Arlington County Public Health Division
www.arlington.us

Association of Environmental Health Academic Programs
www.aehap.org

CDP, Inc.
Mike Peth
www.cdpehs.com

Chemstar Corp
Henry Nahmad
hnahmad@chemstarcorp.com
www.chemstarcorp.com

City of Bloomington
www.ci.bloomington.mn.us

City of Winston-Salem
ritchib@cityofws.org

Coalition To End Childhood Lead Poisoning
Ruth Ann Norton
ranorton@leadsafe.org

Comark Instruments Inc.
Alan Mellinger
www.comarkusa.com

Decade Software Company LLC
Darryl Booth
www.decadesoftware.com

DEH Child Care
www.denvergov.org/DEH

Del Ozone
Beth Hamil
beth@delozone.com

DeltaTRAK, Inc.
Paul Campbell
pcampbell@deltatrak.com

Diversey, Inc.
Steve Hails
www.diversey.com

DuPage County Health Department
www.dupagehealth.org

Ecolab
Robert Casey
robert.casey@ecolab.com
www.ecolab.com

EcoSure
charlesa.arnold@ecolab.com

English Sewage Disposal, Inc.
(756) 358-4771

Environmental Health, Chesapeake Health Department
Yunice Bellinger
(757) 382-8672

Evansville in Water & Sewer Utility
Jeff Merrick
jmerrick@ewsu.com

FDA Food Defense Oversight Team
Jason Bashura
www.fda.gov/Food/FoodDefense/default.htm

Food Safety News
info@foodsafetynews.com

Giant Microbes
Jeff Elsner
www.giantmicrobes.com

Gila River Indian Community, Environmental Health Services
ehshelpdesk@gric.nsn.us

GLO GERM/Food Safety First
Joe D. Kingsley
www.glogerm.com

HealthSpace USA Inc
Joseph Willmott
www.healthspace.com

Intertek
Phil Mason
www.intertek.com

Jefferson County Health Department
Joe Hainline
www.jeffcohealth.org

Kansas Department of Health & Environmental
jrheads@kdheks.gov

Kenosha County Division of Health
www.kenosha.wi.us/dhs/divisions/health

LaMotte Company
Sue Byerly
sbyerly@lamotte.com

Linn County Public Health
health@linncounty.org

Living Machine Systems
www.livingmachines.com

Macomb County Environmental Health Association
jarrod.murphy@macombcounty.gov

Madison County Health Department
www.madisoncountync.org

Maricopa County Environmental Services
jkolman@mail.maricopa.gov

Mars Air Doors
Steve Rosol
www.marsair.com

MindLeaders
www.mindleaders.com

Mitchell Humphrey
www.mitchellhumphrey.com

Mycometer
www.mycometer.com

National Environmental Health Science Protection & Accreditation Council
www.ehacoffice.org

National Registry of Food Safety Professionals
Lawrence Lynch
www.nrfsp.com

National Restaurant Association
David Crownover
www.restaurant.org

National Swimming Pool Foundation
Michelle Kavanaugh
www.nspf.org

NCEH/ATSDR (National Center for Environmental Health/Agency for Toxic Substances and Disease Registry)
www.cdc.gov

New Hampshire Health Officers Association
jbjervis03833@yahoo.com

New Jersey State Health Department
James Brownlee
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

Oneida Indian Tribe of Wisconsin
www.oneidanation.org

Orkin
Zia Siddiqi
orkincommercial.com

Ozark River Hygienic Hand-Wash Station
www.ozarkriver.com

Palintest USA
Terry McHugh
tmchugh@palintestusa.com

Pender County Health Department
dmcvey@pendercountync.gov

Proctor and Gamble, Co.
Barbara Warner
warner.bj.2@pg.com
www.pg.com

Prometric
www.prometric.com

Public Health Foundation Enterprises
www.phfe.org

San Jamar
www.sanjamar.com

Seattle & King County Public Health
Michelle Pederson
michelle.pederson@kingcounty.gov

Shat-R-Shield Inc.
Anita Yost
www.shat-r-shield.com

SneezeGuard Solutions Inc.
Bill Pfeifer
www.sneeze-guard-solutions.com

St. Johns Housing Partnership
www.sjhp.org

StateFoodSafety.com
Christie H. Lewis, PhD
www.StateFoodSafety.com

Steton Technology Group Inc.
www.steton.com

Sweeps Software, Inc.
Kevin Thrasher
www.sweepssoftware.com

Target Corporation
www.target.com

Taylor Technologies, Inc.
www.taylor technologies.com

Texas Roadhouse
www.texasroadhouse.com

The Mahfood Group, LLC
vmahfood@themahfoodgroup.com

The Steritech Group, Inc.
www.steritech.com

Tri-County Health Department
www.tchd.org

Underwriters Laboratories, Inc.
Gus Schaeffer
www.ul.com

Waco-McLennan County Public Health District
davidl@ci.waco.tx.us

Winn-Dixie Stores
www.winn-dixie.com

WVDHHR Office of Environmental Health Services
www.wvdhhr.ogr

XOS
www.xos.com

Educational Institution Members

American Public University
Tatiana Sehring
StudyatAPU.com/NEHA

Colorado State University, Department of Environmental/Radiological Health
www.colostate.edu

Dartmouth College, Environmental Health & Safety
michael.blaney@dartmouth.edu

Dickinson State University-Environmental Health Program
www.dsu.nodak.edu

East Tennessee State University, DEH
Phillip Scheuerman
www.etsu.edu

Internachi-International Association of Certified Home Inspectors
Nick Gromicko
lisa@internachi.org

University of Nebraska 

SPECIAL LISTING

The board of directors includes NEHA's nationally elected officers and regional vice presidents. Affiliate presidents (or appointed representatives) comprise the Affiliate Presidents Council. Technical advisors, the executive director, and all past presidents of the association are ex-officio council members. This list is current as of press time.



Carolyn Hester Harvey,
PhD, CIH, RS, DAAS, CHMM
First Vice President

National Officers

President—Brian Collins, MS, REHS, DAAS, Director of Environmental Health, City of Plano Health Department, 1520 Avenue K, Ste. 210, Plano, TX 75074-6232. Phone: (972) 941-7334; e-mail: briancc@plano.gov

President Elect—Alicia Enriquez, REHS, Deputy Chief, Environmental Health Division, County of Sacramento, Environmental Management Department, 10590 Armstrong Avenue, Suite B, Mather, CA 95655-4153. Phone: (916) 875-8440; e-mail: enriqueza@saccounty.net

First Vice President—Carolyn Hester Harvey, PhD, CIH, RS, DAAS, CHMM, Professor, Director of MPH Program, Department of Environmental Health, Eastern Kentucky University, Dizney 220, 521 Lancaster Avenue, Richmond, KY 40475. Phone: (859) 622-6342; e-mail: carolyn.harvey@eku.edu

Second Vice President—Bob Custard, REHS, CP-FS, Environmental Health Manager, Alexandria Health Department, 4480 King St., Alexandria, VA 22302. Phone: (703) 746-4970; e-mail: Bob.Custard@vhd.virginia.gov

Immediate Past President—Mel Knight, REHS, 109 Gold Rock Court, Folsom, CA 95630. Phone: (916) 989-4224; Cell: (916) 591-2611; e-mail: melknight@sbcglobal.net

NEHA Executive Director—Nelson E. Fabian (non-voting ex-officio member of the board of directors), 720 S. Colorado Blvd., Suite 1000-N, Denver, CO 80246-1926. Phone: (303) 756-9090, ext 301; e-mail: nfabian@neha.org

Regional Vice Presidents

Region 1—David E. Riggs, REHS/RS, MS, 2535 Hickory Ave., Longview, WA 98632. Phone: (360) 430-0241; e-mail: davidriggs@comcast.net. Alaska, Idaho, Oregon, and Washington. Term expires 2014.

Region 2—David Ludwig, MPH, RS, Manager, Environmental Health Division, Maricopa County Environmental Services Department, 1001 N. Central Avenue, Suite #300, Phoenix, AZ 85004. Phone: (602) 506-6971; e-mail: dludwig@mail.maricopa.gov. Arizona, California, Hawaii, Nevada. Term expires 2015.

Region 3—Roy Kroeger, REHS, Environmental Health Supervisor, Cheyenne/Laramie County Health Department, 100 Central Avenue, Cheyenne, WY 82008. Phone: (307) 633-

4090; e-mail: roykehs@laramiecounty.com. Colorado, Montana, Utah, Wyoming, and members residing outside of the U.S. (except members of the U.S. armed forces). Term expires 2015.

Region 4—Keith Johnson, RS, Administrator, Custer Health, 210 2nd Avenue NW, Mandan, ND 58554. Phone: (701) 667-3370; e-mail: keith.johnson@custerhealth.com. Iowa, Minnesota, Nebraska, North Dakota, South Dakota, and Wisconsin. Term expires 2013.

Region 5—Sandra Long, REHS, RS, Inspection Services Supervisor, City of Plano Health Department, 1520 K Avenue, Suite #210, Plano, Texas 75074. Phone: (972) 941-7143 ext. 5282; Cell: (214) 500-8884; e-mail: sandral@plano.gov. Arkansas, Kansas, Louisiana, Missouri, New Mexico, Oklahoma, and Texas. Term expires 2014.

Region 6—Adam London, RS, MPA, Environmental Health Director, Kent County Health Department, 700 Fuller NE, Grand Rapids, MI 49503. Phone: (616) 632-6916; e-mail: adam.london@kentcountymi.gov. Illinois, Indiana, Kentucky, Michigan, and Ohio. Term expires 2013.

Region 7—CAPT John A. Steward, REHS, MPH, CAPT, USPHS (ret), Institute of Public Health, Georgia State University, P.O. Box 3995, Atlanta, GA 30302-3995. Phone: (404) 651-1690; e-mail: jsteward@gsu.edu. Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee. Term expires 2014.

Region 8—Vacant

Region 9—Edward L. Briggs, MPH, MS, REHS, Director of Health, Town of Ridgefield Dept. of Health, 66 Prospect Street, Ridgefield, CT 06877. Phone: (203) 431-2745; e-mail: eb.health@ridgefieldct.org. Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. Term expires 2013.

Affiliate Presidents

Alabama—Steven McDaniel, Public Health Area Environmental Director, Alabama Department of Public Health, 2500 Fairlane Dr., Ste. 200, Bldg. 2, Montgomery, AL 36116. Phone: (334) 277-8464; e-mail: steven.mcdaniel@adph.state.al.us

Alaska—John B. Gazaway, Environmental Health Specialist, 825 L Street, Anchorage, AK 99501. Phone: (907) 343-4063; e-mail: gazawayjb@muni.org

Arizona—Shikha Gupta, Environmental Operations Program Supervisor, Maricopa County, 1001 N. Central Ave, Ste. 401, Phoenix, AZ 85004. Phone: (602) 506-6939; e-mail: sgupta@mail.maricopa.gov

Arkansas—Jeff Jackson, 740 California Street, Camden, AR 71701. E-mail: jeff.jackson@arkansas.gov

California—Brenda Faw, Senior REHS, California Department of Public Health EHS-Net, 1500 Capitol Ave., MS7602, Sacramento, CA 95814. Phone: (916) 445-9548; e-mail: brenda.faw@cdph.ca.gov

Colorado—Joseph Malinowski, Boulder County Public Health, Environmental Health Division Manager, 3450 Broadway, Boulder, CO 80304. Phone: (303) 441-1197

Connecticut—Elizabeth Kavanah, MS, RS, EH Sanitarian 2, City of Hartford, 131 Coventry Street, Hartford, CT 06112. Phone: (860) 757-4757; e-mail: ekavanah@hartford.gov

Florida—Charles Henry, MPA, REHS/RS, Administrator, Sarasota County Health Department, 2200 Ringling Blvd., Sarasota, FL 34237. Phone: (941) 861-2950; e-mail: charles_henry@doh.state.fl.us

Georgia—Allison Strickland, phone: (912) 427-5768

Hawaii—John Nakashima, Sanitarian IV, Food Safety Education Program, Hawaii Dept. of Health, 1582 Kamehameha Avenue, Hilo, HI 96720. Phone: (808) 933-0931; e-mail: john.nakashima@doh.hawaii.gov

Idaho—Jami Delmore, Idaho Southwest District Health, P.O. Box 850, Caldwell, ID 83606. Phone: (208) 455-5403; e-mail: jami.delmore@phd3.idaho.gov

Illinois—Michael Charley, EH Supervisor, Village of Oak Park Health Dept., 123 Madison Street, Oak Park, IL 60302. Phone: (708) 358-5489; e-mail: charley@oak-park.us

Indiana—Joshua Williams, Administrator, Delaware County Health Dept., 100 W. Main Street, Muncie, IN 47305. Phone: (756) 747-7721; e-mail: jwilliams@co.delaware.in.us

Iowa—Tim Dougherty, Environmental Health Specialist, 600 West 4th Street, Davenport, IA 52801. Phone: (563) 326-8618, ext. 8820; e-mail: tdougherty@scottcounty iowa.com

Jamaica—Andrea Brown-Drysdale, Jamaica Association of Public Health Inspectors, Shop #F201, Rodneys Memorial, Emancipation Square, P.O. Box 616, Spanish Town, St. Catherine, Jamaica. Phone: (876) 840-1223; e-mail: jahandrea@yahoo.com

Kansas—Levi H. Beaver, 718 West Fifth Street, Lyons, KS 67554. Phone: (620) 257-5331; e-mail: levi@ricecounty.us

Kentucky—Kenny Cole, REHS, Estill County Health Dept., P.O. Box 115, Irvine, KY 40336. Phone: (606) 723-5181; e-mail: kennyc@ky.gov

Louisiana—Tammy Toups, Environmental Scientist, 110 Barataria St., Lockport, LA 70704. Phone: (985) 532-6206; e-mail: tammy.toups@la.gov

Maryland—James Lewis, 14 Spyglass Court, Westminster, MD 21158-4401. Phone: (410) 537-3300; e-mail: jlewis@md.state.md.us

Massachusetts—Heidi Porter, Bedford Board of Health, 12 Mudge Way, Bedford, MA 01730. Phone: (781) 275-6507; e-mail: president@maeha.org

Michigan—Adeline Hambley, REHS, Ottawa County Health Department, 12251 James Street, Suite 200, Holland, MI 49424. Phone: (616) 393-5635; e-mail: ahambley@meha.net.

Minnesota—Daniel Disrud, Sanitarian, Anoka County Community Health and Environmental Services, PO Box 441, Anoka, MN 55303-0441. Phone: (763) 422-7062; e-mail: dan.disrud@co.anoka.mn.us

Mississippi—Eugene Herring, Wastewater Program Specialist, Mississippi Department of Health, P.O. Box 1700, 0-300, Jackson, MS 39215-1700. Phone: (601) 576-7695; e-mail: eugene.herring@msdh.state.ms.us

Missouri—Paul Gregory, Hiland Dairy Foods Company, 1133 E. Kearney, Springfield, MO 65801. Phone: (417) 862-9311; e-mail: pgregory@hilanddairy.com

Montana—Karen Solberg, RS/REHS, Tri-County Environmental Health, 800 South Main, Anaconda, MT 59711. Phone: (406) 563-4067; e-mail: ksolberg@anacondadeerlodge.mt.gov

National Capitol Area—Victoria Griffith, President, Griffith Safety Group, 9621 Franklin Woods Place, Lorton, VA 22079. Phone: (202) 400-1936; e-mail: vicki@griffithsafetygroup.com

Nebraska—Scott Holmes, Manager, Environmental Public Health Division, Lincoln-Lancaster County Health Department, 3140 N Street, Lincoln, NE 68510. Phone: (402) 441-8634; e-mail: sholmes@lincoln.ne.gov

Nevada—John Wagner, Environmental Health Specialist, P.O. Box 30992, Las Vegas, NV 89173. E-mail: wagner@snhdmail.org

New Jersey—Aimee Puluso, REHS, Wayne Health Department, 475 Valley Road, Wayne, NJ 07470. Phone: (973) 694-1800, ext. 3245; e-mail: adjeha@gmail.com

New Mexico—Lucas Tafoya, 111 Union Square SE, #300, Albuquerque, NM 87102. Phone: (505) 314-0310; e-mail: ltafoya@berncogov

New York—Contact Region 9 Vice President Edward L. Briggs, Director of Health, Town of Ridgefield Dept. of Health, 66 Prospect Street, Ridgefield, CT 06877. Phone: (203) 431-2745; e-mail: eb.health@ridgefieldct.org

North Carolina—Lynn VanDyke, Craven County Health Dept., 2818 Neuse Blvd., New Bern, NC 28561. Phone: (252) 636-4936; e-mail: lvandyke@cravencountync.gov

North Dakota—Lisa Otto, First District Health Unit, P.O. Box 1268, Minot, ND 58702. Phone: (701) 852-1376; e-mail: ecotto@nd.gov

Northern New England Environmental Health Association—Co-president

Brian Lockard, Health Officer, Salem Health Dept., 33 Geremonty Dr., Salem, NH 03079. Phone: (603) 890-2050; e-mail: blockard@ci.salem.nh.us

Co-president Thomas Sloan, RS, Agricultural Specialist, NH Dept. of Agriculture, P.O. Box 2042, Concord, NH 03302. Phone: (603) 271-3685; e-mail: tsloan@agr.state.nh.us

Ohio—Jennifer Wentzel, Sanitarian Supervisor, Public Health—Dayton & Montgomery, 117 S. Main St., Dayton, OH 45422. Phone: (937) 225-5921; e-mail: jwentzel@phdmc.org

Oklahoma—Lovetta Phipps, Environmental Health Specialist, Cherokee Nation Office of Environmental Health, 115 W. North Street, Tahlequah, OK 74464. Phone: (918) 453-5130; e-mail: lphipp@cherokee.org

Oregon—**Ian Stromquist**, e-mail: istromquist@co.coos.or.us

Past Presidents—**Keith L. Krinn, RS, MA, DAAS, CPHA**, Environmental Health Administrator, Columbus Public Health, 240 Parsons Ave., Columbus, OH 43215-5331. Phone: (614) 645-6181; e-mail: klkrinn@columbus.gov

Pennsylvania—**Dr. Evelyn Talbot**, President of Environmental Section of PPHA. PA contact: Jay Tarara, littlefamily@aol.com

Rhode Island—**Martha Smith Patnoad**, Cooperative Extension Professor/Food Safety Education Specialist, University of Rhode Island, 112 B. Ranger Hall, 10 Ranger Road, Kingston, RI 02881. Phone: (401) 874-2960; e-mail: mpatnoad@uri.edu

Saudi Arabia—**Zubair M. Azizkhan**, Environmental Scientist, Saudi Arabian Oil Company. P.O. Box 5250, MC 135, Jeddah 21411, Saudi Arabia. Phone: +966-2-427-0158; e-mail: Zubair.azizkhan@aramco.com.sa

South Carolina—**Richard Threatt**, e-mail: threatt@dhec.sc.gov

South Dakota—**Roger Puthoff**, SD Dept of Public Safety, 1105 Kansas Ave. SE, Huron, SD 57350. Phone: (605) 352-5596; e-mail: roger.puthoff@state.sd.us

Tennessee—**David Garner**, 5th Floor Cordell Hull Building, 425 5th Avenue, Nashville, TN 37247. Phone: (615) 741-8536; e-mail: david.garner@tnenvironmentalhealth.org

Texas—**Janet Tucker**, Environmental Health Specialist, City of Richardson, P.O. Box 830309, Richardson, TX 75083-0309. Phone: (972) 744-4077; e-mail: janet.tucker@cor.gov

Uniformed Services—**Timothy A. Kluchinsky, Jr., DrPH, MSPH, RS/REHS-E**, Program Manager, U.S. Army Health Hazard Assessment Program, U.S. Army Public Health Command, ATTN: HHA, E-1570, 5158 Blackhawk Road, Aberdeen Proving Ground, MD 21010-5403. Phone: (410) 436-1061; e-mail: timothy.kluchinsky@us.army.mil

Utah—**Dave Spence**, Environmental Health Director, Davis County Health Department, P.O. Box 618, Farmington, UT 84025. Phone: (801) 525-5162; e-mail: davids@co.davis.ut.us

Virginia—**Preston K. Smith**, Environmental Health Coordinator, 109 Governor Street, 5th Floor, Richmond, VA 23219. Phone: (804) 864-7468; e-mail: preston.smith@vdh.virginia.gov

Washington—**Geoffrey Crofoot**, Environmental Health Specialist, Washington State Environmental Health Association, 3020 Rucker, Suite 104, Everett, WA 98201. Phone: (425) 339-5250; e-mail: gcrofoot@shd.snohomish.wa.gov

West Virginia—**Ryan Harbison**, West Virginia Board of Public Health, P.O. Box 368, Wayne, WV 25570-0368. Phone: (304) 722-0611; e-mail: ryan.t.harbison@wv.gov

Wisconsin—**Todd Drew**, Environmental Health Sanitarian, City of Menasha Health Department, 316 Racine St., Menasha, WI 54952. Phone: (920) 967-3522; e-mail: tdrew@ci.menasha.wi.us

Wyoming—**Neal Bloomerader**, 2049 West 43rd, Casper, WY 82604. Phone: (307) 472-0952; e-mail: nbloom@state.wy.us

NEHA Historian

Dick Pantages, NEHA Past President, Fremont, CA. E-Mail: dickpantages@comcast.net

Technical Advisors

Ambient Air—**Scott Holmes, REHS/RS**, Environmental Public Health Manager, Lincoln-Lancaster County Health Department, Lincoln, NE. Phone: (402) 441-8634; e-mail: sholmes@lincoln.ne.gov

Children's EH—**M.L. Tanner, HHS**, Environmental Health Manager III, Bureau of Environmental Health, Division of Enforcement, South Carolina Department of Health and Environmental Control, Columbia, SC. Phone: (803) 896-0655; e-mail: tannerml@dhec.sc.gov

Disaster/Emergency Response—**Vince Radke, MPH, REHS, CP-FS, DAAS**, Sanitarian, CDC/NCEH/DEEHS/EHSB, Atlanta, GA. Phone: (770) 488-4136; e-mail: vradke@cdc.gov

Drinking Water—**Robert Warner, CP-FS**, Environmental Health Scientist, Draper, UT. Phone: (435) 843-2340; e-mail: rwarn@utah.gov

Emerging Pathogens—**Lois Maisel, RN, CP-FS**, Environmental Health Specialist II, Fairfax County Health Department, Fairfax, VA. Phone: (703) 246-8442; e-mail: lois.maisel@fairfaxcounty.gov

Environmental Justice—**Sheila D. Pressley, PhD, REHS/RS**, Associate Professor, Environmental Health Sciences Department, Eastern Kentucky University, Richmond, KY. Phone: (859) 622-6339; e-mail: sheila.pressley@eku.edu

Food (including Safety and Defense)—**John A. Marcello, REHS, CP-FS**, Pacific Regional Food Specialist, U.S. Food and Drug Administration, Tempe, AZ. Phone: (480) 829-7396, ext. 35; e-mail: john.marcello@fda.hhs.gov

General—**Eric Pessell, REHS**, Environmental Health Division Director, Barry-Eaton District Health Department, Charlotte, MI. Phone: (517) 541-2639; e-mail: epessell@bedhd.org

Hazardous Materials/Toxic Substances—**Priscilla Oliver, PhD**, Life Scientist/Program Manager, U.S. EPA, Atlanta, GA. Phone: (404) 703-4884; e-mail: POLIVERMSM@aol.com

Healthy Homes and Healthy Communities—**Sandra Whitehead, MPA**, Environmental Public Health Planner, Division of Environmental Health, Florida Department of Health, Tallahassee, FL. Phone: (850) 245-4444, ext. 2660; e-mail: Sandra.Whitehead@doh.state.fl.us

Indoor Air—**Thomas H. Hatfield, DrPH, REHS, DAAS**, Professor and Chair, Department of Environmental and Occupational Health, California State University, Northridge (CSUN), Northridge, CA. Phone: (818) 677-7476; e-mail: thomas.hatfield@csun.edu

Injury Prevention—**CDR Donald B. Williams, REHS, MPH, DAAS**, U.S. Public Health Service, Indian Health Service, Tucson, AZ. Phone: (520) 295-5638; e-mail: Donald.Williams@ihs.gov

Institutions/Schools—**Angelo Bellomo, REHS**, Director of Environmental Health, Los Angeles County Department of Public Health—Environmental Health, Baldwin Park, CA. Phone: (626) 430-5100; e-mail: abellomo@ph.lacounty.gov

International—**Sylvanus Thompson, PhD, CPHI (C)**, Quality Assurance Manager, Toronto Public Health, Toronto, ON, Canada. E-mail: sthomps@toronto.ca

Land Use Planning/Design—**Steve Konkel, PhD**, Associate Professor of Health, University of Alaska Anchorage, Anchorage, AK. Phone: (907) 786-6522; e-mail: steven.konkel@uaa.alaska.edu

Legal—**Bill Marler**, Attorney, Marler Clark, The Food Safety Law Firm, Seattle, WA. Phone: (206) 346-1888; e-mail: bmarler@marlerclark.com

Management Policy (including Leadership)—**Val F. Siebal, REHS/RS, NMT**, Director, Environmental Management Department, County of Sacramento, Mather, CA. Phone: (916) 875-8444; e-mail: siebalv@saccounty.net

Meteorology/Weather/Global Climate Change—**James Speckhart, MS**, Industrial Hygienist, Norfolk, VA. Phone: (907) 617-2213; e-mail: beacon_3776@hotmail.com

Occupational Health/Safety—**Donald Gary Brown, DrPH, CIH, RS**, Professor, Eastern Kentucky University, Richmond, KY. Phone: (859) 622-1992; e-mail: gary.brown@eku.edu

Pools/Spas—**Colleen Maitoza, REHS**, Supervising Environmental Specialist, Environmental Management Department, County of Sacramento, Mather, CA. Phone: (916) 875-8512; e-mail: maitozac@saccounty.net

Radiation/Radon—**R. William Field, PhD, MS**, Professor, College of Public Health, University of Iowa, Iowa City, IA. Phone: (319) 335-4413; e-mail: bill-field@uiowa.edu

Recreational EH—**Tracynda Davis, MPH**, Director of Environmental Health Programs, National Swimming Pool Foundation, Colorado Springs, CO. Phone: (719) 540-9119; e-mail: tracynda.davis@nspf.org

Risk Assessment—**Sharron LaFollette, PhD**, Chair, Public Health Department, University of Illinois at Springfield, Springfield, IL. Phone: (217) 206-7894; e-mail: slafol@uis.edu

Sustainability—**Tom R. Gonzales, MPH, REHS**, Environmental Health Director, El Paso County Public Health, Colorado Springs, CO. Phone: (719) 578-3145; e-mail: TomGonzales@epchealth.org

Mark McMillan, MS, Oil and Gas Team Supervisor, Colorado Department of Public Health and Environment, Denver, CO. Phone: (303) 692-3140; e-mail: mark.mcmillan@state.co.us

Technology (including Computers, Software, GIS, and Management Applications)—**Darryl Booth, MBA**, Product Manager, Decade Software Company, Fresno, CA. Phone: (800) 233-9847, ext. 702; e-mail: darrylbooth@decadesoftware.com

Terrorism/All Hazards Preparedness—**Louis Dooley, RS, MS-EH**, Retired Director of Environmental Health, Lakewood, WA. Phone: (253) 495-9929; e-mail: lou_done@yahoo.com

Vector Control—**Zia Siddiqi, PhD**, Director of Quality Systems, Orkin, Inc., Atlanta, GA. Phone: (770) 220-6030; e-mail: zsiddiqi@rollins.com

Wastewater—**Craig Gilbertson, RS**, Environmental Planner, TrackAssist-Online, Walker, MN. Phone: (218) 252-2382; e-mail: cgilbertson@yahoo.com

Water Pollution Control/Water Quality—**Sharon Smith, RS**, West Central Region Supervisor, Minnesota Department of Health, Fergus Falls, MN. Phone: (218) 332-5145; e-mail: sharon.l.smith@state.mn.us

Workforce Development—**Ron de Burger, CPH, CPHI**, Director, Toronto Public Health, Toronto, ON, Canada. Phone: (416) 392-1356; e-mail: rdeburg@toronto.ca

NEHA Staff: (303) 756-9090

Rance Baker, Program Administrator, NEHA Entrepreneurial Zone, ext. 306, rbaker@neha.org

Trisha Bramwell, Customer & Member Services Specialist, ext. 336, tbramwell@neha.org

Andrew Brissette, Sales and Training Support, NEHA Entrepreneurial Zone, ext. 340, abrissette@neha.org

Laura Brister, Customer & Member Services Specialist, AEC Registration Coordinator, ext. 309, lbrister@neha.org

Ginny Coyle, Grants/Projects Specialist, ext. 346, gcoyle@neha.org

Jill Cruickshank, Marketing and Communications Manager, ext. 342, jrcruickshank@neha.org

Vanessa DeArman, Project Coordinator, Research and Development, ext. 311, vdearman@neha.org

Cindy Dimmitt, Receptionist, Customer & Member Services Specialist, ext. 300, cdimmitt@neha.org

Elizabeth Donoghue-Armstrong, Copy Editor, *Journal of Environmental Health*, nehasmtp@gmail.com

Misty Duran, Continuing Education Specialist, ext. 310, mduran@neha.org

Chris Fabian, Senior Manager, Center for Priority Based Budgeting, ext. 325, cfabian@neha.org

Nelson Fabian, Executive Director, ext. 301, nfabian@neha.org

Soni Fink, Strategic Sales Coordinator, ext. 314, sfink@neha.org

Genny Homyack, Analyst, Center for Priority Based Budgeting, ext. 344, ghomyack@neha.org

Sandra Hubbard, Credentialing Specialist, ext. 328, shubbard@neha.org

Jon Johnson, Senior Manager, Center for Priority Based Budgeting, ext. 326, jjohnson@neha.org

Dawn Jordan, Customer Service Manager, Office Coordinator, HR and IT Liaison, ext. 312, djordan@neha.org

Elizabeth Landeen, Assistant Manager, Research and Development, (860) 357-2097, elandeen@neha.org

Larry Marcum, Managing Director, Research and Development and Government Affairs, Contact for National Radon Proficiency Program, ext. 303, lmarcum@neha.org

Carol Newlin, Credentialing Specialist, ext. 337, cnewlin@neha.org

Terry Osner, Senior Advisor, HR and IT, tosner@neha.org

Susan Peterson, Project Specialist, Research and Development, speterson@neha.org

Barry Porter, Financial Coordinator, ext. 308, bporter@neha.org

Kristen Ruby, Content Editor, *Journal of Environmental Health*, ext. 341, kruby@neha.org

Christl Tate, Project Coordinator, Research and Development, ext. 305, ctate@neha.org

Shelly Wallingford, Credentialing Coordinator, ext. 339, swallingford@neha.org



AEC...Customize Your Learning Experience

Blue skies, pristine beaches, and a gentle Mediterranean climate describe the backdrop for the 76th NEHA Annual Educational Conference (AEC) & Exhibition in San Diego, California! The 2012 AEC took place June 28–30. It was confirmed that attendees enjoyed San Diego as a conference destination when at the President's Banquet, NEHA's Executive Director Nelson Fabian mentioned that he had been told over and over that all NEHA AECs should be held in San Diego, and the crowd roared with applause!

But it wasn't only the destination of San Diego that drew approximately 1,100 attendees—an increase from the prior year—it was also the draw of all the training and educational sessions, opportunities to network, and the motivational and inspirational teachings from keynote speaker and senior futurist, Thomas Frey. (Check out Frey's regular *Journal* column on page 46 to get an idea of the intriguing and thought-provoking nature of his keynote address). The different facets of the conference—training, education, networking, policy involvement, advancement, and motivation and inspiration—enabled attendees to customize their own learning experiences. From the multitude of environmental health topics to the different learning environments of the Lectures and Learning Labs to the option to attend in-person or virtually, the 2012 AEC offered a fresh, progressive, and modern approach to training and education.

Over a year of planning goes into each AEC. This year's planning committee continued to build upon the multifaceted structure of the event, building upon prior successes and evolving to continue to meet the needs of the environmental health professionals in attendance. The AEC is truly one of NEHA's crowning programs that supports and fur-



thers NEHA's mission to advance the environmental health and protection profession for the purpose of providing a healthful environment for all.

The following pages provide a summary of the different facets that made up this year's

extraordinary AEC. While text and photos fail to fully represent the amazing atmosphere and broad scope of the AEC, they do highlight just how much goes on, how energized people feel, and how special this event is to NEHA and to those in attendance.

Greening of the AEC

2nd Annual Volunteer Community Event



For a second year, NEHA organized a community volunteer event at the 2012 AEC to support NEHA's sustainable efforts, reduce its carbon footprint, and give back to the AEC host city. Seventeen participants worked with Park Ranger Carole to clear 80 yards of brush in San Diego's beautiful and historic Balboa Park that will be reused as mulch. Volunteers got to enjoy the outdoors, great camaraderie with their fellow NEHA volunteers, and giving back to the community. Ralph's Supermarket donated \$25 in gift certificates and all volunteers received a NEHA water bottle. Upholding the principles of sustainability, volunteers also walked, rode the bus, took the trolley, or carpooled with a hybrid car to and from the event. Thank you to all of the volunteers for their hard work! Below is a list of volunteers.

Darryl Booth	Jenny Murphy
Sara Brown	Elisabeth Otto
Siân Buckley	Briana Overman
Carol Dellapenna	Elaine Overman
Sara Griffith	Stephanie Peugh
Margo Jones	Joyce Tuttle
Liz Kavanah	Ken Walters
Tony Lewis	Suzi Youssef

Green Initiatives at the AEC

NEHA continues to improve its efforts in greening the AEC:

- All items from the conference recycled at the hotel were weighed and NEHA **recycled over 211 pounds**. NEHA will use this information to improve its sustainability efforts in the future.
- Online registration and e-mail communications with attendees increased.
- A \$10 surcharge was automatically assessed on hard copy registrations and was donated to TerraPass (www.terra-pass.com) to offset the carbon emissions that resulted from paper waste. Also, attendees were encouraged to donate to TerraPass.
- A volunteer community event was held to offset the event's carbon footprint.
- Eco-friendly name badge ribbons were used.
- Staff and volunteers involved in the on-site registration desk were made aware of environmental policies.
- The number of hard-copy brochures sent to potential attendees was reduced by implementing an online promotional strategy, which helped cut waste produced by printing and mailing hard copies.
- The production of the conference CD was eliminated by offering these resources through the Virtual AEC instead.
- Program guides were printed locally to reduce shipping and handling.
- The "greening" of the exhibit hall was improved by creating awareness and providing training to exhibitors about ways they can help reduce waste of many forms.
- The number of cars rented by conference attendees was reduced by promoting the various alternative transportation modes offered by the City of San Diego.

- Leftover food was donated to a local charitable food distributor and to the hotel employee cafeteria.
- Food waste was composted.
- A percentage of food was prepared for all meals as vegetarian or vegan.
- Condiments were served in bulk containers whenever possible.
- Car rental companies that have green initiatives in place and opportunities for attendees to purchase carbon offsets were recommended.
- Airlines that have green initiatives in place and opportunities for attendees to purchase carbon offsets were recommended.

Host Hotel Green Initiatives

- Received the San Diego Excellence in Energy Award from the Center for Sustainable Energy.
- Certified by the Clean Marinas California Program.
- Uses energy efficient lights throughout the facility.
- Uses low-flow water fixtures.
- Purchases local food whenever possible.
- Adheres to a comprehensive recycling program.
- Provides all meeting rooms with filter water coolers.
- Composts leftover food.
- Purchases 100% recycled and biodegradable carryout bags, cups, and lids.
- Adjusts thermostats and turns of lights in vacant rooms.



National Environmental Health Association (NEHA) Annual Educational Conference (AEC) & Exhibition

Save the Dates Washington, DC ♦ July 9–11, 2013

Start planning your attendance to the NEHA AEC.

For preliminary information and pricing visit neha2013aec.org.

TRAINING *and* EDUCATION

The educational lineup at this year's AEC was outstanding in terms of both quantity and quality. Quantity-wise, 137 educational sessions covering 18 different areas of environmental health, three credential courses and exams, four preconference workshops, two poster sessions, and two off-site field trips were offered. Quality-wise, cutting-edge infrastructure including the Virtual AEC, incorporating return on investment (ROI) principles, and new educational tracks were integrated into the overall structure of the conference. With so much information packed into three days, as one attendee stated, "Society is ever changing and this conference provides so many new ways to combat the challenges those changes present to the environmental health field." Another attendee stated, "This conference and exhibition provide a great opportunity to learn new skills and enhance existing skills to improve environmental health services within the community."

NEHA's AEC again implemented ROI principles into the education and training structure. ROI principles work to ensure that attendees can return to their workplaces with the ability to more than pay for their trip to the conference by using what they learned at the event. NEHA's AEC planning committee identified objectives that the 2012 conference aimed to meet. Examples of these objectives included providing education and training that are relevant to attendees' jobs and ensuring attendees met at least five new colleagues in environmental health to contact for professional suggestions or sharing of best practices. For a complete listing of all the ROI objectives the 2012 AEC was designed to meet, please visit www.neha2012aec.org/roi.html.

The Lecture and more interactive Learning Lab sessions constituted the main structure of educational activities at the conference again this year. Outstanding speakers from a vast array of disciplines in environmental health presented on pertinent emerging topics. In the Lecture sessions, presentations on the Food Safety Modernization Act, all-hazards preparedness, and the keynote presentation drew large numbers of attendees. Likewise, the raw milk presentation, body art, and drop-in Learning Lab sessions also proved quite popular. One attendee wrote, "Working at a small health department, I have always attended conferences at the state level. These conferences always prove to be dull and



An expert panel provided a lively discussion on the programs and tools being created to help respond to food safety disasters.

not very insightful. This cannot be said about the NEHA conference. Every presentation I attended was very informative and entertaining. By far the best conference I have attended. Very nice selection of presenters." Another attendee stated that hearing "...a mother talk about why she gave her son raw milk, listening to her talk about her experience, and what happened as his disease progressed empowered me to become more vocal in my state about the real dangers of raw milk." In addition, by using roundtable discussions and hands-on activities in the Learning Lab sessions, attendees gained practical hands-on experience that can be used in their daily work.

The four preconference workshops equipped attendees with valuable training in guidance on NSF plan review, commercial ventilation, food-borne illness response strategies, and emergency response. Some of NEHA's well-reputed credentialing courses and exams, including the Certified Professional of Food Safety (CP-FS) and Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS), were also offered.

Other organizations that worked synergistically with NEHA to produce stellar educational content for the conference include the Association of Environmental Health Academic Programs, the Association of Pool and Spa Professionals, NSF International, the State Onsite Regulators Association, the California Onsite Wastewater Association, and the Uniformed Services Environmental Health Association.

Environmental Health Topics Covered

- Children's environmental health;
- emerging environmental health issues;



Session rooms were packed with attentive attendees eager to learn from the 137 educational sessions offered at the AEC.

- environmental health impact assessments;
- food protection and defense;
- general environmental health;
- hazardous materials and toxic substances;
- healthy homes and communities;
- informatics, leadership, and management;
- injury prevention and occupational health;
- international environmental health;
- onsite wastewater systems;
- pathogens and outbreaks;
- recreational waters;
- sustainability and climate change;
- technology and environmental health;
- terrorism and all-hazards preparedness;
- uniformed services;
- vector control and zoonotic diseases; and
- water quality.

NEHA's Technical Advisors

- Ambient Air—Scott Holmes, REHS/RS;
- Children's Environmental Health—M.L. Tanner, HHS;
- Disaster/Emergency Response—Vince Radke, MPH, REHS, CP-FS, DAAS;
- Drinking Water—Robert Warner, CP-FS;
- Emerging Pathogens—Lois Maisel, RN, CP-FS;
- Environmental Justice—Sheila D. Pressley, PhD, REHS/RS;
- Food (including Safety and Defense)—John A. Marcello, REHS, CP-FS;
- General—Eric Pessell, REHS;
- Hazardous Materials/Toxic Substances—Priscilla Oliver, PhD;
- Healthy Homes and Healthy Communities—Sandra Whitehead, MPA;
- Indoor Air—Thomas H. Hatfield, DrPH, REHS, DAAS;

- Injury Prevention—CDR Donald B. Williams, REHS, MPH, DAAS;
- Institutions/Schools—Angelo Bellomo, REHS;
- International—Sylvanus Thompson, PhD, CPHI (Canada);
- Land Use Planning/Design—Steve Konkell, PhD;
- Legal—Bill Marler, JD;
- Management Policy (including Leadership)—Val F. Siebal, REHS/RS, NMT;
- Meteorology/Weather/Global Climate Change—James Speckhart, MS;
- Occupational Health/Safety—Donald Gary Brown, DrPH, CIH, RS;
- Pools/Spas—Colleen Maitoza, REHS;
- Radiation/Radon—R. William Field, PhD, MS;
- Recreational Environmental Health—Tracynda Davis, MPH;
- Risk Assessment—Sharron LaFollette, PhD;
- Sustainability—Tom R. Gonzales, MPH, REHS, and Mark McMillan, MS;
- Technology (including Computers, Software, GIS, and Management Applications)—Darryl Booth, MBA;
- Terrorism/All-Hazards Preparedness—Louis Dooley, RS, MS-EH;
- Vector Control—Zia Siddiqi, PhD;
- Wastewater—Craig Gilbertson, RS;
- Water Pollution Control/Water Quality—Sharon Smith, RS; and
- Workforce Development—Ron de Burger, CPH, CPHI (Canada).



Virtual AEC

NEHA was pleased to again offer the Virtual AEC to attendees and to those who were not able to make it to the AEC in San Diego. With current budget cuts and demanding workloads NEHA understands that it is difficult for some environmental health professionals to get the approval and support to attend events like the AEC. The Virtual AEC provided those individuals with the opportunity to share in the AEC experience right from their office or home desks.

Over 30 educational sessions were recorded live during the AEC in San Diego and virtual attendees were able to view the sessions as they happened and ask questions of the speakers almost as if they were sitting right there in the rooms. Additionally, virtual attendees were able to connect with AEC attendees, speakers, and exhibitors through networking tools available in the Virtual AEC. The Virtual AEC also provided attendees with access to speaker handouts and other materials and the opportunity to earn continuing education credits.

The Virtual AEC was available to those who attended the conference in San Diego—free of charge—as a valuable part of their registration package. Before even getting to San Diego, attendees were able to build their own schedules of training, networking, and advancement opportunities to take advantage of while at the AEC. The Virtual AEC also offered attendees greater flexibility to attend more sessions (and learn more) by being able to access the recorded sessions after the conference at their own convenience. Plus, attendees can go back and continue to review recorded sessions as many times as they would like for a year!

Although the 2012 AEC has ended in San Diego, the Virtual AEC continues to provide access to valuable educational content and networking opportunities. If you were not able to attend in San Diego and have not done so yet, you too can have access to these items by registering for the Virtual AEC. Visit neha2012aec.org to **register today!**

Grants, Partners, and Sponsors

Grants

- » U.S. Food and Drug Administration

Partners

- » Centers for Disease Control and Prevention
- » U.S. Food and Drug Administration
- » The Association of Pool and Spa Professionals
- » Uniformed Services Environmental Health Association
- » State Onsite Regulators Alliance and Captains of Industry
- » California Onsite Wastewater Association

Sponsors

Tier I

- » UL

Tier II

- » Decade Software Company, LLC
- » MindLeaders
- » NSF International
- » Prometric

Tier III

- » American Public University
- » National Restaurant Association

Tier IV

- » U.S. Food and Drug Administration Food Defense Oversight Team
- » Orkin

Tier V

- » HealthSpace USA, Inc.
- » Living Machine Systems
- » Mycometer, Inc.
- » San Jamar
- » Sweeps Software, Inc.

Honorable Mention

- » American Academy of Sanitarians
- » Center for Environmental Research & Technology, Inc.

POLICY INVOLVEMENT

Board of Directors Meeting Highlights

NEHA's board of directors meets four times a year. One meeting is always held at the AEC. Highlights from this year's board meeting include the following.

1. Executive Director Nelson Fabian explained the process for selecting an individual to fill the now-vacant Region 8 vice president position. NEHA will mail a letter to all NEHA members of that region (Delaware; Maryland; Pennsylvania; Virginia; Washington, DC; West Virginia; and members of the U.S. armed forces residing outside the U.S.). Each NEHA member will be invited to prepare nominations material on their behalf. By the time of the board's October meeting, an appointment will be made. The term of the appointment will run through June 2015.

2. AEC guests: The AEC board meeting is the only meeting in which guests are allowed to speak to the board about various topics. This year, the board welcomed guests from the National Association of County and City Health Officials (NACCHO) and NSF.

David Dyjack from NACCHO shared with the board that while water quality is an important issue from an environmental health perspective, water *quantity* is an emerging concern. He gave the example of how the Colorado River passes through seven states and Mexico before it dries out in the Sea of Cortez. Dr. Dyjack also indicated that the key message he wished to convey on behalf of NACCHO and its executive director is that NACCHO seeks to work with NEHA on multiple projects.

Stan Hazan of NSF and Dick Rabbideau, chairman of the NSF board, addressed the NEHA board of directors. Mr. Rabbideau stated that his principal message from the perspective of his board was the desire to continue and expand the relationship that NSF has with NEHA. Mr. Hazan explained that NSF has over 1,200 employees with offices in 20 countries. He added the NSF's mission for quality public health is the primary reason why NSF is so invested in NEHA, since NEHA is a natural partner in that mission. He added that NSF continues to develop standards and



NEHA's leadership provided Town Hall Assembly attendees with a status of the association. Attendees were also able to take the floor to ask questions of or make comments to NEHA's leadership.

more in the area of food safety, which is an important aspect of NEHA's future.

3. AEC & Exhibition Topics

- a. Executive Director Fabian reported that the 2012 AEC in San Diego was the best attended AEC in four years.

- b. Executive Director Fabian indicated that the board's selection of Las Vegas for the NEHA 2014 AEC was well received in Vilnius, Lithuania, by the International Federation of Environmental Health (IFEH) members. NEHA will host the IFEH Congress at the 2014 AEC and expects over 200 attendees from around the world.

- c. Executive Director Fabian informed board members about the separate Center for Priority Based Budgeting (CPBB) conference occurring at the Omni Hotel. While a much smaller conference than the AEC, the CPBB conference focused on local government decision makers and financial planners. He added that CPBB has worked out arrangements to develop two apps that will be supported only by the CPBB's platform. He explained that the International City/County Management Association has been so impressed with CPBB that it has offered to cosponsor an event in Washington, DC, at the 2013 AEC.

4. The board reviewed the work of a subcommittee chaired by Regional Vice President (RVP) John Steward. The subcommittee collaborated to develop updated definitions of environmental health and environmental health professional. RVP Steward asked board members to submit their feedback to him and he plans to hold additional meetings with the subcommittee. RVP Steward indicated that he would

present a finalized set of definitions to the board at its October meeting for approval.

5. Report on IFEH Vilnius, Lithuania, meeting: President Mel Knight explained how impressed he was by the IFEH conference participants and the level of commitment to IFEH that was evident. Executive Director Fabian explained that the most interesting aspect of the trip was to learn how environmental health in other countries is being impacted by the global economic situation.

6. Environmental health postage stamp: Guest Ben Gale explained the process required for the U.S. Postal Service to approve a new postage stamp. The board approved a resolution supporting the development of a national campaign to petition the Citizen's Stamp Advisory Committee of the U.S. Postal Service to develop, approve, and issue a commemorative stamp honoring the environmental health profession.

7. New NEHA awards: RVP David Ludwig provided additional details on the administration of the two new NEHA awards—the Environmental Innovation Award and the Education Contribution Award—inviting additional input from board members.

Town Hall Assembly

For a second year in a row, the Town Hall Assembly was well attended. Attendees were treated to breakfast, which was generously sponsored by the National Restaurant Association. NEHA President Mel Knight called the meeting to order and David Crownover from the National Restaurant Association provided a welcome. President Knight gave a report on the status of the association over the past year, which highlighted many of the activities NEHA has been engaged in, as well as future directions. NEHA's election process and results from the 2012 election were shared. Furthermore, nominations from the floor for second vice president were opened up and no nominations were given. The only candidate for the second vice president position is current RVP David Riggs. A special presentation from Managing Director Larry Marcum was given on the status of NEHA's grants, contracts, and government affairs program. The floor was then opened up to any member comments and President Knight closed the meeting by thanking all for attending.

NETWORKING

Exhibition

The exhibition is a key event held at the AEC each year because it provides a prime networking opportunity for professionals to connect with exhibitors who can provide the products, services, and knowledge needed for environmental health professionals and their organizations to continue to improve their programs and operations. This year's exhibition provided a lively, face-to-face interaction between attendees and nearly 80 exhibitors.

Winning is always fun, and this year we had some fun door prizes to give away during the exhibition. Jason Boothe was the winner of a waterproof camcorder, perfect for sightseeing in San Diego! Adrienne Palmer was the lucky winner of the Kindle e-Reader, generously donated by Decade Software Company, LLC. And Bjorn Listerud won a fantastic TomTom navigation device. Many thanks to our door prize sponsors for their generous contributions!



One-on-one time with exhibitors gave attendees an amazing opportunity to interact and learn about relevant products and services from nearly 80 different exhibitors.



The exhibition floor was packed with attendees excited to reconnect with old friends, meet new professionals, network, and survey all each exhibitor had to offer.

Silent Auction

This year's Silent Auction was another success! Sixty-one items made their way to the tables from our very generous NEHA members, affiliates, exhibitors, and sponsors. The \$2,880 that was raised from this event will go to NEHA's 2013 AEC speaker fund.

A sampling of this year's items includes the following.

- Swarovski crystalline pen with USB memory key
- U.S. flag flown over U.S. Capitol Building
- Gift cards for Munson's Chocolates, Cabela's, Best Buy, Taste of Chicago, and Fiesta de Reyes in Old Town San Diego
- Gift baskets from Alabama, California, Hawaii, Minnesota, Missouri, New Jersey, Oklahoma, Salcor Inc., StateFoodSafety.com, and Texas
- Grand Canyon and *Ranches of Colorado* books
- *100 Years, 100 Chefs, & 100 Recipes* cookbook and a Chef John Folse autographed Louisiana seafood cookbook
- Black and white framed scenic photograph
- Salem, Massachusetts, sweatshirts
- Famous environmental health "Top Ten" t-shirt

Perhaps the most interesting items were two sets of Queen Elizabeth's Diamond Jubilee plates, book, and miniature British flag.

NEHA and NEHA staff also donated Silent Auction items. In addition to donating NEHA shirts, a 2013 AEC registration and four hotel nights in Washington, DC, were donated, which ended up being the highest bid item. NEHA staff contributed an iHome Bluetooth keyboard case for iPad 2, beaded jewelry, and the famous NEHA Inspector Spock/Sam O'Day autographed red shirt. In addition, 16 pieces of fashion jewelry were donated by NEHA during a Silent Auction fundraiser held in the Denver office in April. NEHA received several free pieces when staff purchased jewelry from a catalog—and as a bonus, NEHA's board of directors contributed to the orders. Thanks again to NEHA's board! The total amount received from the Silent Auction for the jewelry was \$485.

NEHA thanks the generous donors and attendees who helped to make this year's Silent Auction a success!



A long table displayed the amazing items ready to be won in the Silent Auction.

Silent Auction Donators

NEHA Affiliates: Alabama, Arizona, California, Colorado, Connecticut, Hawaii, Illinois, Indiana, Iowa, Louisiana, Minnesota, Missouri, National Capitol Area, Nebraska, New Jersey, Oklahoma, Texas, and Wyoming

- | | |
|-----------------------------------|---------------------|
| Brian Collins | NSF International |
| Alicia Enriquez | Terry Osner |
| Fiesta de Reyes | Salcor Inc. |
| Keith Johnson | StateFoodSafety.com |
| Roy Kroeger | John Steward |
| Sandra Long | UL |
| David Ludwig | Shelly Wallingford |
| Rick Miklich | Alan Whyman |
| NEHA board of directors and staff | Peter Wright |

Exhibitors

AbTech Industries, Inc.
www.abtechindustries.com

Advanced Drainage Systems, Inc.
www.ads-pipe.com

American Academy of Sanitarians
www.sanitarians.org

American Public University
www.studyatapu.com/NEHA

Anua
www.anua-us.com

Association of Environmental Health Academic Programs
www.aehap.org

Association of Professional Piercers
www.safepiercing.org

Atlantic Mills – ITW
www.atlanticmills.com

Bio-Microbics
www.biomicrobics.com

California Conference of Directors of Environmental Health
www.ccdeh.com

California Environmental Health Association 2013 AES
www.ceha.org

California Onsite Wastewater Association
www.cowa.org

CAMBRO
www.cambro.com

CDC NCEH/ATSDR
www.cdc.gov

CDP, Inc
www.cdpehs.com

Chicopee
www.chicopeeproducts.com

Clarke
www.clarke.com

Columbia Southern University

Cooper-Atkins Corporation
www.cooper-atkins.com

Decade Software Company, LLC
www.decadesoftware.com

DeltaTRAK
www.deltatruk.com

Department of Veteran Affairs

Dynasil Products
www.dynasilproducts.com

Eljen Corporation
www.eljen.com

Environment One Corporation
www.eone.com

FastTrackGov
www.mitchellhumphrey.com

FDA/Center for Food Safety and Applied Nutrition
www.fda.hhs.gov

First Water Systems, Inc.
www.firstwaterinc.com

F.R. Mahony & Associates, Inc.
www.frmahony.com

Garrison Enterprises, Inc.
www.garrisonenterprises.com

Glo Germ Company
www.glogerm.com

Global Food Protection Institute
www.gfpi.org

HealthSpace USA, Inc.
www.healthspace.com

iGov Data Solutions
www.igovdata.com

Intertek
www.intertek.com

Jet, Inc.
www.jetincorp.com

Lamotte Company
www.lamotte.com

Living Machine Systems
www.livingmachines.com

LongJump
www.longjump.com

MindLeaders
www.mindleaders.com

Mycometer, Inc.
www.mycometer.com

NACCHO Advanced Practice Centers
www.apc.naccho.org

National Center for Biomedical Research and Training (NCBRT)
www.ncbrt.lsu.edu

National Environmental Health Association
www.neha.org

National Everclean Services
www.evercleanservices.com

National Library of Medicine
www.nlm.nih.gov

National Pasteurized Eggs, Inc.
www.safeeggs.com

National Swimming Pool Foundation
www.nspf.org

NSF International
www.nsf.org

OnlineRME
www.onlinerme.com

Ozark River Portable Sinks
www.ozarkriver.com

Palintest
www.palintestusa.com

Paster Training, Inc.
www.pastertraining.com

PICS, Inc.
www.picsauditing.com

Presby Environmental, Inc.
www.presbyenvironmental.com

Prometric
www.prometric.com

RGF Environmental Group
www.rgfairpurification.com

RMSYS, Inc.
www.rmsyscontrols.com

Salcor, Inc.

San Jamar Chef Revival
www.sjcr.com

ServSafe
www.restaurant.org

StateFoodSafety.com™
www.StateFoodSafety.com

State Onsite Regulators Alliance and Captains of Industry®
www.nesc.wvu.edu/sora

Sure Aqua Corporation
www.sureaqua.com

Sweeps Software, Inc.
www.sweepsoftware.com

The University of Findlay
www.findlay.edu

ThermoWorks, Inc.
www.thermoworks.com

TrackAssist-Online
www.yaharasoftware.com

UL
www.ul.com

U.S. EPA, Indoor Environments

U.S. EPA, Memorandum of Understanding Coalition

U.S. EPA, Office of Wastewater Management

U.S. Navy Recruiting Command
www.navy.com

USDA Food Safety and Inspection Service
www.fsis.usda.gov

National Environmental Health Association (NEHA) Annual Educational Conference (AEC) & Exhibition

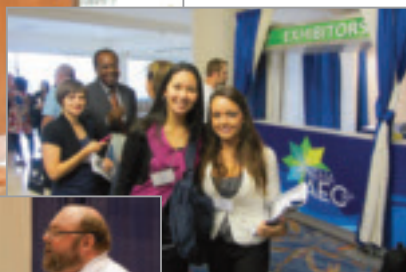
Do Business Here! Visit neha2013aec.org for information.
Connect with environmental health professionals needing your products and services: exhibit, sponsor, and/or advertise at the NEHA 2013 AEC & Exhibition.



NETWORKING



The President's Banquet closed the AEC with the traditional passing of NEHA's presidency from Mel Knight (left) to Brian Collins (right).



The AEC was packed with many opportunities to network with fellow attendees—be it at the Ice Breaker, Networking Luncheon, Exhibition, Student Mentoring Program, the various meetings and focus groups, or in the hotel hallways!

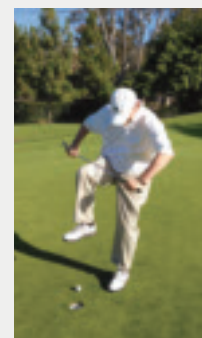
Annual UL Event



At the Annual UL Event, attendees explored a floating city at sea and relived nearly 50 years of world history aboard the longest-serving Navy aircraft carrier of the 20th century while visiting the USS Midway Museum. The event featured an enjoyable tour of the historic aircraft carrier, a delicious catered dinner on the hangar deck, and other entertaining features such as private access to the flight deck, which made for some breathtaking views of the sun setting over the ocean!



Golf Tournament Highlights



The beautiful golf course at Riverwalk Golf Club was the venue for this year's Golf Tournament. Formerly known as the Stardust Country Club, the course entertained a myriad of golf's legends while hosting the PGA tour during the '50s and '60s. Six attendees took on the challenge of this course that featured undulating fairways, waterfalls, and well-protected bent grass greens.

NEHA 2012 AEC photos by Spencer Cross, Nelson Fabian, and Roy Kroeger.

MOTIVATION *and* INSPIRATION

Keynote

NEHA's selection of the keynote speaker is always intentional. This year, NEHA sought out an individual to explore what the future world of work—and a profession like environmental health—would look like. NEHA was pleased to have Thomas Frey, Google's top-rated futurist and author of *Communicating with the Future: How Re-engineering Intentions Will Alter the Master Code of Our Future*, as the 2012 keynote speaker.

Frey devoted a great deal of his presentation to depicting what the future is likely to look like. He gave context to his presentation by focusing on the dramatic explosion of both information and technology advances. It was against this background of overwhelming amounts of information and un-understandable advances in technology that he then directed his attention to the environmental health profession. He observed that our culture has long held the belief that we each have a personal responsibility to safeguard our lives and that we do that by checking things out before we buy them, eat them, use them, etc. This perspective fits nicely into the phrase we are all familiar with—"buyer beware."

In the world of today, however, it has become quite challenging for the lay public to draw out trustworthy facts from reams of contradictory information. This has made it increasingly difficult for the average person to exercise appropriate caution and make decisions that are in one's health interests. Therefore, professions like environmental health have become increasingly important as it is now being looked to as the trusted authority for informing and even protecting people in ways that they can no longer do themselves.

Frey's message spoke quite directly to the importance of environmental health in a future that is becoming more and more characterized by excessive information and technological advances that can be both helpful and harmful.

Awards & Honors

Walter S. Mangold Award

For only the sixth time since 1956, no one received NEHA's highest honor, the Walter S. Mangold Award, as no nominations were sub-



Senior Futurist Thomas Frey engaged attendees during the keynote session with his fascinating depiction of the future and the dramatic explosion of information and technology advances.

mitted. NEHA encourages all members to consider nominating an individual who exemplifies the dedication and commitment to environmental health and the profession that is honored through this award. Nomination information can be found at neha.org/about/awardinfo.html.

Certificates of Merit

Certificates of Merit are awarded to affiliate members who make exemplary contributions to the profession of environmental health. Each affiliate sets its own criteria for recognition, so recipients do not need to be NEHA members. For 2012, the following winners were announced.

- Jamaica—Pauline Ellington
- Louisiana—Henry Graham
- Michigan—Alan Hauck, RS
- New Jersey—Paschal Nwako
- Uniformed Services—LCDR Katie Noonan Hubbard
- Wyoming—Stephanie Styvar

A. Harry Bliss Editor's Award

Thomas H. Hatfield, DrPH, REHS, DAAS

Dr. A. Harry Bliss was editor of the *Journal of Environmental Health* in 1969, the year this award was first presented. When he retired, the award was named after him to honor his 40 years of involvement in *Journal* production. NEHA often gives this annual award to outstanding writers and columnists, but the award may also go to individuals who, through other significant contributions made to the

Journal, advance the cause and interests of both the association and the profession.

This year, NEHA is delighted to announce that the 2012 recipient of the A. Harry Bliss Award is Dr. Thomas H. Hatfield. Dr. Hatfield has been a long-time contributor to the *Journal* as an author and peer reviewer. He has been named the recipient of this award before. He is again being given this honor for the dedication and hard work he has shown this past year as one of the *Journal's* newly appointed technical editors. Dr. Hatfield selflessly volunteered his time last fall to assist the *Journal* in getting through a backlog of manuscripts and continues to serve in this capacity as part of the *Journal's* technical editor team. His reviews and publication decisions are based upon his vast expertise in the field of environmental health and science and are thoughtful and well reasoned. Dr. Hatfield is a professor and chair of the Department of Environmental and Occupational Health at California State University, Northridge. Dr. Hatfield's technical editor work has ensured that quality material that is relevant, diverse in topic, and purposeful appears in the *Journal*. Dr. Hatfield is truly deserving of this award, as he is a tremendous asset to the *Journal* department.

NEHA/AAS Scholarship Awards

NEHA supports students in many ways. One way involves financial tuition support through



NEHA President Mel Knight (right) presents Bryce Larsen (left) with the prestigious Crumbine Award. Larsen accepted the award on behalf of the Salt Lake Valley Health Department.



Colleen Maitoza accepts the Dr. Neil Lowry Award from Ken Jenke on behalf of the Sacramento County Environmental Management Department.



Dr. David Gilke (far left) and CAPT Michael Herring (far right) stand with the proud winners of the Student Research Presentation awards.

a special scholarship program that is cosponsored by NEHA and the American Academy of Sanitarians (AAS). A special scholarship committee chaired by NEHA Past President Jim Balsamo manages the scholarship program. The following scholarships were presented on behalf of the committee:

- \$2,000 graduate scholarship to Ryan A. Lester from the University of Kansas
- \$1,000 undergraduate scholarship to Jessica K. Roff from Ohio University
- \$1,000 undergraduate scholarship to Heather Noelle Schmidt from Dickinson State University
- \$1,000 undergraduate scholarship to Rosalie M. Peterson from Dickinson State University

Walter F. Snyder Award

Harry E. Grenawitzke, RS, MPH, DAAS

NSF International and NEHA honored Harry E. Grenawitzke with the 2012 Walter F. Snyder Award. This award is given in honor of NSF's cofounder and first executive director, and it recognizes outstanding contributions to public health and the environment. Please see the accompanying story on page 70, which details Mr. Grenawitzke's career and contributions to the profession.

Sabbatical Exchange Award

Dhitinut Ratnapradipa, PhD, MCHES

NEHA offers a wide-ranging opportunity for professional growth and the exchange of valuable information on the international level through its longtime Sabbatical Exchange Program. The recipient of this award may go either to England, in cooperation with the Chartered Institutes of Environmental Health, or to Canada, in cooperation with the Canadian Institute of Public Health Inspectors. Underwriters Laboratories, Inc. (UL) currently sponsors the sabbatical.

The award jury this year decided that the sabbatical award should be given to Dhitinut

Ratnapradipa, assistant professor in the Department of Health Education and Recreation at Southern Illinois University. Dr. Ratnapradipa will be conducting his sabbatical in England. He will be studying environmental health impacts of climate change, focusing specifically on risk communication. He also hopes to give a series of lectures while there.

Excellence in Sustainability Award

Now in its fifth year, the Excellence in Sustainability Award, which reflects NEHA's commitment to the promotion and practice of sustainability, is drawing an outstanding list of applicants from across the county. This year, the sustainability committee has chosen an exemplary program that "shows the way" for communities across the country.

The Atlanta Regional Commission's (ARC) Green Communities Program is the recipient of the 2012 NEHA Excellence in Sustainability Award. The ARC Green Communities Program is a technical assistance and voluntary certification program for jurisdictions in the ARC 10-county planning area. The program is intended to foster greater environmental stewardship in metro Atlanta by providing technical assistance to local governments and recognizing those communities that invest in programs leading to a more sustainable region. Since its official kickoff in 2009, 16 local governments in the region have been certified as Green Communities and are making great strides towards reducing their impact on the environment. In addition, several other state-level sustainability certification programs across the U.S. have been modeled after ARC's Green Communities program.

UL generously sponsored an award memento and a \$500 honorarium to the winners of this year's award.

Dr. Neil Lowry Memorial Award

The Dr. Neil Lowry Memorial Award honors and recognizes public health officials who

have made outstanding contributions to advance the public's healthy and safe use of recreational water. The award is given by the Association of Pool and Spa Professionals (APSP) in memory of Dr. Lowry, a long-time member of APSP, who influenced the pool and spa industry for over 25 years as a consultant to government and private industry. The award was presented to the Sacramento County Environmental Management Department. Colleen Maitoza, supervising environmental specialist, accepted the award for the department. The Sacramento County Environmental Management Department plans to use the award to provide more workshops for operators and service companies to continue reduction of major violations; create brochures and flyers to support their educational offerings; and develop and fund a survey to identify deficiencies in knowledge, and then tailor training based on results.

Student Research Presentations

Every year, the Association of Environmental Health Academic Programs (AEHAP) and CDC's National Center for Environmental Health (NCEH) sponsor and financially support undergraduate and graduate student research presentations. Thanks to a generous donation from NCEH, six students and their faculty mentors had the opportunity to present their research at the AEC.

Presenting the student research awards were CAPT Michael Herring of the U.S. Public Health Service/CDC/NCEH and Dr. David Gilkey from Colorado State University. Each student participant listed below received a \$500 award, a plaque, and a stipend of up to \$1,000 to cover travel and research expenses.

An Evaluative Study of Lead Exposure Sources

Thomas Powell, Undergraduate Student, West Chester University, West Chester, PA
Faculty Mentor: Dr. Charles V. Shorten, PE

continued on page 71



2012 Walter F. Snyder Award Recipient

Harry E. Grenawitzke, RS, MPH, DAAS

NSF International and NEHA presented the prestigious Walter F. Snyder Award to Harry E. Grenawitzke, RS, MPH, DAAS, at the 2012 AEC in San Diego. This award, given in honor of NSF International's cofounder and first executive director Walter F. Snyder, is presented annually in recognition of outstanding contributions to the advancement of environmental health.

Grenawitzke was honored for his more than 40 years of significant and lasting contributions to the fields of public and environmental health at the international, federal, state, and local levels. His expertise and commitment to environmental health led to important roles in several public health organizations, including NEHA, the Michigan Environmental Health Association (MEHA), the Canadian Institute of Public Health Inspectors, the American Academy of Sanitarians, and NSF International's Council of Public Health Consultants. His work in mentoring colleagues and developing innovative programs and standards that protect public health strengthened these organizations and led to lasting improvements in environmental health.

As an active member of NEHA and MEHA since the 1970s, Grenawitzke served as chairman of several committees and was elected president of NEHA in 1989. He was well known for his ability to develop cooperative agreements between international communities and U.S. environmental health professionals, organizing the first cooperative conferences with Canada and England.

Grenawitzke's personable and effective teaching and training skills have played a key role in his career. Starting in 1989, he became an adjunct professor at the University of Michigan School of Public Health. He also worked with university officials to develop the environmental health program at Central Michigan University.

In 1990, Grenawitzke joined public health and safety organization NSF International to manage its auditing and training programs. He served in many leadership roles at NSF, including vice president of Regulatory Affairs and Field Services, a role that truly utilized all of his passion for environmental and public health policy. He also served on the NSF International Council of Public Health Consultants, which advises NSF in the development of standards and environmental health programs.

Grenawitzke's expertise was often sought by international authorities. In 1988 and again in 1991, he joined a team of experts who viewed the

Chernobyl disaster area at the request of Russian officials. After the investigation, Grenawitzke consulted with Russian scientists regarding the environmental health impacts that resulted from the nuclear accident. In 1992–1993, he visited Mexico City to highlight the role harmonized standards could play in the North American Free Trade Agreement.

Since 2003, Grenawitzke has worked as a public health consultant and food safety trainer. He works closely with the U.S. Department of Justice to elevate standards and living conditions at U.S. correctional institutions. He also teaches courses on hazard analysis and critical control point (HACCP), safe quality food, internal auditing, and NSF/ANSI food equipment standards.

Kevan P. Lawlor, NSF International president and CEO, congratulates Grenawitzke on this well-deserved honor: "Harry Grenawitzke's career achievements reflect the principles expressed by Walter F. Snyder and the public health mission of NSF International. His work as a celebrated public health advocate, trainer, and consultant, as well as past work with local, federal, and international environmental health organizations, demonstrate his strong commitment to the promotion of public and environmental health. These accomplishments make him a very worthy recipient of the Walter F. Snyder Award."

Grenawitzke received the 2007 Davis Calvin Wagner Award from the American Academy of Sanitarians and the 2002 Walter S. Mangold Award from NEHA. With the addition of the Walter F. Snyder Award for achievement in the advancement of environmental health, he has earned the triple crown of environmental health awards.

"Harry Grenawitzke is a respected leader in both the public and private sectors of the environmental health field. He is also highly regarded and liked because he has mentored numerous environmental health professionals, helping them to realize their potential. His leadership in developing effective organizations and more responsive programs both in the field and in educational institutions has made his contributions to professional improvement enduring. Harry is an inspiring model of professionalism and for this he is deserving of the Walter F. Snyder Award," said Nelson Fabian, executive director and CEO of NEHA.

continued from page 69

Carbon Monoxide Exposures Associated With the Operation of Recreational Watercraft

Megan Smith, Undergraduate Student, Boise State University, Boise, ID

Faculty Mentor: Dr. Dale Stephenson

Biomethane Production From Corn Stover

Kevin Carling, Undergraduate Student, Illinois State University, Normal, IL

Faculty Mentors: Dr. Guang Jin and Dr. Tom Bierma

Measuring Occurrence of Iodinated Disinfection Byproducts (I-DBPs) in Treated Drinking Water

Nazila Shakibaei, Undergraduate Student, University of Washington, Seattle, WA

Faculty Mentor: Dr. Gretchen Onstad

Determining the Efficacy of an Emerging Water Quality Indicator

Christopher Payne Ray, Graduate Student, Eastern Kentucky University, Corbin, KY

Faculty Mentor: Dr. Gary Brown

Developmental Phytotoxicity of Silver and Zinc Oxide Nanoparticles to the Crop Plants

Lok Pokhrel, Graduate Student, East Tennessee State University, Johnson City, TN

Faculty Mentor: Dr. Phillip Scheuerman

Samuel J. Crumrine Consumer Protection Award

Salt Lake Valley Health Department, Salt Lake City, Utah

The Samuel J. Crumrine Award is a prestigious national award given annually to a local food protection agency that demonstrates excellence and continual improvement in a food protection program. The award is named in honor of Dr. Samuel J. Crumrine, a sanitarian, physician, and public health pioneer who was renowned for his innovative methods of improving public health protection. It is supported by the Conference for Food Protection in cooperation with the American Academy of Sanitarians; the American Public Health Association; the Association of Food & Drug Officials; the Foodservice Packaging Institute, Inc.; the International Association for Food Protection; the National Association of County and City Health Officials; the National Restaurant Association Solutions; NEHA; NSF; and UL.

The award selection jury was impressed with Salt Lake Valley Health Department's work as a pioneer in FDA's Voluntary National Retail Food Regulatory Program Standards, its close collaboration with academia, and state-of-the-art Web site showing inspections, ratings, and the ability to compare establishments. The award-winning application can be found online at fpi.org. Bryce C. Larsen,

manager of the Bureau of Food Protection, accepted the plaque on behalf of Salt Lake Valley Health Department.

Past Presidents Award

Each year, the Past Presidents group, comprised of former NEHA presidents, identifies a hero for the profession who accomplishes much on behalf of environmental health, but who does a lot of work behind the scenes. This year, the presidents identified two, long-time NEHA members and friends who made enormous contributions to our field of practice. They were happy to publicly recognize Joe E. Beck, RS, DAAS, from Eastern Kentucky University, and CAPT Charles S. Otto, III, MPA, RS, CP-FS, from CDC's NCEH.

Presidential Citations

A Presidential Citation is a special award given to individuals who have made exemplary contributions to NEHA during the president's term of office. President Mel Knight presented Presidential Citations to the following individuals.

- | | |
|-----------------|-----------------|
| Debbie Bankston | Martin Kalis |
| Angelo Bellomo | Diane Knight |
| Darryl Booth | Melanie Knight |
| Brian Collins | Mark McMillan |
| Bob Custard | Pam Muse |
| Nelson Fabian | Terry Osner |
| Tom Gonzales | Liz Pozzebon |
| Tom Hatfield | Vince Radke |
| Michael Herring | Henroy Scarlett |
| Scott Holmes | |

Decade Scholarship Awards

Each year, Decade Software Company gives away scholarships to environmental health professionals who might not otherwise be able to attend the AEC. This year, 56 individuals from 43 different health departments applied for 15 Decade Software scholarships. A panel of Decade Software executives along with executives and elected officials of NEHA scored the short-essay responses of the applicants. The essay provided an opportunity for applicants to express their innovative ideas for the industry. Fifteen applicants receive a \$700 scholarship. This year's scholarship winners are listed below.

- | | |
|----------------|------------------|
| Kerry Abdullah | Kelly McCoy |
| Judinea Ablang | Paschal Nwako |
| Wayne Fox | Ruchi Pancholy |
| Jillian Gibbs | Morgan Riley |
| Donald Hwang | Amber Sturdivant |
| Andrea Jordan | Marie Woodin |
| Matthew Krenz | Denise Wright |
| Teresa Lee | |

NEHA Scholarship Awards

NEHA provided 21 full conference registration scholarships to attend the AEC. These scholarships were available to NEHA members working within the field of environmental health. Besides meeting basic qualifications, applicants were asked to explain why they were in need of these scholarships, as well as how they would benefit from attending the AEC. Congratulations to the scholarship recipients listed below.

- | | |
|--------------------------|-------------------------|
| Christina Baghdikian | Misty Joy |
| Veronica Becerra | Eric Khambatta |
| Loree Boyanton | Bilal Korin |
| Eric Bradley | Valerie Lane |
| Everette Brooks, III | Leslie (Les) Miyashiro |
| Jodi Brounstein | Michelle Rhone |
| Patricia Bygrave-Johnson | Art Sheyko |
| Norbert Campbell | Antoinette Stetzenmeyer |
| Steven Hall | Christine Sylvis |
| Evelyn Hoban | Robert Uhrick |
| Kristina Holtz | |

Student AEC Travel Scholarship Fund Recipients and Donors

NEHA received donations through its Student AEC Travel Scholarship Fund to provide five students with travel stipends to attend the AEC. Over \$1,600 was donated this year to this fund. Congratulations to the recipients and thank you to all of the donors!

Scholarship Recipients

- | | |
|-----------------|-----------------|
| Iris Davies | Ruth Fran Slone |
| Iris Quinn | Allison Yee |
| Nicholas Sexton | |

Scholarship Donors

- American Academy of Sanitarians
 American Public University
 Griffith's Safety Group Valerie Lane
 John E. Hiramoto Robert Lynch
 Richard Jager Lisa C. McCormick
 Terri Khoury NEHA Staff
 Mel Knight Kristen Ruby
 Keith L. Krinn Robert Uhrick 🐶



NEHA President Mel Knight (left) and Decade Software Company President Kevin Delaney (right) award an AEC attendee with one of the Decade Scholarships that afforded 15 applicants the opportunity to attend the AEC.

ANNOUNCING THE

77th National Environmental Health Association (NEHA)
Annual Educational Conference (AEC) & Exhibition

July 9-11, 2013 ♦ Washington, DC



neha2013aec.org

The NEHA AEC is the premier event for environmental health training, education, networking, advancement, and more!

NEHA 2013 AEC CALL FOR ABSTRACTS

The National Environmental Health Association presents its
77th Annual Educational Conference & Exhibition
in Washington, DC, July 9-11, 2013.

The NEHA AEC is designed to train, educate, and advance people who have an interest or career in environmental health and protection, as well as to bring people together to build a professional network of environmental health colleagues, exchange information, and discover new and practical solutions to environmental health issues.

AEC Format

Directed and sequenced programming will be presented in simultaneous training and educational tracks. NEHA is seeking abstracts that bring to a national and international audience the latest advances in environmental health, as well as unique responses to environmental health and protection problems. Practical applications in both the public and private sectors should be emphasized along with the latest in proven emerging technologies.

NEHA offers two different types of training and educational sessions at the AEC—the Lecture and the Learning Lab. For Lectures, applications for single or multiple speaker presentations that are educational in nature are being accepted. However, presentations that are more interactive will be given first consideration. For Learning Labs, NEHA is accepting applications for hands-on demonstrations, tabletop exercises, poster presentations, drop-in learning labs, roundtable discussions, and other types of interactive and innovative presentation formats that will help train the attendees.



Ensuring Attendees a Return on Investment

Additionally, the NEHA AEC is being rationalized according to return on investment (ROI) principles. Emphasis will be given to those abstracts that have the potential to impart knowledge to attendees, which enables them to make cost effective program improvements in their workplaces as a result of what they learn by attending the event, and thereby helping to pay for the investment made for their attendance to the NEHA AEC.

Virtual AEC

NEHA continues to offer attendees the opportunity to access the AEC online with a number of educational sessions being streamed as they happen live at the AEC. Thus, abstract submitters should be aware that if accepted, their abstracts and presentations may also be part of the Virtual AEC. Certain presentations on particularly pertinent issues will be selected for live webcasting during the event, and presenters are required to engage with attendees on the Virtual AEC as well.

Submission Process

Individuals and groups involved in all aspects of environmental health and public health are strongly encouraged to participate in this Call for Abstracts. If you have a presentation, please submit your abstract electronically at neha2013aec.org.

**For abstract deadline and submission details,
refer to neha2013aec.org.**

NEHA Radon Resistant New Construction (RRNC) Training

November 27–29, 2012 ■ Washington, DC

Rn

Are you interested in expanding your knowledge and commitment in radon resistant techniques? If so, then this training opportunity is for you!

The National Environmental Health Association (NEHA), in cooperation with U.S. EPA Indoor Environments Division, is sponsoring a 2½ day **all-expenses-paid** training for environmental health (EH) professionals to implement radon resistant new construction (RRNC). **Attendees are expected to serve as NEHA field partners who will be resources for residential construction activities in their community for a minimum of one year.**

The training includes

- technical information on components of RRNC,
- state and local building code processes, and
- risk assessment and risk communication information about the health effects of long-term exposure to elevated levels of radon gas.

Attendees will

- work with U.S. EPA staff, local code officials and builders, other affiliate partners, nationally recognized instructors, and NEHA field partners—past attendees of this training—who have successfully implemented RRNC in their communities;
- learn new skills to increase consumer awareness of radon hazards, build local coalitions, and collaborate with other stakeholders and nonprofit organizations such as Habitat for Humanity and homebuilder associations; and
- assist in developing an action plan with specific and measurable goals for a RRNC program appropriate for their community.

How to Apply

Please e-mail an application to Vanessa De Arman at vdearman@neha.org by **October 15, 2012**. Participants will be notified by October 19, 2012, if selected.

Applications must be on agency letterhead and include

- each attendee name, position title, complete mailing address, phone, fax, and e-mail address;
- community and/or industry partners that will be attending;
- description of current or planned radon activities including partner organizations;
- description of the area to be served, approximate number of new residential construction building permits in the past year, and the radon zone classification, if known;
- information on previous radon or RRNC training; and
- a statement indicating the support of management to undertake this program.

NEHA strongly encourages joint applications from the same community—teaming public/EH professionals with building code, zoning, or planning department officials, and/or interested builders or homebuilder association representatives.



For more information, please contact Vanessa De Arman, Project Coordinator, at vdearman@neha.org or 303.756.9090, ext. 311.

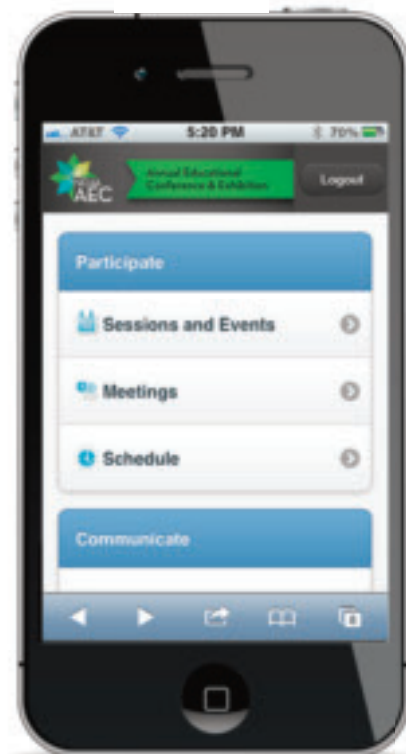
Access Valuable Educational Content from the NEHA 2012 AEC

Though the NEHA 2012 AEC has ended in San Diego, you can still access valuable educational content from this event using the Virtual AEC. The Virtual AEC provides you with:

- An archive of over 30 educational sessions that were recorded live from San Diego, which can now be viewed on demand
- Access to speaker presentations, handouts, and other materials
- The opportunity to earn continuing education credits
- A way to connect to a professional network of environmental health professionals, speakers, and exhibitors that attended the AEC

Whether or not you attended the NEHA 2012 AEC in San Diego, the Virtual AEC serves as an important resource for you to review valuable educational content over and over again, and to continue networking and conversing with other professionals!

Visit neha2012aec.org for more information.



Managing Editor's Desk

continued from page 78

- Model codes for pools (both International Code Council [ICC] and Model Aquatic Health Code)
- Body art
- The built environment
- The budgets of the Centers for Disease Control and Prevention (CDC), National Center for Environmental Health, U.S. Environmental Protection Agency (U.S. EPA), and Food and Drug Administration (FDA)
- Low-risk food sellers in Chicago
- Climate change
- The environmental health role in sustainability
- Childhood lead poisoning and healthy housing
- Preparedness
- Ozone
- Feral cats (under consideration now)
- The relationship between training and certification (under consideration now)
- The development of a U.S. postage stamp to honor environmental health (under consideration now)

The activity of our Government Affairs program has never been more energetic.

Beyond developing policy positions and commenting on legislation and regulations, a lot of our policy work involves participating in committees, coalitions, study groups, etc. The fact is that NEHA is at the table like never before.

As but one example, NEHA populates the highest levels of the committee structure that has been crafted to design the new integrated food safety system in our country.

NEHA has also been deeply involved in the development of the two new pool codes authored by ICC and CDC.

In an effort to make the public at large more aware of our work and our perspective on food safety, we shopped a *Journal* presidential column to the nation's major newspapers. It was gratifying that the *Denver Post* picked it up and published it.

Forty scholarships were funded for this year's AEC.

NEHA has continued to build its working relationships with a host of federal governmental agencies that touch the environmental health issue such as U.S. EPA, CDC (and various centers within CDC), FDA, the Department of Housing and Urban Development, and the Department of Agriculture.

NEHA went to both Jamaica and Lithuania this past year to participate in the meetings of the Jamaica Association of Public Health Inspectors and the International Federation of Environmental Health (IFEH). NEHA's involvement in IFEH has increased and we will host the next IFEH Congress at our AEC in Las Vegas in 2014. Through our involvement in IFEH and a new program that enables environmental health professionals in other nations to connect with NEHA, we look to build multinational efforts on environmental health issues of common concern.

Our grant program has us involved in issues ranging from food-safe schools to indoor air quality to health tracking and climate change to the training of FDA's rapid response teams to healthy housing and even to the future leadership of the profession.

Joining with the American Academy of Sanitarians, NEHA continues to co-fund a substantial scholarship program that helps students in environmental health pay for their college expenses. We were also able to build a small traveling scholarship fund this year to help defray the travel expenses for a half-dozen students to get to the AEC in San Diego.

We also helped students through an increasingly popular mentoring program at the AEC.

Our credentialing program continues to grow. In addition to our credentials for Registered Environmental Health Specialist/Registered Sanitarian, Food Safety, Housing, Environmental Health Technicians, Radon, and Onsite Wastewater, an FDA grant is enabling us to build an advanced food safety credential (inclusive of food manufacturing) and a credential for food safety auditors.

We are also in the early stages of building a registry that would store information on all people who have food safety credentials. As an example of how this could be used, employers would be able to find qualified people for positions they need to fill.

Our conference planning work continues to be in step with trends in the industry. We work to make our AECs green; we offer a virtual option for people who can't be present; we feature a community service event; we work to develop education that offers a return on investment; and we design education to be interactive and therefore attractive to younger professionals.

We're also putting the finishing touches on a special arrangement with Decade Software

that will give us our first real co-branding program. We will work with Decade to advance the IT sophistication of environmental health programs around the nation.

One of our most innovative initiatives is our Center for Priority Based Budgeting. This program enables us to see what the drivers in municipal budgeting are. More importantly, we are learning how to position environmental health so that it becomes clearer that our work supports the priorities that local policy makers are funding.

This program ties in very tightly to my earlier comments about what NEHA's work stands for. We are working to create an understanding among policy makers that environmental health is embedded in their priorities. We're hopeful that that awareness will pave the way for heightened levels of political and funding support.

We've created two new awards: one for a model pool program and another that would recognize innovation in our field.

Remember when I said that we were looking for ways to increase capacity in environmental health? The new award in innovation is a part of that effort as we are seeking to recognize and publicize effective examples of where environmental health has broken from tradition to do more with less.

We also succeeded in getting the International City/County Management Association to publish a paper we wrote on the role of environmental health in community sustainability programs. We want the tens of thousands of city and county managers to know that environmental health professionals can help them realize their sustainability goals.

And all this is in addition to simply maintaining and building our standard programs including the *Journal*, AEC, credentials, E-News, and customer service.

Finally, a report of this nature needs to touch on the health of NEHA itself.

It was only four short years ago that our association lost almost \$200,000 as our members were forced to cut back on their NEHA memberships and purchases.

Adjustments followed. So too did three straight years of budget surpluses. We fully expect this to be our fourth straight budget surplus year. Our overall fund balance has now climbed to well over \$1 million.

Two months ago, our auditors gave us a glowing audit report. They also complimented

us on our ability to be creative when other associations seem frozen in their tracks, afraid to try anything new.

The staff is steady and the staff capability continues to grow. Our products and services continue to both improve and expand.

The mood of the membership is good—we truly receive very few complaints—perhaps in part because we continue to employ a real live receptionist who actually answers calls with a real live voice!

And our reputation is excellent—as evidenced by the growing number of invitations we receive to participate in an array of different initiatives, committees, policy undertakings, etc.

NEHA is in a good place. Moreover, our prospects for being able to continue our work

for the betterment of this profession and all who are employed within it remain excellent.

This encouraging report is not dismissive of challenges that lie in front of us. We have struggled to install our new association management software, which in turn has delayed our ability to offer tiered memberships and an e-journal. Finding qualified people for open positions is a constant challenge. As the federal budget ratchets down, we worry about the level of grant funding that will be available to us.

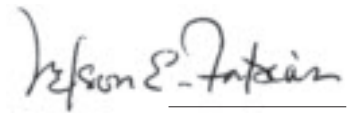
All of us are only one terrorist event away from a whole different psychology that could have significant consequences for our organization.

And if the financial doldrums that plague environmental health programs today don't

clear up sometime soon, further adjustments may become necessary as NEHA depends to an appreciable extent on the ability of this profession to support their professional society.

Finally, we continue to look for ways to build the attendance of the AEC, even as the environmental health community continues to shrink.

I sincerely hope that this report gives you a good feeling about the organization you support and what we are doing to improve our profession, its impact, and its practitioners. That's the NEHA story, which your membership makes possible. Thank you. 🐼



nfabian@neha.org

NEHA NEWS



Staff Profile: Soni Fink

I am a Colorado native and enjoy music, sunshine, and the Rocky Mountains. I received my bachelor's degree in marketing from Regis University in Denver. My expertise is in business development and I enjoy assisting my clients obtain maximum visibility in front of their desired audience. I have worked for other associations and was very successful

helping them increase membership and in assisting their members to obtain positive marketing results.

My position at NEHA is strategic sales coordinator. A fair amount of my time is dedicated to helping businesses and organizations become NEHA members and advertise in the *Journal of Environmental Health*, in the NEHA E-News, and on the NEHA Web site, as well as provide

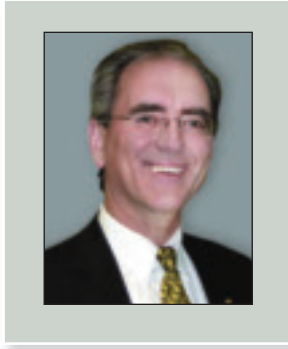
them with exhibiting and sponsorship opportunities at NEHA's Annual Educational Conference & Exhibition to increase their visibility to environmental health professionals. The other part of my energy is spent informing people about the exciting food safety training materials that NEHA has available. I offer individuals and companies the opportunity to make communities safer and help decrease foodborne illness through the use of NEHA's comprehensive and cost-effective materials. If you contact me I will help select the food safety training materials to train your food handlers and food managers to ensure less critical violations at your food establishment.

I look forward to working with NEHA members and prospective businesses and organizations to assist them to achieve their goals and increase their business. Please give me a call or e-mail me if I can help you in any way. My passion is to help you. I can be reached at sfink@neha.org or 303-756-9090, ext. 314. 🐼

Did You Know?

NEHA recently posted two new position papers on cottage foods and the recognition and reaffirmation of the public health importance of community water fluoridation. NEHA has a responsibility to speak up on issues of concern to its members and one way of doing that involves adopting positions. By publishing these positions, NEHA strives to keep you informed about where it stands as an association on issues critical to environmental health. These papers can be found at www.neha.org/position_papers/index.shtml.

▶ MANAGING EDITOR'S DESK



Nelson Fabian, MS

At the NEHA Annual Educational Conference (AEC) & Exhibition each year, we report on the state of your association. Because it is only right that all members know how their association is doing, I will present here a condensed version of the presentation that we made at the AEC.

The association is doing well, despite the hardships that many environmental health programs are enduring these days. It is difficult to be financially viable when the major market for NEHA products and services is under so much stress. Nonetheless, we have found ways to succeed despite this business environment and

- we haven't raised dues;
- we haven't laid off, furloughed, or otherwise cut back on either staff or staff benefits;
- we haven't materially changed our AEC or credentialing fees; and
- we haven't cut back on programs and services; in fact, we've increased them!

That NEHA could be financially stable and actually increase its services when the people we depend on to buy our products and services have had their buying power curtailed says a lot about how NEHA's leaders have managed and governed your association during these challenging times for environmental health.

To get a sense for the bigger picture, it is important to acknowledge that if an organization is to be legitimate, it has to mean something. It has to exist and function to advance some constructive change that aims to improve the conditions of life for its customers, clients, shareholders, and citizens. If an organization exists only to keep busy or perpetuate itself, it isn't contributing to any

State of the Association

...if an organization is to be legitimate, it has to mean something.

cause greater than itself. Attaching to a larger cause is what makes an organization's existence meaningful and legitimate.

So what then does our work aspire to mean?

The answer to that question emerges from the condition of our practice today. The impact of the great recession and its aftermath on local environmental health programs in particular have been daunting. Since 2008, public health has lost 52,000 jobs. This trend shows no signs of abating as just last year, some 55% of all local health departments executed cutbacks in at least one program. All too often, environmental health ends up being one of those programs affected. And yet public expectations for our work are, if anything, increasing.

The challenge then becomes—how can we maintain capacity even as our numbers decline? Moreover, how can we open up opportunities for those who practice environmental health so that these wonderful people who have a passion for this special work may continue to enjoy fulfilling and fairly compensated careers?

Much of what NEHA is getting involved in is driven by our quest to find acceptable answers to questions like these. Our focus on these concerns gives our work and our organization meaning and legitimacy that far transcend any accomplishment that benefits only NEHA.

Over this past year, for example, we have been exploring the enabling power of IT and how it can be used to maintain—if not increase—our capacities. We have also been pushing hard to bring environmental health into play in such topical and contemporary issues as health effects of global climate change, healthy communities, sustainability, and healthful built environments. In addition, NEHA has been vigorously constructing bridges to local policy makers to enable us to demonstrate the importance of environmental health to the priorities that policy makers are willing to fund.

In short and as never before, NEHA is preoccupied these days with the future and in building for this profession a strong, rich, and rewarding role for the cause and outcomes of environmental health, whatever the new normals happen to be. That's the meaning behind the ambitious NEHA agenda that we follow and why we believe that this organization has a valid claim on legitimacy.

As for NEHA's activities, what follows is a representative listing of our diverse work. We have developed (or are studying) positions on

- Fluoridation of drinking water
- The Clean Air Act
- Cottage foods
- Swimming pool legislation

continued on page 76



Get there faster!

No matter where you're going, when you use solutions from Decade Software you're headed in the right direction. That's because we help you manage your data with workflows and features purpose-built for your agency.

- Organize your information with a single, powerful data management solution.
- Connect everyone in your department—and your organization—with access to the material they need to do their job.
- Streamline workflows so that busy people touch only what's relevant to their duties.
- Manage your agency's workload with detailed task and status reporting.

We know that every program tracks and uses data in different ways. We've made it easy to manage functions and information unique to each program's needs. Put it all together and you gain critical efficiencies that improve accuracy and save you time.



www.decadesoftware.com

For all the details and to schedule a demo,
visit us online or call
800.372.3632

Learn more about TrainCon, Decade's annual training conference! For details visit decadesoftware.com

Last year Angie Clark did **700** routine inspections, **200** complaint inspections, **100** Court dates and logged **3,000** travel miles and quite possibly prevented dozens of illnesses.



She doesn't take chances. The communities she serves depend on her to do more inspections under an increasingly difficult work load and conditions. As a true professional, she demands the most from her tools and equipment.

That's why she is never without her tablet computer and HealthSpace EnviroIntel Manager.

In the office or on the road she always has the information she needs for maximum productivity and accuracy. Facilities are never missed and high hazard establishment inspections are never late.

When Angie makes a call, her work is available to the department and the public within minutes.



HEALTHSPACE
HARMONIZED INTELLIGENCE

HealthSpace EnviroIntel Manager provides the busy professional with Intelligence and the ability to get more done with less work.

HealthSpace provides data and communication management systems for Environmental and Public Health organizations across North America. HealthSpace EnviroIntel Manager is a proprietary system with design architecture that makes it easy to configure to meet the needs of the organization.

For more information please visit us at:

www.healthspace.com

Angie Clark is a fictitious character, however, the numbers shown above are taken from actual activity generated by inspectors recorded in HealthSpace EnviroIntel.